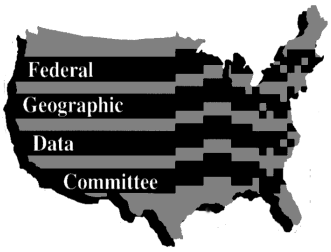


Federal Geographic Data Committee

February 10, 2000

Financing the NSDI: National Spatial Data Infrastructure

The report "Financing the NSDI: National Spatial Data Infrastructure" was prepared for the Federal Geographic Data Committee (**FGDC**) to research alternative mechanisms and options for securing financial resources for spatial data activities. The report has been delivered to the FGDC by Urban Logic.

This report represents a significant accomplishment as a resource for use in considering a wide array of potential opportunities to align or leverage resources and investments for spatial data activities in support of the NSDI. The FGDC intends to use the report in support of ongoing activities to find additional ways of developing resources and providing incentives for NSDI actions.

The FGDC is in the process of considering the Report's recommendations and will formulate actions to capitalize on the results of this groundbreaking research and the ideas that it stimulates.

Urban Logic, Inc.
A Non-Profit Organization helping
Communities use Technology Better

Draft Dated: 2/15/00 8:17 PM

Pre-Print Version. Please report errors, corrections or suggestions to the author. Bruce Cahan (bcahan@urbanlogic.org).

Financing the NSDI: National Spatial Data Infrastructure

Aligning Federal and Non-Federal Investments in Spatial Data, Decision Support and Information Resources

(Revision 2.0 for Public Comment)

This Report is the result of research conducted by Urban Logic, Inc., for the Federal Geographic Data Committee, pursuant to Cooperative Agreement #98HQAG2193 with the U.S. Department of the Interior - U.S. Geologic Survey.

Disclaimer of Warranties and Other Conditions of Use

No copyright or other intellectual property interest is claimed by the author in any brand name, copyrighted work, registered mark, service mark, trademark or trade style referenced herein which are owned by or licensed to any third party, each of which shall be and remain the property of the respective lawful owner or licensee thereof. Such references are solely for the educational and research purpose of improving the reader's understanding of the concepts described herein (including, without limitation, the importance to NSDI diffusion of brand identification and uniformity), and in no way express or imply the review or approval by such owners or licensees of this Report or any part thereof.

Subject to the aforesaid acknowledgement of third-party copyright and other intellectual property rights, the statements, findings, conclusions and recommendations are those of the author, and do not necessarily reflect the views of the U.S. Department of the Interior, the Federal Geographic Data Committee or any other Agency or official of the Federal government.

All items in this Report of a financial or legal nature are not intended to be specific or general advice in connection with any actual or potential dispute, problem, question, situation or strategy. Urban Logic, Inc. hereby notifies anyone reading this Report who seeks finance or legal information to consider obtaining independent professional financial or legal advice, as the case may be, that addresses the specific situation the person or the organization is encountering. Urban Logic, Inc. disclaims any liability for such misuse of this Report, and is not and does not make any representation or warranty as to the accuracy, up-to-date status, validity or applicability of financial or legal references or information referenced or contained in this Report. Any reader that relies on this information without consulting independent professional financial or legal counsel, as the case may be, does so solely at his, her or its own risk.

Table of Contents

Preface & Acknowledgements

This Research continues my work through Urban Logic, Inc. to improve how spatial processing resources are developed and made more accessible at reduced cost. While some may see technical standards as the prime mover of data sharing, I chose to "follow the money" and study the role that capital budgeting and finance processes play in determining the spatial resources that get prototyped, built, enhanced and die.

Given the goals and timing of this Research, I reached out to commercial, financial and government leaders to tap their minds for financial analogies to serve as models for Spatial Data capital formation. Their fresh approaches and seasoned insights added immensely to this Report and are attributed where the source approved.

Several people must be acknowledged for recognizing that the economic aspects of geo-processing decisions need further study, and that a compendium of analogous structures to leverage those economics would further the implementation of the NSDI. Among them, John Moeller, Gene Thorley and Kathy Covert of FGDC: Federal Geographic Data Committee must be thanked for being willing to listen and build bridges of understanding between a finance lawyer and a group of cartographic specialists, all of us knowing that the NSDI as a vision transcends many professional specialties, belonging to no club. Kathy has broadened my view of NSDI in the communities it was designed to serve. This allowed me to place the context for NSDI within the overall national vision for the NII: National Information Infrastructure. FGDC's Review Team added the rich practical and conceptual insights and research knowledge of Mark Reichert, Carl Shapiro, Eric Goods and Milo Robinson.

On the private sector side, I must thank David Schell, Louis Hecht and Lance McKee of OpenGIS Consortium, Inc. for appreciating that the commercial goals of interoperability would mean precious little to users still fending for themselves to find reliable data unless dramatic steps were taken to enhance access to and supply of Spatial Data to geoprocess. In that regard, ours has been a unique collaboration (across multiple disciplines in several cities) to find ways of understanding the role that federal data standards and industry interoperable standards might play as "underwriting principles" for financing community geo-processing and other Information Technology investments.

On the personal side, I must thank my wife Jane L. Rosenthal, MD, for the patience to let me pursue my commitment to Urban Logic, Inc. and its work to solve community technology issues.

January 20, 2000
New York, New York

Bruce B. Cahan (bcahan@urbanlogic.org)

Executive Summary

Businesses and houses are located on streets, inside state and city boundaries. To achieve its mandates and missions, government at all levels generates and consumes vast amounts of Spatial Data – from planning road, water and sewer infrastructure to emergency response and economic development. So too Spatial Data is used by the private sector: in utilities and telecommunications companies for infrastructure engineering, in the real estate industry for urban development projects and leasing activity, in the airline and transportation industries for route and fleet analysis, by marketing companies for finding target consumers, and many others. Interest groups tap Spatial Data to understand environmental, health, neighborhood and social conditions and consequences of public and business policies, and to shape viable alternatives to those policies.

This and much more information traditionally shown on maps (Spatial Data) rests everywhere in databases maintained by government, industry, universities and non-profits (sources). The Internet may have "Changed everything" (according to CEO Larry Ellison of ORACLE),[*] yet Spatial Data's transformation into a universally trusted commodity supplied to users throughout the Digital Economy is just beginning. Maximizing the value of that information requires (1) maintaining it as current and accurate in a standardized form useful outside of the organization that collects it, (2) pooling it through the Internet, Intranets or other Data Service Bureaus for use in future interoperable software environments and (3) decision support tools – from basic to advanced – to use and leverage the Data into Information and ultimately Knowledge. In turn, these maximizing activities require ***Capital*** to transform and align legacy and inconsistent Spatial Data into more universally transacted commodities. How Capital can be better used and invested in Spatial Data and shared decision support tools (**Spatial Information Services**) driving the demand for Spatial Data is the subject of this Report.

Main Recommendations & Their Benefits

At the dawn of the Digital Economy, the Report finds an urgent opportunity to provide a national capacity to support the capital financing that ***Regional, Industry and Interest Group Consortia*** need to form and grow. These Consortia pool and align intergovernmental and public-private investments in Spatial Data acquisition and maintenance, decision support applications and supporting hardware, software and integration services. A ***National Information Technology Development and Finance Corporation*** – a specialized bank to underwrite information technology investments like spatial information services - could be formed as a public-private partnership, or as a quasi-governmental institution, with appropriate oversight and citizen accountability to reflect the public policy benefits and concerns implicit in Spatial Data use. Financing is just one of six services that such Consortia need to grow. The other five services are Bulk Procurement, Internet & Digital Democracy, Data and Systems Quality Assurance, Public Policy and Legal, and Technology Transfer. A public-private partnership (***U.S. Community Technology Partners***) to align access to, and enhance the robustness of, all six services is also recommended. Consortia and their members would remain forever free to find other means of obtaining these six services on better market terms – participation in the recommended initiatives would be entirely voluntary, not compulsory.

The benefits of such recommendations would be to

- Add more dependability and liquidity to the capital sources traditionally used to budget for Spatial Information Services in governments at all levels by tapping Wall Street financial mechanisms, pooled member subscription fees and other economies of scale savings of

[*] Fortune, *Larry Ellison: Oracle at Web Speed* (May 24, 1999), p. 128.

collaborative action;

- Reduce federal outlays for Spatial Information Services by (i) externalizing the portion of Data Mandates that can be supported by Consortia, (ii) aligning the capital planning cycles and mechanisms for spatial information resources developed by or for intergovernmental units, and (iii) leveraging non-federal investments to supply high-quality standardized data essential to Agency functions;
- Simultaneously improve the accuracy, detail and coverage of granular information now at the local level and required to understand the context for making better decisions in federal programs;
- Encourage intergovernmental, and inter-Agency cooperation and efficiencies in organizing using, prioritizing and understanding the benefits of federal programs (environment, health care, housing, infrastructure, transportation and others) by causing all stakeholders in a set of decisions to share a common "map" of the affected population, community or industry;
- Support Regional, Industry and Interest Group Consortia to form using standardized data management and dissemination practices that provide better information at lower costs and in more detail and variety than currently available;
- Provide more consistent and better citizen access to Spatial Information Services as part of participating in the Digital Democracy – thus enhancing the national tools for understanding governmental and business decisions and programs and their effect on urban and rural livability;
- Improve the efficiencies in the marketplace Spatial Information Services so that American Technology leadership in this area will operate with an expanded set of financial and market driving mechanisms;
- Provide a powerful market-driven alternative for International use in organizing and financing Spatial Information Services markets worldwide – furthering the ability of American companies to compete abroad and the interest of American foreign policy in widespread information resources as technologies that enhance open societies and stable, democratic forms of government;
- Reduce the Digital Divide so that all our communities know that they can tap federal and market mechanisms to finance and maintain long-term, functional Spatial Information Services;
- Leverage the work of the Federal Geographic Data Committee, OpenGIS and other standards development organizations by embedding their policy and technical specifications appropriately in market-driven underwriting, investment and purchasing decisions that businesses and governments make every day; and
- Leverage the leadership resources of associations interested in better government, responsible access to information, and other groups who depend on a Digital Economy where Spatial Information Services represent a key enabler of cooperative decision-making, business marketing opportunities and economies of scale.

Specific Recommendations

Specific findings and recommendations of the Report are found in Chapter 9, and include:

1. Identify the annual investments now devoted to Spatial Information Services in all processes throughout all sectors of the Economy.
2. Understand how governmental "data mandates" drive the supply, ubiquity and investment

priority of much Spatial Data at the local, regional and national levels.

3. Be open-minded, opportunistic and ingenious about the Internet World Wide Web's far-reaching realignment of these previously "stove-piped" investments, as relational database software, more sophisticated geoprocessing software and catalogues of standardized, online data on interoperable Internet and Intranet servers enable far greater pooling of consumer, business and government demand for Spatial Information Services.
4. Spatial Data maintained by governments at all levels is part of a larger public information infrastructure, subject to appropriate (but at state and city levels, inconsistent) Freedom of Information laws. This disparity of public access born of state sovereignty interferes with a seamless NSDI, as long as some governments charge for their Spatial Data, maintain their Spatial Data offline, or do not have their legacy Spatial Data yet in digital form.
5. By analogy to other types of infrastructure and businesses that would be of considerable local or regional impact and thereby strengthen the national economy, the federal government has participated in financing strategies to align public and private investments through programs like highways and mass transit (transportation), small business investment companies, Fannie Mae home mortgages, Airport Facility Improvement bonds and clean air and clean water financing.
6. Spatial Information Services that pool community capital and information resources devoted to servicing federal "Data Mandates" can readily be bundled into 3 types of Consortia:
    a. *Regional* (such as San Diego's Regional Urban Information System or the Pacific Disaster Center in Hawaii),
    b. *Industry* (such as Energy, Healthcare, Insurance, Real Estate and Telecommunications) and
    c. *Interest Groups* (such as The Nature Conservancy's 80 data centers to track and preserve Biodiversity, and spatially-enabling the etiology of breast cancer through data collections and analysis sponsored by the National Alliance of Breast Cancer Organizations and National Action Plan on Breast Cancer).
7. These Consortia provide an "architectural unit" like LEGO blocks for public-public, public-private and private-private partnerships (where "private" includes nonprofit and academic users) to align their investments in Spatial Information Services.
8. The Consortia are adaptive to their members' needs for Spatial Information Services and can form without federal support or encouragement. Without mediating incentives, policy goals (like public access, privacy protection, system security, data standardization and other elements of an NSDI) would not necessarily be reflected in each type of Consortia, nor evenly across all Consortia of the same type, as "pay to play" pragmatism influences the organization's resource allocations and distribution of public benefits, if any.
9. The federal government's Agencies are natural members of almost all Consortia who desire such membership. Federal Agencies stand to save the cost of using inconsistent Spatial Data that is not "tweaked" to the more functional, specific purposes honed by each Consortia's non-federal members. Externalizing federal dependence on non-federal sources of Spatial Data would implement a number of Congressional information technology reforms.
10. If a Consortium chooses to incorporate "public benefits" (like public access, privacy, security and other NSDI elements), the federal government could provide incentives through membership fees (a savings over federal Agency reliance on "stove-piped" Spatial Information Services), credit enhancement of Consortium borrowings, technology transfer from dual-use research and other incentives that would turn federal public policy goals into

"investment criteria" for Consortia. Consortia would offer non-federal members a unique advantage in negotiating "one-stop" data sharing arrangements and financial supports with the entire federal government – a vast improvement over the time, delay and narrow scooping of separate negotiations with individual federal agencies.

11. The Consortia would seek to leverage federal incentives with financing through conduits like state infrastructure bond banks (for tax-exempt rate funds). In developing a program of Wall Street sources of capital financing, these adaptable Consortia could cooperate and increase their market negotiating strength through a ***National Information Technology Development and Finance Corporation***.

12. For Consortia to focus on offering Spatial Information Services, they could become members of an national organization like ***US Community Technology Partners***. In all, there are 6 areas ripe for a national organization that serve its Consortia members:

    a. Financial Services (tapping the far greater resources of bond and equity investors and funds)
    b. Bulk Procurement
    c. Internet Strategies for Public (free) and Commercialized Services
    d. System Quality Strategies (including metadata, security, privacy protection, certification of data nomenclature and quality)
    e. Public Policy and Legal Strategies (to formulate "best practices" for licensing, copyright, data malpractice and other solutions)
    f. Technology Transfer (both ways, but especially for dual-use of military and intelligence assets that could reduce the cost of updating Spatial Data, enhancement of Spatial Information Services or speed the effectiveness of non-federal users in emergency, environmental or other appropriate contexts)

13. Applying this perspective deserves a test phase before any national implementation could be launched, whereby we can get experience in 3 settings (Regional, Industry and Interest Group) with new methodologies to account for their benefits to members (including the federal government), their Data Mandates and other perennial investments in Spatial Information Services, and their costs, capital needs and sources to generate such benefits. What would emerge is an empirically valid set of adaptive, market-driven and real world investment criteria for Consortia to tap such capital, and a method for determining the limited capital and other incentives most appropriate for the federal government to supply.

How This Report is Organized

This Report begins by analyzing the context for financing and building the NSDI. It examines the life cycle for creating Spatial Data and finds that existing government mandates – some reflected in Year 2000 (Y2K) data interdependency studies – play an important role in the supply of Spatial Data. Sources of cash flows generated by Spatial Data are reviewed in the larger Digital Economy or choices, and legal and policy limitations discussed. New ideas for treating these cash flows separate from (or distinct within) larger operating and capital budget items and "externalizing" these flows for co-investment purposes are described. Pertinent Federal statutory and regulatory requirements for Capital Planning of Agency Technology investments (including Spatial Information systems) appear in Appendix B.

Chapter 9 concludes by summarizing the context for financial analysis reviewed in the prior chapters, distills lessons from the analogies in Appendix A, and suggests a series of recommendations. Appendix C sketches a public-private partnership formed as a national association to bring private sector knowledge of market mechanisms to finance and commercialize Spatial Data and still operates in support of distinctly regional data needs.

Appendix A takes up analogues for financing the NSDI. To leverage identified Spatial Data cash flows and uncoordinated investments, capital investment pooling and securitization is described in Appendix A using analogies from Infrastructure Finance (EPA Environmental Revolving Loan Funds, and Airport and Surface Transportation Facilities). Given the regionally meaningful nature of Spatial Data, community development finance analogies from SBA, EDA and LISC are reviewed for guiding principles and precedents.

To accommodate the wide diffusion of neighborhoods and communities that assemble Spatial Data and the metadata standardization problems that sharing Spatial Data demands, Appendix A highlights the automated, standardized underwriting, lending and mortgage pooling by Fannie Mae (Home Mortgage-Backed Bonds) and several Service Bureaus (LEXIS-NEXIS, VISA, SABRE, New York Clearinghouse Association, CUSIP, and UPC Bar Coding). These Service Bureau analogies suggest that brand identification of standardized processes for creating, processing and assessing accuracy (like the Underwriter's Laboratory UL® Brand does for electrical appliances) would commercialize the value and trustworthiness of Spatial Data as a commodity.

Given the new roles that Federal agencies and employees may be asked to take on and the possibilities for outsourcing more Spatial Data commercialization and support activities to the private sector, Appendix A considers a performance-based organization (U.S. Investigations Service) such as the British have adopted for their Ordnance Survey.

Appendix B summarizes pertinent Federal legislation and regulations that impact Spatial Information Services of Federal Agencies, and in many cases the legislation and regulations appear to endorse the capital financing perspective taken throughout this Report.

Appendix C is a short business plan for a national service entity that could provide services to Consortia in line with the recommendations of this Report.

A User's Guide to the Material

Beyond the Report's organization, here are few more ideas for interacting with the Report.

Because this Research is intended for dissemination on the Internet, by design, footnotes often lead the reader to hyperlinked information that support the text and describe analogous financial situations in greater detail. Hopefully, the hyperlinked content makes the recommendations more powerful by showing just how profitable and ubiquitous the analogous financial programs, brand names and commercial enterprises have become. Speaking through analogies started when I was a boy reading *The Way Things Work*, and is a technique intended to give the reader comfort that there are many ways to align investments in spatial technology and data resources and finance them, once the country and the market decide to do so.

The Appendix A material is arranged using uniform headings to permit comparison of one analogy's structure against others. By no means does this Report represent a comprehensive "finance textbook" or an endorsement of the merits of applying any given analogy to finance Spatial Data in every setting. Instead, the Report is intended as a resource for citizens, businesses and policymakers at all levels of community and to empower national and local innovators in developing new financing options to capitalize their stake in the NSDI (National Spatial Data Infrastructure).

Time constraints and the number of analogies I wanted to cover demanded that I research and rely on treatises to summarize the historic progression and operating characteristics of certain analogies (for instance, Olson's Paper on Electric Utility Deregulation in Chapter A 4). This reliance gave me enough time to distill the analogy's significance for organizing and financing Spatial Data. If time and resources had permitted, the reliance on those excellent treatments of particular analogies would have been balanced by more extensive research of other points of view. If reliance on individual treatises unintentionally mischaracterizes the history of an analogy, I encourage readers to point the error out to me, and I will correct the presentation in future versions of this Report.

Bruce B. Cahan (bcahan@urbanlogic.org)

Analysis & Recommendations

Chapter 1. Overview of Spatial Information

President Kennedy once said:

> *"Democracy is a difficult kind of government.*
>
> *It requires the highest qualities of self-discipline, restraints, a willingness to make commitments and sacrifices for the general interest,* ***and also it requires knowledge****."*

That knowledge often comes from accurate statistics.

You cannot begin to solve a problem until you can measure it.

Senator Daniel P. Moynihan (January 1999)[1]

There's a silent revolution going on. It's a revolution that impacts each of our lives, although few of us have heard anything about it. It affects the rates we pay for utility services and the quality of our roadways. It can influence the speed with which emergency vehicles respond to our calls and how quickly criminals are put behind bars. It can help prevent famine, blight, and pestilence. It has played an instrumental role in planning and fighting wars and then rebuilding war- torn communities. It is being used for applications as far flung as finding delinquent taxpayers, developing pizza delivery routes, and setting insurance rates. It's even being used to increase the impact of "junk" mail you receive. The basis for this silent revolution is a technology called GIS--an acronym for Geographic Information Systems.

Business Week (July 1991)[2]

Why is Government Spatial Information Processing More than Just Maps?

People have been drawing maps with field instruments and surveyors tools since before our Country's independence from England.

In the Colonial States, these paper maps (and the cartographic standards and the art to render them) determined crucial jurisdictional and territorial boundaries of responsibility and governance.

With the Lewis & Clark Expedition in 1803,[3] the Western Territories were opened for settlement and a national survey was commissioned to describe federal and state government boundaries. Up until the 1840s, Congress had its own cartographer to understand how the geographic nature of North America should affect future policy.[4]

For more than 100 years, official maps and related information have been considered so essential to the rule of law, democracy, accessibility and reliability of public information and governing the country, that anything short of safeguarding, preserving and knowing how to find official maps is likely a crime.[5]

---

[1] Senator Daniel P. Moynihan, *Remarks introducing S. 205* (Congressional Record January 19, 1999) p. S637, at http://frwebgate.access.gpo.gov/cgi-bin/getpage.cgi?dbname=1999_record&page=S637&position=all.

[2] Quoted by Geospatial Information and Technology Association (**GITA**), at http://gita.org/scope.html.

[3] Ken Burns, *Lewis & Clark: The Journey of the Corps of Discovery* (PBS Online, May 18, 1999) http://www.pbs.org/lewisandclark/index.html, and Lewis and Clark Trail Heritage Foundation http://www.lewisandclark.org/.

[4] According to Gary Fitzpatrick, Cartographic Specialist, Library of Congress (June 8, 1999), the last cartographer to Congress was David H. Burr.

[5] The intentional actual or attempted concealment, removal, obliteration, destruction or mutilation of a map "or other thing" deposited with any branch (executive, legislative or judicial) is a crime punishable by a fine,

Property deeds and other official derivations of authority for the maps America's history produced (and the legal descriptions of parcels they show) are important for us to this day. Last year, geoprocessing of historic maps played a large part in the Supreme Court's determination of the ownership of Ellis Island in New York's Harbor as between the claims of New Jersey and New York.[6]

Industry commentators claim that 70-80% of all business information has a spatial or place-based component.[7] As a by-product of its operations, government is the largest producer of spatial data. State Department country risk assessments for international travelers turn into maps for handy reference.[8] Federal agriculture surveys help farmers plan, plant and harvest crops. Federal highway maps help truckers and travelers route interstate commerce.

From Automatic Map-Making to Decision Support

Today, computers turn a series of compass points into a map faster than manual methods for drawing a map. Using geographic information system (**GIS**) software, a person with no cartographic or statistical training can use location as a common denominator to group data from multiple sources for decision support.[9]

The first of these uses (automated map-making) is an example of GIS' *Efficiency*. The second of these uses (geo-processing as an enhanced decision support tool) represents GIS' *Effectiveness* to create a new capacity for an organization that would not have been possible before.[10]

Increasing Investment Expectations

The cost/benefit of GIS for federal Agencies has been studied and varies between 1:1 and 1:7, according to a set of formulas that describe both the Efficiency and Effectiveness Benefits.[11] Or as

---

imprisonment up to 3 years or both, and disqualifies any participating official from ever holding public office in the United States. 18 USC §2071. Arguably, "map…or other thing" would include spatial information in any form (paper, photograph, remote sensing, and digital), and anything spatial available under the federal Freedom of Information Act.

[6] The U.S. Supreme Court relied on an 1819 Map of Ellis Island and on New York State's practice of mapmaking through the 1950s to interpret the 1834 Interstate Compact by which the 2 states manage this Island, and determined the portions added by "land-fill" in New Jersey's waters remain under the sovereign jurisdiction of New Jersey. State of New Jersey v. State of New York, 523 US 767 (1998), and 1999 U.S. LEXIS 3450 (1999). Bill McGarigle (GIS Editor), *The Battle over Ellis Island: GIS produces evidence in U.S. Supreme Court ruling on Ellis Island dispute* (Government Technology January 2000), p. 44, http://www.govtech.net. [add cite]

[7] GITA, *What are AM/FM, GIS and SCADA?*, at http://gita.org/scope.html.

[8] Pinkerton Global Intelligence, *World Status Map* (July-August 1999), at http://www.pinkertons.com/pgis.

[9] Microsoft's decision to include a mapping function in Excel 97 showed business and personal productivity users the simplicity and accessibility of mapping data in business environments already fluent with spreadsheet functionality. Now 3 years later, Microsoft (responding to market demand and opportunity) is offering a more complete business mapping package, MapPoint 2000, as part of its Office 2000 applications suite.

All major database vendors, including Oracle, IBM, Informix and Sybase support spatial data formats as part of their mainstream database products. See, IDC's Report *Spatial Information Management, 1999 Worldwide Markets and Trends* (September 1999).

Such trends should drive demand for additional Spatial Data access, supply, standardization and variety.

[10] According to IDC, the traditional GIS market of users requiring such Efficiency Benefits may be maturing (3% growth rate), and the market for spatial enabling of business decision support may be growing (30% growth rate). For more on shifts in the Spatial Technology industries, see Chapter 2.

[11] Elaine Silva, *Cost-Benefit Analysis for Geographic Information System Implementation Justification*

NASA saw it, in the early 1990s the Federal Government spent $100 million on GIS applications to produce $500 million of productivity (an Efficiency Benefit of 80%), and that same $100 million GIS investment drove a much larger $3.5 billion in Effectiveness Benefits.[12]

The Strategic Plan for U.S. Geological Survey (**USGS**) includes trying to help all government sectors capture the benefits of GIS through the NSDI.[13] Quantification of GIS' benefits should count the benefits that consumers/taxpayers enjoy from the enhanced services and range of choices an automated government agency represents over a non-automated one.[14] And in organizations that recognize knowledge capital (i.e., they value and reward key employees who have long-term knowledge of how to use their GIS assets), these knowledge benefits need to be quantified and included in capital investment decision trees for information technology (**IT**).[15]

States are already moving in this direction. Treating GIS like a capital asset, Montana applied this methodology to help track, evaluate and prioritize the State's investment in GIS.[16] Massachusetts has regularly included GIS projects in their State Information Technology Bond Program.[17] King

---

(Literature Review) (March 4, 1998), at http://www.nysl.nysed.gov/gis/costanal.htm. Also, Stephen Gillespie, *Measuring The Benefits of GIS Use: Two Transportation Case Studies* (URISA Journal, 6:2), at pp. 62-67; and Stephen R. Gillespie, *A Model Approach to Estimating GIS Benefits* (unpublished). Gillespie's model was used in Montana to inventory State and County Benefits in implementing GIS in single Departments without a Data Consortium. Similar benefit models have been suggested in France (Michel Didier, *Utilité et Valeur de L'Information Géographique* (Conseil Nationale L'Information Géographique, 1990) and the United Kingdom (Coopers & Lybrand, *Economic Aspects of the Collection, Dissemination and Integration of Government's Spatial Information: A Report for Ordnance Survey* (May 1996)).

[12] NASA, *GIS Business Plan Imaging and CADD Technology Team - A report to IOG on the cost/benefit and applicability of Geographic Information Systems technology to processes and problems at NASA Langley Research Center* (February 16, 1995), Chapter 7, at http://gis-www.larc.nasa.gov/bplan/bplan7.html.

[13] See USGS Strategic Plan 1997-2005, http://www.usgs.gov/strategic/part3.html#3.

[14] In this regard, IT investments often have benefits to consumers that may exceed the prices that such consumers can be charged to purchase products from an institution that employs optimum IT to stay competitive. See, Lorin Hitt and Erik Brynjolfsson, *Productivity, Profit and Consumer Welfare: Three Different Measures of Information Technology's Value*, (MIS Quarterly June 1996), at http://ccs.mit.edu/CCSWP190.html.

[15] Paul A. Strassmann, *The Value of Knowledge Capital* (American Programmer - March 1998), at http://www.strassmann.com/pubs/valuekc/; and Paul A. Strassmann, *The Value of Computers, Information & Knowledge Capital* (January 30, 1996), at http://www.strassmann.com/pubs/cik/cik-value.shtml.

[16] Logan McInnis (Montana Department of Administration) & Stuart Blundell (Integrated Geoscience, Inc.), Analysis of Geographic Information Systems (GIS) Implementations in State and County Governments of Montana, (Final Report Prepared for The Montana Geographic Information Council, December 1998), at http://www.mt.gov/isd/groups/mgic/eacba/eacba_cba.htm. The Montana Study applied the Gillespie Model to identify efficiency and effectiveness benefits in the real world, and found the Model more helpful than not.

The state of the art in measuring the impact of technology inputs and outputs in the Digital Economy is relatively new. See, John Haltiwanger, Center for Economic Studies U.S. Bureau of the Census and University of Maryland and Ron S. Jarmin Center for Economic Studies U.S. Bureau of the Census, *Conference Draft: Measuring the Digital Economy* (Prepared for U.S. Department of Commerce Conference: Understanding the Digital Economy – Data, Tools & Research May 1999), at http://mitpress.mit.edu/UDE/haltiwanger.pdf.

Research efforts like the Gillespie Model in footnote 11 (and its future progeny) will give Spatial Technology's users traditional cost/benefit justifications using objectively measurable investment criteria to better communicate these benefits to investors, budget directors and the public.

[17] Project BG09: GIS – Digital Parcel Base Map as described in Information Technology Division of the Executive Office for Administration and Finance of the Commonwealth of Massachusetts, *Fiscal Year 1997 Report to the House and Senate Ways and Means Committees on Projects Funded by the Information Technology Bonds* (September 30, 1997) and *Fiscal Year 1998 Report to the House and Senate Ways and*

County (encompassing Seattle Washington) has used bond proceeds for its GIS project since 1994, with the attendant audit and budgetary lessons that reliance on a single GIS user's bond issuing authority entails for financing a community's growing demands for Spatial Data.[18]

As the 21st century begins, organizations are not only using spatial modeling for decision-support, they are improving capital asset models for choosing among the various investment options to implement and enhance their GIS.

Means Committees on Projects Funded by the Information Technology Bonds (September 30, 1998).

[18] Don Eklund (King County Washington Auditor), Bond Funded Capital Improvement Projects: Financial Audit (June 22, 1999, Report No. 99-03), at http://www.metrokc.gov/auditor/1999/99-03CIPBond.PDF.

Chapter 2. Preparing Spatial Information for the Digital Economy

The newest innovations, which we label information technologies, have begun to alter the manner in which we do business and create value, often in ways not readily foreseeable even five years ago.

Alan Greenspan, Chairman, Federal Reserve Board (May 6, 1999)[19]

By 2006, almost half of the U. S. workforce will be employed by industries that are either major producers or intensive users of information technology products and services.

US Secretary of Commerce William Daley, *The Emerging Digital Economy II* (1999)[20]

Business is going to change more in the next ten years than it has in the last fifty.

Building a Digital Nervous System does not require some huge new investment in hardware and software. In fact, most companies [and other organizations] have the key building blocks today.

Bill Gates, *Business @ the Speed of Thought (1999)*[21]

In a January [1999] report by research firm Jupiter Communications, analysts wrote that "consumers are overwhelmingly more satisfied with maps and directions online than they are with those offline; ***71 percent of consumers said online maps and directions are more valuable than traditional media****."* [Emphasis added]

C|Net News Service, *MapQuest's services turn heads on the Street (June 17, 1999)*[22]

On April 11, 1994, by Executive Order 12906, the President ordered the Federal Geographic Data Committee (**FGDC**) to plan and implement the National Spatial Data Infrastructure (**NSDI**) component of the National Information Infrastructure (**NII**). This Chapter reviews and forecasts key changes in the markets for Spatial Data and geo-processing since 1994:

- Increased IRM investments and dependence
- Emergence of the Internet as the Platform for sharing Knowledge, conducting ecommerce and driving the Digital Economy
- Shifts in the scope, size and segments of the GIS/Spatial Technology market
- Changing dominance of traditional and new players in the industry who are active in each market segment

---

[19] U.S. Department of Commerce, Economics and Statistics Administration - Office of Policy Development, *The Emerging Digital Economy II* (June 1999), at http://www.ecommerce.gov/ede/ede2.pdf. For an inside view of technology's impact on delivery of financial services, see also, Herbert M. Allison, Jr., President and Chief Operating Officer, *Re-Engineering Financial Services in the Information Age* (March 10, 1998), at http://www.ml.com/woml/commentary/hma031098.htm.

[20] U.S. Department of Commerce, Economics and Statistics Administration - Office of Policy Development, *The Emerging Digital Economy II* (June 1999), at http://www.ecommerce.gov/ede/ede2.pdf.

[21] See, http://www.speed-of-thought.com/looking/index.html.

[22] Beth Lipton (C|Net Staff Writer), *MapQuest's services turn heads on the Street* (CNET News.com, June 17, 1999), at http://www.news.com/News/Item/0,4,37975,00.html, quoting Jupiter Communications, at http://www.jup.com/sps/ccs/1999/09/tof.html..

Changes in the Landscape for the NSDI: IT, Data Warehousing, the Internet & the GIS Industry

In the 5 years since then Executive Order 12906, information technology has become a significant investment for public and private enterprises, accounting for 8.2% of the nation's Gross Domestic Product in 1998 and growing at the rate of 15% annually.[23] IT-producing industries (*i.e.*, producers of computer and communications hardware, software, and services that enable e-commerce) play a strategic role in the growth process. Between 1995 and 1998, these IT-producers, while accounting for only about 8% of U.S. GDP, contributed on average 35% of the nation's real economic growth.[24] Internationally, more than $1.8 trillion is being spent on IT - 6% of the Global Gross National Product.[25] IT now represents over 50% of the capital equipment purchased by business.[26] The most IT-intensive businesses spend $14,128 per employee on IT (versus $3,532 per employee for the economy as a whole), and these IT-intensive businesses account for more than 50% of the GNP and employ more than half of the American workforce.[27]

In 1993, the Mapping Science Committee of the National Research Council estimated that the nation spent between $8 and 10 billion annually on Spatial Technologies and Information.[28] 1993 was

- *before* the Digital Economy and the Internet started their momentum,
- *before* GPS (Global Positing System devices) made answering where you are part of everyday life and business practices, before ITS America's automated vehicle routing, and
- *before* the focus on making geo-processing environments interoperable for institutional and personal users.

The 1998 National Academy of Public Administration (**NAPA**) Report *Geographic Information for the 21st Century: Building a Strategy for the Nation* (the **NAPA Study**),[29] estimated that $1 billion is spent annually on narrowly-defined federal Spatial Data, NAPA concluded that the Spatial Data by-products of 12 core federal functions facilitated national economic sectors (from real estate to

---

[23] U.S. Department of Commerce, *The Emerging Digital Economy* (April 1998), p. 4, at http://www.ecommerce.gov/EmergingDig.pdf. While the productivity of these IT investments may defy precise measurement in the near-term and depend on an institution's non-technology organizational skills, the shift to automated information creation, processing and dissemination continues a 150-year old trend. See, NSF: National Science Board, *Science and Engineering Indicators – 1998* (February 26, 1998), Chapter 8, http://www.nsf.gov/sbe/srs/seind98/frames.htm.

[24] U.S. Department of Commerce, Economics and Statistics Administration - Office of Policy Development, *The Emerging Digital Economy II* (June 1999), at http://www.ecommerce.gov/ede/ede2.pdf, Executive Summary.

[25] See, ITAA: Information Technology Association of America, *Background Information: The Cybercitizen Partnership A Critical Information Protection Empowerment Campaign* (March 15, 1999) http://www.itaa.org/news/source/renoback.htm.

[26] U.S. Department of Commerce, *The Emerging Digital Economy* (April 1998), p. A1-7, at http://www.ecommerce.gov/EmergingDig.pdf

[27] U.S. Department of Commerce, *The Emerging Digital Economy* (April 1998), p. A1-8, at http://www.ecommerce.gov/EmergingDig.pdf The 1987 estimates of $10,000 and $2,500 per employee were inflation adjusted by 41.28% to $14,128 and $3,532, respectively, using the Consumer Price Index through 1997 in the U.S. Statistical Abstract, Table 772, at http://www.census.gov/prod/3/98pubs/98statab/sasec15.pdf.

[28] Mapping Science Committee of the National Research Council, Toward a Coordinated Spatial Data Infrastructure for the Nation (1993), Executive Summary, at http://www.nap.edu/books/0309048990/html/index.html.

[29] Available from National Academy of Public Administration, p. 67, http://38.217.229.6/NAPA/NAPAPubs.nsf/00a36275d19681118525651d00620a03/229b79ae768d77e48525658c0061a3bd?OpenDocument.

insurance to agriculture to defense) worth upwards of $3.5 trillion.[30]

Worldwide investment in Spatial Information Services (hardware, software and integration services for traditional GIS business support systems and personal productivity) was $1.08 billion in 1999, and should increase to $2.1 billion by 2004.[31] This global estimate appears to be conservative, as some industry experts suggest that US domestic investments are at least $3 billion annually. By extension this would mean that the United States economy will soon invest a multiple of 2 to 4 times that amount on the Spatial Data that runs through such systems. By one estimate, a 16% increase in GNP may be achievable over the next few decades as spatial decision support tools and the data to use them becomes ubiquitous.[32]

Within every community in the United States by design or default,[33] there is a set of Information Resource Management (**IRM**) mandates, policies, standards and constraints.[34]

Interoperable data warehouses (where data is defined according to shared institutional standards) are IRM policies by design to capture the apparently large benefits of data pooling.[35] Of 45 organizations studied in depth by IDC, the average three-year Return on Investment (**ROI**) for both enterprise-wide and discrete data warehouses is 401%, and the average payback period 2.3 years.[36]

These ROI Benefits (particularly given the Data Interdependencies mapped through Y2K remediation surveys)[37] suggest that coordinated data pooling and IRM planning by design are necessary across

---

30 NAPA Study, Table 2-1, pp. 12-13.

31 PRNewswire, *Powerful Market Forces Transform Structure of the Information Management Market, IDC Says* (January 11, 2000), http://www.bigcharts.com/news/articles.asp?newsid=984571&time=&sid=2578&symb=ingr&date=&orig=charting.

32 Andrew Frank (Professor, Vienna University of Technology), *The Change from Big GIS to Small GIS* (ICTPA'99 Bucharest, Rumania, November 11, 1999), Slide 4, at http://www.geoinfo.tuwien.ac.at/publications/frank/big_vs_smallGis_ICTPA99_af/index.htm.

The magnitude of such efficiency benefits may be tied to the inter-relationship among costs for hardware: software: data for spatial tools. In 1991, this inter-relationship was estimated at 1:10:100. A. Andrew Frank, M. Egenhofer, and W. Kuhn, *A Perspective on GIS Technology in the Nineties* (Photogrammetric Engineering & Remote Sensing 57 (11): 1431-1436, 1991), at http://www.spatial.maine.edu/~max/RJ5.html. As computing costs decline (Frank's 1 unit of hardware), the speed, open specifications and interoperability of software grew (Frank's 10 units) and the organizational effectiveness of using spatial decision support becomes accepted management practice, the relative proportion of improved data fueling the operation of a spatial decision support tool (Frank's 100 units) could increase at lower costs. Commercially-viable standards for spatial data as commodities from transactions that generate such data as their by-product would speed realization of such GNP benefits. In turn, researching, designing, testing and deploying public and private financial incentives for such quality standardization would accelerate the realization of such GNP benefits even faster.

33 For discussion of the Year 2000 bug (**Y2K**) as an IRM mandate by default, see Chapter 5.

34 For a discussion of how GIS use is altering these IRM policies for museums and governmental stewards of national collections of culturally-significant archeological sites and relics, see Neil Lang (Royal Commission on the Historical Monuments of England (RCHME), National Monuments Record Centre), *GIS and Archaeology*, (Museum Documentation Association *Information* Vol.2: No. 3, 1997-8), at http://www.mdocassn.demon.co.uk/info23l.htm. In this country, a spatially-enabled relational database might help Bureau of Land Management conservators track museum holdings of our nation's archeological treasures. Cf., *U.S. Lost Track of Artifacts by the Millions* (NYT December 5, 1999).

35 For an interesting perspective on Data Warehousing's strategic value to enterprise business processes, see http://www3.ncr.com/product/retail/presentations/whitepapers/data_warehousing/index.shtml#overview.

36 See *What's It Worth: Benefits of Data Warehousing*, http://www.cio.com/archive/100196_invs.html.

37 Chapter 5 suggests Y2K's lessons for the NSDI. Y2K Data Interdependencies are described on p. 56.

enterprises.

At the same time, demands for Data Warehouses to support enterprise and enterprise-partners have mushroomed. Demand for Data Warehouses and supporting analytic applications are expected to grow at a compound annual growth rate of 42% for the next five years.[38] Current trends for Data Warehouses may foretell trends for Spatial Data.[39]

IRM architectures and sunk costs cause specific economic outcomes. For example, much new job growth in the information economy can be traced to first generation small firms of less than 20 employees (called *gazelles*), whose lack of investment in prior/legacy computer systems lets them invest in the latest, fastest and most productive information infrastructure resources via the Internet.[40] For good and bad, bank mergers and the consolidation of the banking industry are significantly impacted by the effect on customer service of aligning multiple IT platforms.[41] And in public health, the need is constant for timely information about environmental and other factors in a certain geographical region in order to treat illness, prolong the lives of children and adults and make and explain policy choices in treatment and resource allocation decisions.[42]

Given this growing dependence on IT, it is surprising to learn that $250 billion is spent annually on software development, but that a staggering 31.1% of projects will be canceled before they ever get completed, and 52.7% of applications will cost 189% of their original estimates. The cost of these

---

[38] IDC's Report *Spatial Information Management, 1999 Worldwide Markets and Trends* (September 1999).

[39] Wayne W. Eckerson of The Data Warehousing Institute, *Ascending the Data Warehousing Summit, Trends and Predictions for 1998 and Beyond*, at http://www.dw-institute.com/buyersguide/trends.html, points out the following trends:

1. Data Warehousing has gone Mainstream – The 1998 market was $1.88 billion (a 28% increase over 1997)
2. Analytic & Decision Support Applications are Driving Data Warehousing because they support a key business process, such as budgeting, forecasting, churn management, fraud detection, etc. Embedded in these applications are decision support and data warehousing technologies.
3. Turnkey Decision Support Solutions are pre-integrating technology components users need
4. Enterprise-wide IT resource planning and budgeting drive Data Warehousing
5. User-specific Web-enabled Reporting actually fuels building and maintaining the Data Warehouse
6. Technology Platform and Architecture disputes are Dissipating
7. Data Mining tools are being integrated into traditional Relational Database products and strategies
8. Management & Administration of Data Warehouses is getting more Executive Management attention as the strategy becomes part of more business processes. Thus, system security, data change management and enhancing system speed and reliability are more visible initiatives.
9. Staffing, training and retention of qualified technical personnel is becoming a constraint.

[40] Michie P. Slaughter, *ENTREPRENEURSHIP: Economic Impact and Public Policy Implications - An Overview of the Field* (Prepared for the Library of Congress Congressional Research Service March 1996), p. 6, available at http://www.entreworld.org/Bookstore/Product.cfm?DID=6&Product_ID=21&CATID=22.

[41] Deena Amato-McCoy, *Summit employs mapping system to pinpoint best branch, ATM sites* (Bank Systems & Technology; New York; Apr 1999), Vol. 36 Issue 4, p. 54.

[42] U.S. Public Health Service, Public Health Data Policy Coordinating Committee *Making a Powerful Connection: The Health of the Public and the National Information Infrastructure* (July 6, 1995), Section 6.0, http://www.nlm.nih.gov/pubs/staffpubs/lo/makingpd.html; Thomas B. Richards et al, *Geographic information systems and public health: Mapping the future* (Public Health Reports, Jul/Aug 1999), Vol. 114, Issue 4, pp. 359 and at the National Cancer Institute's Long Island Breast Cancer Study site, http://www-dccps.ims.nci.nih.gov/LIBCSP/ms8156/maintext.html.

failures and overruns are just the tip of the proverbial iceberg. Lost opportunity costs are not measurable, but could easily equal a substantial part of the benefits derived from successful IT projects. Regularly, gaps in end-user understanding of data and the metadata to support that data show up as reasons for software applications to be abandoned.[43]

The Internet is growing at the rate of 46% per year, with about 43 million "advertised" connected computers (hosts) in 214 countries and territories, and estimated to reach 100 million connected hosts by 2001.[44] Globally, 1999 investments of $11.8 billion in building eCommerce sites will more than triple to $43.6 billion by 2002.[45] Since 1994, the Internet has expanded 18-fold.[46] Its success and function as commercial infrastructure has brought traffic patterns and net congestion, mapped in real-time just like vehicular traffic.[47] The Top 50 most visited sites are now tracked for advertising potential, brand recognition and consumer trust, as were the size of the nation's Top 50 companies.[48] Moreover, the value of Websites featuring local content is now commercially significant to advertisers, investors and Web users.[49]

---

[43] The Standish Group, *The Chaos Report* (January 1995), at http://www.standishgroup.com/chaos.html, and The Standish Group, *Concorde's Instant Infrastructure: PROOF* (1997), at http://www.standishgroup.com/proof.html.

[44] See, *No Surprise: The Net Keeps Growing* (Wired February 17, 1999), at http://www.wired.com/news/news/technology/story/17969.html. For a current benchmark of statistics on how fast the Internet has grown and how far-reaching its impact in our daily lives, see United States Internet Council, *State of the Internet: USIC's Report on Use & Threats in 1999*, at http://www.usic.org/usic_state_of_net99.htm.

[45] See, *IDC Identifies Winning Attributes for Internet Services Firms*, at http://www.idc.com/idc7/default.htm.

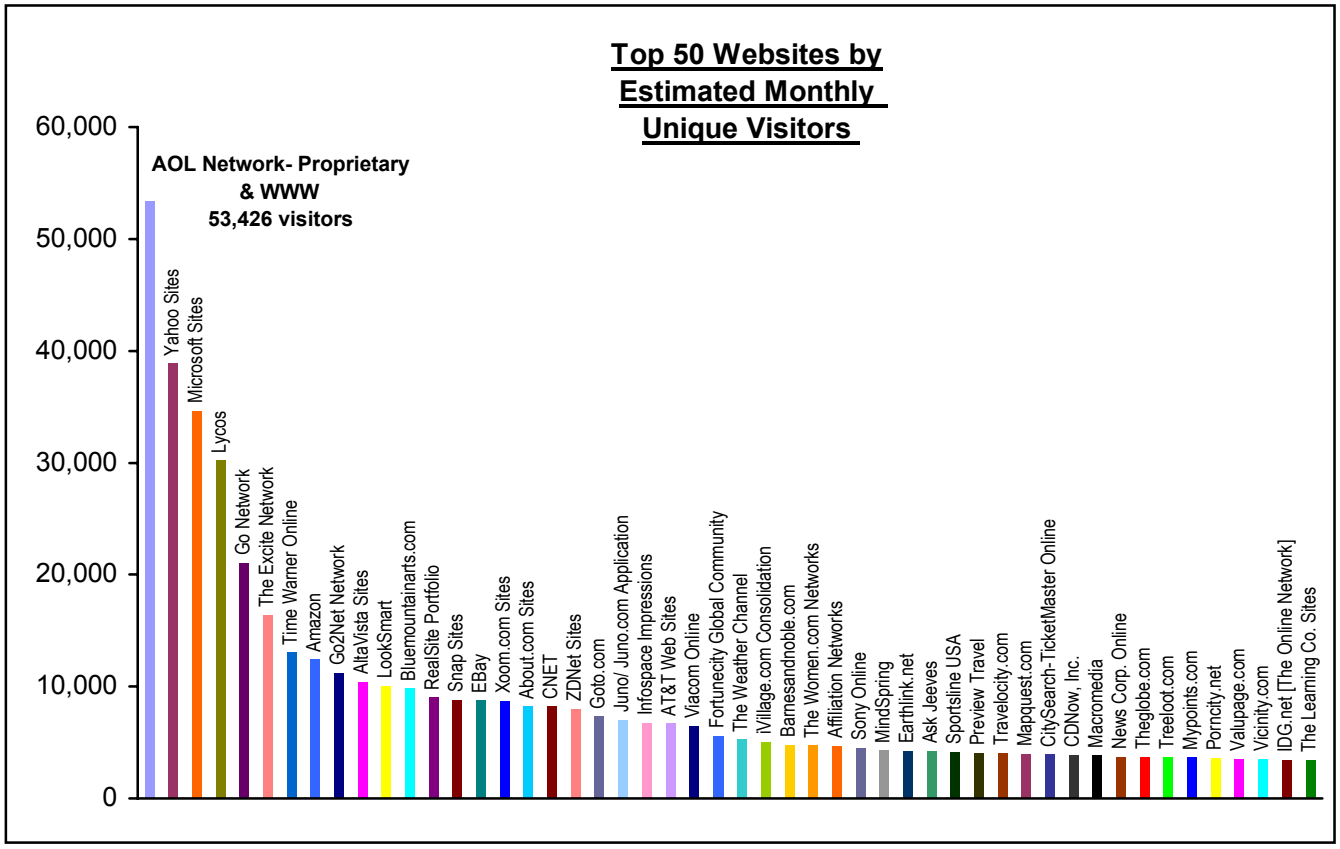
[46] See, Network Wizards Survey (January 1999), at http://www.nw.com/zone/WWW/report.html.

[47] See, Matrix Information & Directory Services, Inc., at http://www.mids.org/weather/us/htmldir/22.html.

[48] See, MediaMatrix, at http://www.mediametrix.com/TopRankings/TopRankings.html.

[49] See, MediaMetrix, MediaMetrix Expands Local Market Measurement Service to Cover 38 Local Geographic Markets - Offering national and local advertisers the greatest depth and breadth in "metered" local market audience measurement (May 13, 1999), at http://www.mediametrix.com/PressRoom/Press_Releases/05_13_99.html.

These trends are borne out in the monthly browsing patterns of users:[50]



What are these visitors worth? MapQuest.Com's 2 million registered users account for 6% of its $27.17 million revenues, and analysts expect that consumer services (via the Internet) will account for 30% of its revenues by 2002.51 MapQuest.Com's stock trades at $13.50 per share for a market capitalization of $443.19 million,[52] or more than 100 times the absolute number corresponding to its loss of -$0.13 earnings per share, and its profit margin is -12.764% of revenues. Thus, the market capitalization of each 1 million users of MapQuest.Com today is roughly $13.3 million, and if the stock price registered users remained constant though 2002, would be roughly $133 million. These numbers illustrate early benchmarks of the market valuations expected from visitors to a Website providing Spatial Data, and suggest the current financial appetite for such equity offerings.

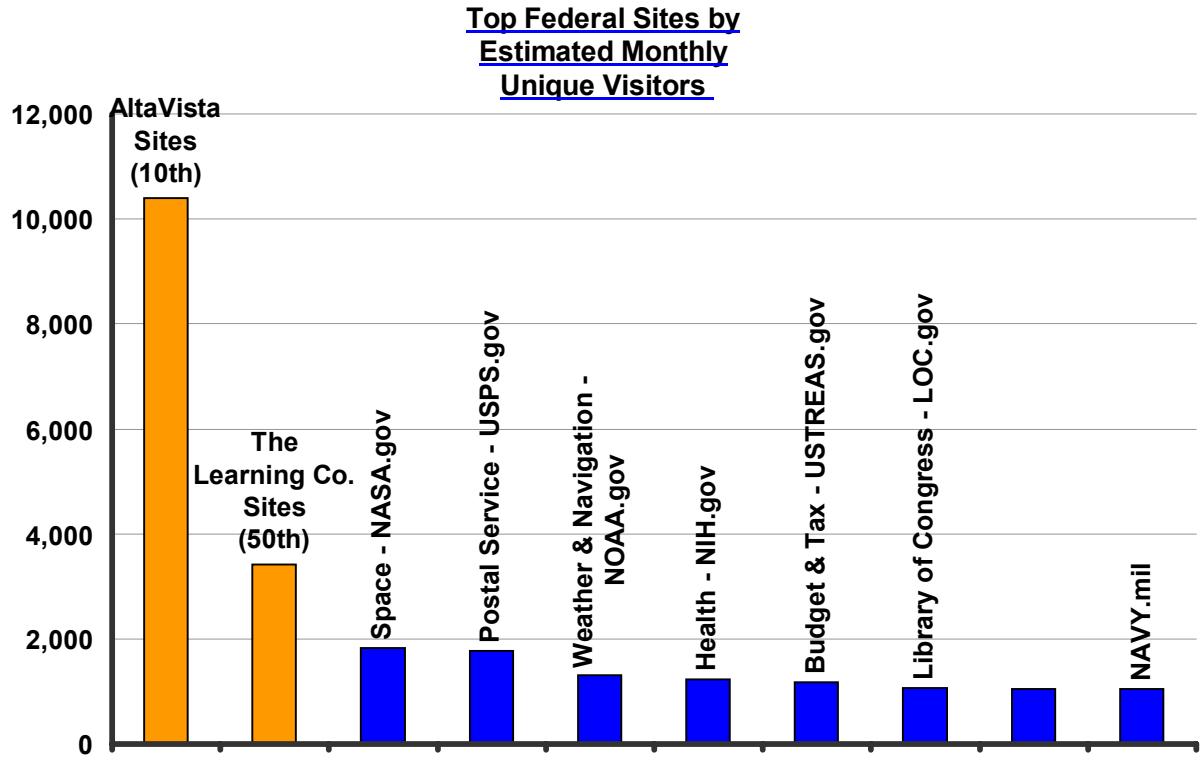
---

50 MediaMatrix, *Top Rankings* (July 1999), http://www.mediametrix.com/TopRankings/TopRankings.html.

51 Beth Lipton (Staff Writer C|Net News Service), *MapQuest's services turn heads on the Street*, (CNET News.com June 17, 1999), at http://www.news.com/News/Item/0,4,37975,00.html, quoting Keith Benjamin, an analyst at underwriter BancBoston Robertson Stephens.

52 MapQuest.Com share price and other per share data calculated as of September 17, 1999, at http://quote.thestreet.com/cgi-bin/texis/StockQuotes?tkr=MQST.

By comparison, taken together the 8 Federal Government sites included in the Top 10 government sites visited most often barely exceed the number of monthly visitors to the AltaVista sites (in the aggregate 10.4 million vs. AltaVista's 10.3 million) and none individually exceed the visitor traffic for The Learning Companies, ranked 50th (last) site in the Top 50 (3.4 million).[53]



Changes in the GIS Industry that affect Implementation of the NSDI

Stretching back over 35 years, the GIS Industry consists of some well-known pioneers. The Digital Economy has added new entrants from the general software, data services and Internet segments of the IT industry. IDC's model segments the Spatial Information Management (**SIM**) industry into 4 areas, with different size, growth rates, maturity and prospective industry leaders (all dollar and user numbers in millions):[54]

---

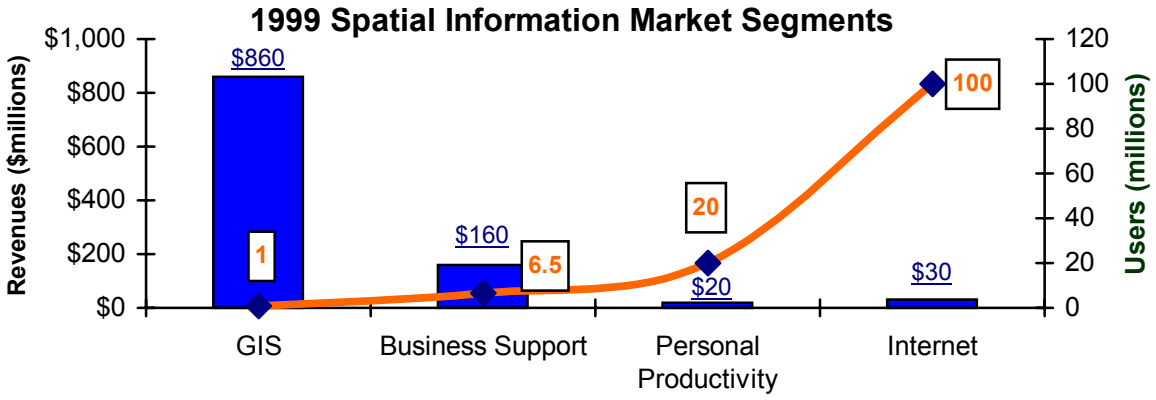
[53] MediaMatrix, *Top Rankings* (July 1999), http://www.mediametrix.com/TopRankings/TopRankings.html. This is a rough comparison of market affinity, and does not account for the fact that much of government's data may end up in commercial websites (such as National Weather Service forecasts on 26th ranked The Weather Channel, or USGS maps on 38th ranked MapQuest).

The comparison illustrates market penetration, and the effectiveness of tie-in advertising, product promotion and cross-marketing arrangements possible in the private sector and atypical in the public sectors. Advertising budgets to promote public sector websites such as US Postal Service's "Fly Like An Eagle" and the Army's "Be All You Can Be" - would no doubt raise the traffic on those sites, but would also open government to criticism for competing with the private sector's portals and spending taxpayer funds on advertising.

[54] Approximations from IDC's *1999 Markets and Trends Data*, courtesy of David Sonnen (ISSI) (September 15, 1999). This market segmentation resembles the lines of business described in MapQuest.Com's Form 10-Q (June 30, 1999), at

IDC Industry Segment	GIS	Business Support Systems	Personal Productivity	Internet
Worldwide Gross Revenue 1999	$860	$160	<$20	<$30
Current Worldwide Growth Rate	3-5%	30%	Not measured	Not measured
Potential Users Worldwide (#)	<1	5-8	20	~100

Plotting the revenues and user figures illustrates the choices facing the SIM industry:



Simplistically, traditional GIS software vendors are seeing the geo-processing functionality of their mature, niche market (IDC's GIS segment) in higher demand and incorporated into the general-purpose applications offered by enterprise-system providers.[55] The choice for such traditional

http://www.sec.gov/Archives/edgar/data/1078284/0000902561-99-000364.txt: Business Products & Services (mapping products to businesses with Internet services and portals), Consumer Products & Services (including advertising revenues and sponsorships), and Digital Mapping Products & Services (the traditional production of digital maps for businesses). According to its 10-Q filing, "MapQuest expects its business and consumer related revenues to become a greater percentage of its total revenues in the future and expects a corresponding decrease in its digital mapping revenues as a percentage of total revenues in the future."

[55] The history of GIS as a distinct and maturing market, and the transitions occurring in the industry to merge it into the IRM demands of the Digital Economy are well summarized in David Sonnen (ISSI) and Henry Morris (IDC), *Spatial Information Management – Structure of An Emerging Market* (Applications and Information Access Tools Bulletin, April 1998). Sonnen & Morris observed:

> To make SIM [Spatial Information Management/GIS] applications acceptable in the personal productivity space [on PCs], *spatial data* and applications will have to be as intuitive, easy to use and inexpensive as spreadsheets or desktop databases.
>
> We believe that widely accepted standards that allow free movement of *spatial data and interoperability* between applications is critical to growth of spatial information management over the long term. [Emphasis added]

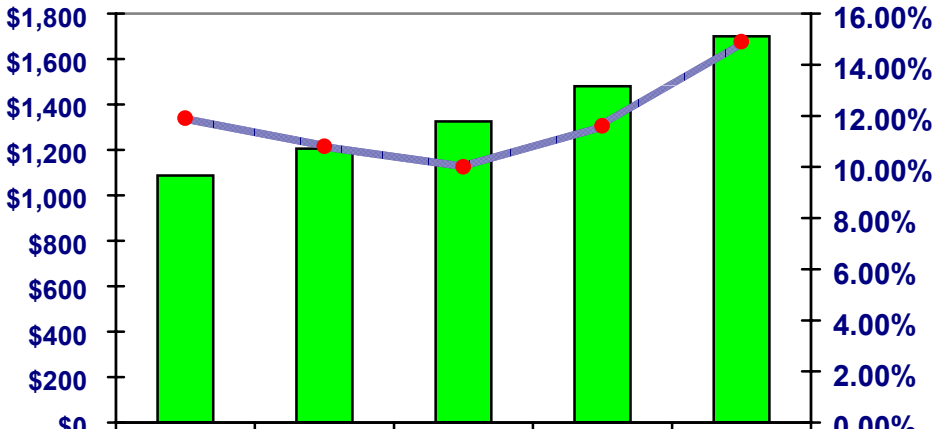
Summarizing the traditional industry's opportunities and barriers, they note:

> We see two primary barriers to entry for spatial information technology vendors.
>
> We can illustrate the basis for these barriers by looking at the mapping/ analysis process.
>
> To accomplish a specific task with a mapping package, the user must:
>
> 1) assemble appropriate data;

players will be how to add their knowledge of spatial value to more general, less-specialized business and personal productivity products and functions, and Internet Portals.

The current size and expected growth rates for the market for GIS Systems looks like this:[56]

Worldwide GIS System Sales



	1998	1999	2000	2001	2002
Sales ($bil)	$1,087	$1,205	$1,326	$1,480	$1,700
Growth Rate	11.90%	10.80%	10.00%	11.60%	14.90%

---

2) select and use appropriate functions to create a result.

The first step, *assemble appropriate data*, requires the user to have a working knowledge of concepts like scale, accuracy, and resolution. The user must also be able to join geographic reference data, like a street map, with their own data, like a customer list. This knowledge requirement is well outside most users expectations for personal productivity applications. To complicate matters further commercially available spatial data is not packaged for individual use. ***A user with a $299 dollar mapping application may find that a local digital street map costs five to fifty times more than the software***. [Emphasis added. NB: Since this Bulletin, the prices for general street maps have declined to $99 or less for major metropolitan centers, but the cost and scarcity of spatial data layers that make the street map mean something remain high.]

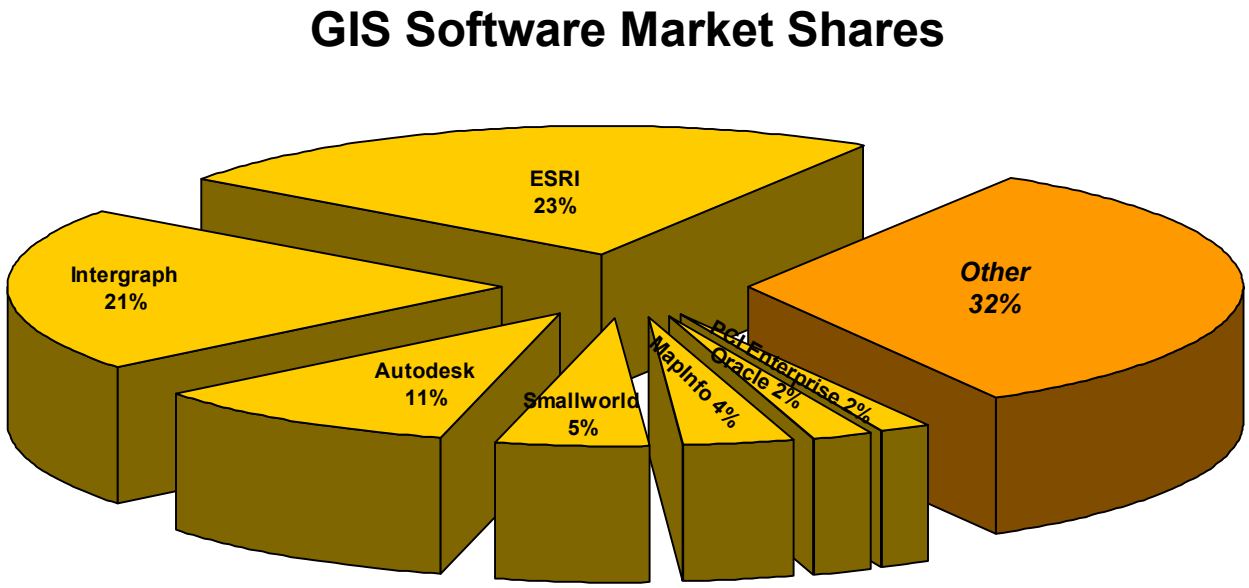
The second step, *select and use appropriate functions to create a result*, requires the user to understand spatial modeling and analysis or at least simple map display. Again, this knowledge requirement is well outside most users expectations for personal productivity applications.

To work with groupware or desktop databases, geospatial technology will have to be available from within the main application. Example: The ablity to map contact addresses from within Lotus Notes using a simple menu pick. In short, to make SIM applications acceptable in the personal productivity space, spatial data and applications will have to be as intuitive, easy to use and inexpensive as spreadsheets or desktop databases.

The ecosystem leader in the personal productivity market is Microsoft. Spatial information management vendors who want to compete in this market will have to operate within Microsoft's framework, at least on the desktop.

[56] Worldwide Sales Figures from International Data Corporation study quoted in Paul Korzeniowski, Utilities explore a brave new world of maps (*Utility Business*, July 1999) Vol. 2, Issue 7, pp. 44-8.

The companies who participate in the GIS Industry share these revenues as follows:



Statistics on companies involved in the GIS industry are summarized below:[57]

[This section may be updated with newer IDC data]

	~~Ownership~~	Market ~~Cap ($Bil)~~	Years ~~in GIS~~	GIS Market ~~Share~~	Total ~~Sales ($mil)~~	Sales ~~Abroad~~	~~Employees~~	Growth in ~~Employees~~
Autodesk	Public (ADSK)	$1.90		10.5%				
Bentley	Private	N/A	15		$175	?	960	46% in 1998
ESRI	Private	N/A	30	24.0%	$250	25%	2,000	0%
IBM	Public (IBM)	$214.50						
Intergraph	Public (INGR)	$0.24	30	20.6%	$1,124	25%	7,700	10% reducti
Lockheed (Parent)	Public (LMT)	$8.20	30		$28,069	25%	170,000	0%
MapInfo	Public (MAPS)	$0.21	13	3.7%	$47	25%	500	38% in 1998
Microsoft	Public (MSFT)	$547.00	3					
Oracle	Public (ORCL)	$168.70		1.9%	$7,144	(excluded)	36,802	
Other		N/A		32.8%				
PCI Geomatics	Private	N/A		1.7%				
Smallworld	Public (SWLDY	$0.08		4.8%				
Sun	Public (SUNW)	$136.20			$9,790	?	26,343	5%

These numbers describe companies managed, staffed and capitalized to pursue multiple IRM businesses and operating platforms. Spatial Data and geo-processing contribute to these revenues

[57] Taken from CorpTech, Directory of Technology Companies (14th US Edition, 1999). Market capitalizations represent the value of outstanding common stock in publicly-held companies as of January 20, 2000, http://www.bigcharts.com.

and profitability. A company's size and historic experience in GIS is no assurance of success[58] and needs inspiration to be parlayed into other market segments using new corporate strategies and market mechanisms.

The Need for a Thorough Analysis of Spatial Data Market Dynamics

If Spatial Data makes up as much as 80% of the cost for GIS projects, the above market figures (with room for some overlap) represent only the 20-25% of projects that are hardware, software, network and systems integration, and omit the costs for Spatial Data. A pre-Digital Economy (circa 1991) study found that the relationships among hardware: software: spatial data are on the order of 1: 10: 100.[59] No doubt the Web's ubiquity and the role that data as content plays may have altered this interrelationship for investors in Spatial Information Systems. Other than the citations herein, research has not uncovered a thorough circa-Digital Economy study (post 1998) of the market size, players and customers for *Spatial Data* (as distinct from Spatial Technology, hardware, software and services) supply and demand, and of the direct and indirect value of Spatial Data as part of Gross Domestic Product or other measure of the Digital Economy.[60]

---

[58] See the discussion of gas companies and the value of converting customers to electricity, at fn 60.

[59] Frank, Egenhofer & Kuhn, *A Perspective on GIS Technology in the Nineties* (Photogrammetric Engineering and Remote Sensing - November 1991), Vol. 57 No. 11, p. 1432. Frank et al. were conservatively prescient in their forecasts for hardware speed and storage and software functionality by the end of the 1990s. However, their recommendation (Id, p. 1435) for better metrics to predict the benefits of GIS has yet to result in an accepted methodology and as a Framework driver for collaborative effort such as the NSDI.

[60] Valuing technologies that serve ubiquitous functions is often difficult as the technology begins its ascent into general use. As Allen R. Foote stated in *The Economic Value of Electric Light and Power* (1889), at p.8:

> *The Economic Value of Electric Light and Power* can not be developed to the point of greatest benefit to the users of Electric Service, by inventors and manufacturers alone. The realization of the advantages of Electricity by the people now depends largely upon the economic conditions fixed for its *Production and Distribution* by state and municipal legislation, than upon any other factor. [Emphasis in original]

Foote was observing the conversion of industry from dependence on steam, gas and water power to electricity, and saying in effect: the value of this new technology depends on the economics organized by governments for its production and distribution.

He formulized the economic problem (at p. 19) to be solved as:

> That power is cheapest and most beneficial which can be subdivided among the largest number of users, with a decided advantage to each over his former method of obtaining power; or which gives new users power which they could not otherwise obtain.

And Foote solves his economic equation by predicting that:

> To obtain the best service at the least cost, three essential conditions must be complied with:
>
> First – An undivided demand [pool demand across all users]
> Second – An unrestricted privilege [producers should earn reasonable profits]
> Third – Permanent investment [capital must form to support the economic chain of events].

In valuing electricity, Foote catalogued its benefits & challenges:

- More Equal Access & Wider Distribution – tethered by wires vs. steam was very portable and water power followed & depended on (well) waterways
- Franchise Value for a City and its Citizens – attracts and retains businesses and residents who rely on the convenience of continuous, clean and affordable electric services. Without a Franchise, utilities would be unable to amortize (pre-Internet) their fixed infrastructure costs to generate and distribute electricity
- Public Health - Reduced pollution and environmental damage from not providing service of using other

Discussions of the NSDI often leave financing as the last agenda item, and sometimes feel like an exercise in "You go first…" Government looking for industry to step up to the plate, industry saying that the primary beneficiaries of an NSDI will be intergovernmental. If government is looking to industry (and its bankers) to raise the capital required to create the NSDI, the role of the market participants (traditional GIS and newer general software and data services companies), the size of their sales to customers of the products they make and their current capitalization are relevant (but not determinative). Of even greater importance to traditional GIS industry players responding to substantial dislocations and new market entrants is proving how an NSDI would increase the portion of the Digital Economy that is spatially-enabled,[61] and the revenue potential and longevity of that increased market.

The new private sector expectations of IRM functionality (epitomized by Data Warehousing and Internet services) and new patterns of investments in economic sectors outside of the Federal government (collectively **Other Sectors**) drive the future IT landscape and have reshaped the 1994 context for implementing Executive Order 12906 and the NSDI.[62] Contexts for programs change all the time, but once significant private sector change is recognized, it requires an adaptive shift in emphasis and adding new mechanisms to achieve federal goals. For instance, activities under other Executive Orders (like E.O. 12862[63] on September 11, 1993 establishing the Government Innovative Technology Solutions Board (**GITS Board**), and E.O. 13011 on July 16, 1996[64] establishing the CIO Council for Federal Agencies and expanding the GITS Board's intergovernmental responsibilities) now embrace *capital planning, outreach to the state and local governments and interoperability at all governmental levels and all private sectors*.[65]

Recognizing and exploiting these changes in the IT landscape will accelerate development of the

---

forms of power – steam required burning wood, coal and other particulate-producing substances

- Economies of Scale – instead of numerous steam and water power turbines scattered throughout a city, businesses could depend on the larger capacity, cheaper maintenance and greater reliability of municipal electric plants.
- Continuity & Assurance of supply – as compared to the limitations on the wood, coal or other fuel producing steam power
- Public Safety – Cities required the electric light to replace dangerous gas streetlights, and to provide illumination for pedestrians and carriages throughout the night. Since cities required these services on all streets, the greater the demand for electric service by private customers, the cheaper the cost to achieve the public's safety. In addition, electricity could be produced more safely than steam, coal oil and gas power.
- Creates Wealth – municipal gas companies who enjoyed virtual monopolies were at first reticent to invest in providing electric services. Foote argued that if the traditional providers of energy services were unable or unwilling to enhance their services to the next technology, then they must make room for the new providers of the latest technology – electricity.

[61] The magnitude of the GNP impacts if industry "spatially-enables" the Digital Economy are suggested by the discussion in fn. 32 and statistics and trends cited elsewhere in this Chapter.

[62] For a timeline of other Strategic Events affecting GIS implementation today, see Appendix K, Ian Heywood, *Ten Years after Chorley: the future for geographic information*, Proceedings of a Conference held at the Royal Society of Cartography, in London on May 1, 1997, at p. 133, available at http://www.agi.org.uk/pages/publications/chorley.html (hereinafter **Beyond Chorley**).

[63] See http://www.gits.gov/htm/vision.htm#appb.

[64] See http://www.itpolicy.gsa.gov/regs/exo13011.htm.

[65] Generally, CIO Council, *Chief Information Officers Council Strategic Plan Fiscal Year 1999: Objective D – Capital Planning and Investment*, p. 18, at http://www.cio.gov. Also, the GITS Board has created I-TIPS: Information Technology Capital Planning Guide, at http://www.itips.gov.

NSDI vision.

Chapter 3. Procurement Patterns

The alignment of information technologies with business objectives must take place through changes in the financial planning and budgeting processes.

Paul A. Strassmann, *The Squandered Computer: Evaluating the Business Alignment of Information Technologies*[66]

Aligning Procurement & Investment Processes

Procurement of the "typical" public sector GIS today goes through the following steps, with the two sectors acting in defined roles:

Role Key:
Collaborator
Follower
Investor
Leader
User

Step	Public Sector Role	Private Sector Role
Project Need Identified	L	F
Project Scoping	L	F
User Feedback	L	F
Capital Planning Analysis	L	F
RFP Design	L	F
Bidding Process	L	F
Bid Selection	L	F
Contract Negotiation	C	C
Funding Allocation	I	F
Project Construction	F	L
User Quality Control	C	C
Project Change Orders	C	C
Re-Bid of Revised Project	L	F
Revised Capital Planning	I	
Delivery of GIS Products	F	L
Training Users	C	C
Website Access Opening	C	C

As the Table illustrates, the roles of the public and private sectors in building a GIS are characterized by unequal levels of risk and capital commitment, and therefore subject the participants to the

66 Paul A. Strassmann, *The Squandered Computer: Evaluating the Business Alignment of Information Technologies*, at http://www.strassmann.com/iep/squandered.html#exec.

opposing duties, rigors and tensions of traditional public works improvement processes.[67]

For technology projects launched in the dynamic environment of innovations led by the private sector, the public sector's reliance on stove-piped design, building, bidding and budgetary/capital processes warrants reexamination and change.

As IDC describes the situation for developing component parts of an IRM:[68]

> There is strong evidence that indicates that reducing requirements errors may be the single most effective way to improve project outcomes and assist us in delivering quality software on time and on budget. Studies performed at GTE, TRW and IBM and published in *IEEE Software*[69] show as much a 200:1 cost savings from finding errors in the maintenance stage of the software life-cycle. In a study performed at Raytheon also published in *IEEE Software*[70] reported that approximately 40% of the total project budget was spent in rework costs. A separate *IEEE Software*[71] study reports that the cost of rework can approach 50% in the largest software projects. Because of their large number and multiplying effect, finding and fixing requirement errors consumes between 70%-85% of total project rework costs.

An experienced industry veteran at Sun Microsystems describes the failure risk, cost and rate for Spatial Database identification, assembly, qualification, cleaning, assembly and maintenance as follows:[72]

> At the OGC's Federal Special Interest Group (Fed-SIG) meeting at the USGS in Reston on April 13th [1999], there was considerable discussion about the advantages of several Federal Pilot Project's use of the OGC Web Mapping Testbed.
>
> The true value of a ready-made, web-enabled, pre-constructed set of digital geographic data can only be truly appreciated if one understands the significant project time, budget, and personnel time consumed in the geographic database building process.
>
> In 1982, while employed as a Staff Research Associate at the University of California, the GIS/RS Lab Director and I did an informal study of GIS and Image Processing analyst's use of project time and funds.
>
> In the subsequent 17 years I have continued to monitor for significant changes in the distribution of the analyst's time allocations. It has changed VERY LITTLE in the last 17 years.
>
> Essentially, [a typical] GeoData-based project looks like this...
>
> > 75% (50-80%) of project time is spent BUILDING THE DATABASE.
> >
> > Of the remaining 25% project time, 75% is spent navigating from image, to map, to

---

67 For an example of balancing these tensions in the procurement process through incentives management, see the NOAA-MapTech CRADA on p. 67.

68 David Sonnen (ISSI) and Henry Morris (IDC), *VISION*Solutions – Municipal Application Partnership: Reducing Cost and Risk through Joint Development* (Data Warehousing and Information Access Bulletin, July 1998), at p. 17.

69 B. Boehm and C. Papaccio, *Understanding and Controlling Software Costs* (IEEE Transactions of Software Engineering, October, 1988)

70 R. Dion, *Process Improvement and the Corporate Balance Sheet* (IEEE Software, July 1993)

71 F. Sheldon et al., *Reliability Measurement from Theory to Practice* (IEEE Software, July 1992)

72 Email, dated April 26, 1999, from Michael Cosentino (Geospatial Market Development Manager - Sun Microsystems, Inc., Palo Alto, California).

ground photos, etc.

THEREFORE

ONLY 6.25% OF PROJECT TIME IS SPENT DOING WHAT THE PROJECT IS ABOUT

This is not an overstatement in any way...in fact, when presented to experienced analysts, they often say that estimates of 75-80% database building time is too LOW.

In 1994, the procurement officer (Stan Bain) for the US Forest Service Procurement, Project 615 said that many projects are cancelled because of the inability to build the database in a timely manner. He also said that ANY technology or processes that could cut this time down would be fiscally prudent for a wide range of federal projects.

I can go into great detail on specific problems encountered in building a geographic database, but suffice it to say that a ready-made, web-enabled, pre-constructed set of digital geographic data can provide great value to federal pilot projects [and by extension all other Spatial Data users]. It can reduce the database building effort, while allowing researchers to spend more time on the specific issues related to the project, rather than the generic issues of building a geographic database - thus, greater bang for the buck. [Emphasis in the original]

As each state, county, regional and tribal government (and their counterparts in business, academic and non-profit sectors) copes with Spatial Technology procurement, legacy GIS and Spatial Data optimization to meet Federal and shared programmatic requirements, the savings of jointly specifying and procuring adaptable solutions should become more attractive. Thus, procurement pooling may be a key business justification for participating in the NSDI strategy.

Leveraging Intergovernmental Procurement & Investment

By statute and Executive Order, Federal Agencies are changing how they buy IT for internal use (i.e., within the procuring agency).[73] The Federal CIO Council and the Energy Department have teamed up to create I-TIPS: Information Technology Investment Portfolio System to improve Agency IT investment analysis and to move IT analysis into a shared context for procurement and funding.[74] In

---

[73] OMB, *Multiagency contracts under the Information Technology Management Reform Act of 1996* (M-97-07, February 26, 1997), at http://www.cio.gov/m9707omb.htm. Generally, see GAO's Summary of Relevant Legislation and Executive Branch Guidance on IT Procurement, starting at p. 203 below and http://www.gao.gov/policy/itguide/criteria.htm, and note that E.O. 12906 is not referenced. Also see, *Capital Considerations - Performance-oriented requirements for buying and managing assets are spurring the evolution of capital management* (Government Executive Magazine, February 1999), at http://www.govexec.com/gpp/0299capital.htm. For the British government-wide benefit of shared data development and exchange, see Shaun Leslie, Finance And Administration Magazine (July 1998), as reprinted on http://www.agi.org.uk/pages/whatsnew/director/genarticles/fandaAug98.htm.

Unfortunately, examples of Federal GIS Procurement using customized solutions (as opposed to open standards-based, COTS – Commercial Off The Shelf – products) still exist. See, Federal Computer Week, *Interior Kills ALMRS* [Bureau of Land Management's 15 year old $413 million Automated Land Mapping and Records System], (April 12, 1999), at http://www.fcw.com/pubs/fcw/1999/0412/fcw-newsalmrs-4-12-99.html, and *BLM Buys Possible ALMRS Proxy* (May 3, 1999), at http://athena.fcw.com/FCW/archive.nsf/Search+View/21522859784B420A8525678B004F65CC?OpenDocument.

[74] I-TIPS Online, at http://www.itips.gov/welcome.asp. I-TIPS is being used by 7 Agencies (Agriculture, Energy, Housing & Urban Development, Labor, General Services Administration, Small Business Administration and Treasury,) and the District of Columbia. I-TIPS Online, at http://www.itips.gov/users.asp.

Britain, the Ordnance Survey, realizing its serves spatial data products to government and private customers for spatial data products, transformed itself into a performance-based organization (**PBO**), and in the process reduced taxpayer cost for national mapping to 1/8th of its 1992/93 funding level.[75]

However, such intra- and inter-Agency initiatives are not yet routine parts of federally-funded IT procurement by state, local and tribal "customers" of Federal programs. This is starting to slowly change: Launched in 1997, EPA's One Stop Reporting Initiative offers (small) $500,000 grants for states to engage in a dialogue that would standardize environmental reporting information processing and procedures.[76] Yet these regulations do not incentivize State Departments of Environmental Conservation to purchase or capital plan for the GIS the State uses to carry out EPA programs. Thus, each State DEC (like all other State Agencies in carrying out their federal mandates) uses its state procurement mechanisms and local expertise.

States are already looking for ways to integrate state agency and municipal technology procurements and operations.[77] In some States, the IT Department may be leading this procurement effort, but unaware or distracted from the procurement opportunities of collaborating with Federal Agencies on Spatial Technology and Spatial Data development. NAPA identified the range of intergovernmental coordination that is possible when the Governor of a State (Utah's Governor Michael Leavitt) signs a memorandum of understanding for Spatial Data sharing and integration with 9 federal agencies operating in his state funded primarily through cost savings and reducing duplicate procurements.[78] Significant training in procurement methodology will be needed to identify and realize the benefits of

---

[75] See, Ordnance Survey 1997/98 Annual Report, at http://www.ordsvy.gov.uk/about_us/anreport/report78/ab/fwd.htm.

[76] See, http://www.epa.gov/reinvent/onestop/about/status1.htm. Significantly, by 2003 EPA hopes all 50 states are active participants in One Stop. Consider the IT infrastructure standards and procedures needed to nationally implement One Stop's Interoperability, and how the state and local contributions of IT infrastructure will be made available.

[77] Chapter 319, New Hampshire 1999 Session Laws (September 14, 1999), at http://www.state.nh.us/gencourt/bills/99bills/sb0124.html creates a state senate-house committee to "investigate specific measures which would promote the integration of technology at the state, county, and municipal levels for the mutual benefit of all entities and the citizens of the state of New Hampshire." Government Technology, *Bill: Committee Eyes Technology Integration* (February 23, 1999), at http://govt-tech.govtech.net/onlineservices/news/Feb2399-3.shtm.

[78] NAPA Study, p. 94. "The Utah Digital Spatial Data Sharing and Integration Project was established by a Memorandum of Understanding (MOU) in October 1997. The agreement calls for the sharing and exchanging of non-sensitive digital spatial information between federal, state, and local agencies, universities, and Native Americans in Utah. The MOU was signed by the Governor for the State of Utah, National Park Service, Bureau of Reclamation, Bureau of Land Management, Natural Resources Conservation Service, U.S. Geological Survey, U.S. Forest Service, Environmental Protection Agency and the U.S. Army Corps of Engineers." USGS National Mapping Program Partnership Mechanisms, at http://rmmcweb.cr.usgs.gov/~ekadams/lancepg2/html/utah.htm. The MOU's text is available at http://www.its.state.ut.us/agrc/html/gisac1.html. The MOU's partnership has been hailed by Governor Leavitt as a "Victory for Common Sense," (Earth Observer September/October 1997), at http://eospso.gsfc.nasa.gov/eos_observ/9_10_97/p30.html.

Research would be worthwhile to better understand the coordinated investments made by the MOU's members, the savings they have individually or collectively enjoyed and the methods used to vet procurements expeditiously under the MOU.

Studies of similar data sharing consortia have explained much of the functional and operational characteristics they share. John D. Evans, Infrastructures for sharing geographic information among environmental agencies (June 1997), at http://web.mit.edu/jdevans/thesis/thesis.html. But studies have left the financial and operational aspects of consortia somewhat hidden from view.

coordinated purchasing power.[79] Annual budget cycle impacts on cross-agency and intergovernmental procurements could be reduced as the number of institutions pooling their procurements grows and as external modes of long-term financing require multi-year capital commitments for shared procurements.[80]

California was early to recognize the value of formulating a coherent State IT policy and CIO office, and has as one of its goals to consolidate data operations and to partner with other states in developing IT.[81] Yet California's guidelines for projects under the State's $2 billion IT budget[82] only vaguely imply that State Agency contracting officers should review opportunities for Federal or sister state programmatic or Agency investment or procurement.[83] From a national planning perspective, California's proprietary telecommunications network CALNET delivers voice and data services to 85% of all State agencies and is being studied for privatization or public-private partnering[84] – state developments that could be leveraged by Federal Agencies to provide essential bandwidth for moving Spatial Data at reduced costs.

State Procurements now can take advantage of the GSA: General Services Administration's Contract, which represents a "ceiling" on commodity prices for IT hardware and software components. How these components are assembled, the services required to integrate legacy and real-time data sources and build out access over a secure network to support the NSDI in practice is not spelled out in the GSA Contract, nor could or should it be. While State Contracting Officers have been innovative in forming bulk purchasing alliances for hardware, software and on-line services,[85] the reforms they are pursuing for IT generally[86] are not sufficient to implement the FGDC's Framework metadata, data content and data transfer standards.[87]

---

[79] Local issues and practices will determine adoption of new procurement options.

Succinctly, as officials responsible for the intelligent transportation system (**ITS**) have discovered, "[p]rocuring ITS is not the same as buying concrete", John A. Volpe National Transportation Systems Center - Policy and Technology Analysis Division, *National ITS Architecture Consistency: Summary of Findings* (April 1998), at http://www.itsdocs.fhwa.dot.gov/jpodocs/proceedn/41q01!.htm.

[80] Western Governors Association Military Munitions Working Group (Final Report September 30, 1999) notes the discontinuity that annual budget cycle dependence causes for cross-cutting groups risk losing when addressing shared problems (in this case an effort funded by Department of Defense to locate and deal with exploded and unexploded munitions and their safety and environmental remediation).

[81] State of California Department of Information Technology, at http://www.doit.ca.gov/About/History.asp.

[82] State of California Department of Information Technology, at http://www.doit.ca.gov/About/History.asp.

[83] State of California Department of Information Technology, *Information Technology: Project Initiation & Approval Report* (December 1, 1997), at http://www.doit.ca.gov/Reports/DecemberReport.asp#Chapter3.

[84] State of California Department of Information Technology, *California Integrated Information Network: A Strategic Plan for CALNET and All State Telecommunications Networks* (December 1996), at http://www.doit.ca.gov/Reports/CIIN.asp.

[85] Even state libraries now pool their procurements of books, on-line services and supplies. See, National Association of State Purchasing Officers Best Practices, at http://www.naspo.org/pubs/Bestpractices/ny.htm.

[86] Joint Task Force of the National Association of State Purchasing Officials and the National Association of State Information Resource Executives, *Buying Smart: State Procurement Saves Millions - A report outlining recommendations to reform the government procurement process for information technology*, at http://www.naspo.org/pubs/buyingsmart.html.

[87] NAPA Study, Chapter 6: *Balancing the Roles and Functions of the Government and Private Sectors*, discusses the pros and cons of outsourcing, privatization, partnerships and other approaches to typical GIS functions. The NAPA discussion highlights (at pp. 175-7) divergent federal and state approaches to data pricing, and stops short of recommending model solutions.

Public Technology Inc. (**PTI**) and National Association of Counties' Financial Services Center (**NACo's FSC**) have shown innovative ways to jointly specify technology and financial procurements. Preceding the first wave of 1990s telephone rate wars, PTI negotiated municipal sharing of as much as 28% of AT&T long distance revenues from payphones situated on government property.[88] NACo's FSC operates a cooperative purchasing alliance of purchasing managers, and has negotiated advantageous computer purchasing, lease financing and general insurance coverages for member counties.[89]

Such inventive pooled bidding at least annually by public institutions for finance and technology would produce multiple benefits across the shared and proprietary public and private IT landscapes essential to GIS by:

1. Assisting community cooperation in daily procurement and investment decisions;
2. Standardizing procurement specifications reduce the delay for communities to achieve institutional consensus in authorizing GIS projects;
3. Improving vendor response times and price competition as specifications make it easier to prepare, compare and negotiate bids for technology services;
4. Improving accounting for GIS costs and budgeting across departments and institutions
5. Identifying key Spatial Data resources that otherwise escape notice on Clearinghouse or Data Inventories;
6. Where procurement specifications incorporate national criteria for NSDI and interoperability as appropriate for local data, metadata and systems, such procurements represent leverageable investments toward the national NSDI vision; and
7. Standardizing procurement specifications that reflect financial underwriting criteria would speed pooling of GIS debt and equity investments across such public and private institutions.[90]

Procurement alignment and pooling could solve decentralization issues that NAPA Study identified:[91]

> Studies by the U.S. Advisory Commission on Intergovernmental Relations (**ACIR**) found that the allocation of functions among the various levels of government hinges on the observed comparative advantages for *economic efficiency [savings], fiscal equity [who should pay],*

---

88 See, http://pti.nw.dc.us/products/att/payphone.html.

89 See, http://www.naco.org/programs/finance/fsc/programs.cfm.

90 Elements of such underwriting criteria are suggested in Chapter 9.

91 NAPA Study, p.153. [Emphasis and parenthetical information supplied].

Numerous studies of institutional obstacles that must overcome point to these common themes in other areas of data sharing and IT collaboration:

> When the ECLIPS (Eliminating Legal and Policy Barriers to Interoperable Government Systems) program of the Ohio Supercomputer Center studied barriers to interoperable systems, interviewees "repeatedly identified hardware and software problems of sharing data as modest when compared to such problems as identifying opportunities for sharing, aligning data definitions and providing political and economic incentives for the sharing of information."
>
> In fact, technology compatibility was not among the top four barriers Harvard [Kennedy School of Government] identified, which were: 1) funding constraints, 2) lack of trust and cultural conflicts between jurisdictions, 3) resistance to collaboration (skepticism) and 4) lack of political empowerment.

Lora Engdahl, *Intergovernmental Partnerships: Success Against the Odds* (The Public Innovator Magazine as posted on Access America 1998), at http://www.accessamerica.gov/docs/partnerships.html.

> *political accountability [who gets credit or blame and can fix the problem of operations or resources] and administrative effectiveness [how close to an activity can it be performed].* Seldom does it make sense to think about a whole function of government being best suited to a particular level of government; instead, the individual activities within the function are where the clear comparative advantages show up. ACIR found distinctions between the activities (or components of governmental functions) of planning, financing, staffing, administration, standard-setting, enforcement, service delivery, information and evaluation. It is logical to assume that many GI [Geographic Information] activities are appropriate for decentralized [non-federally dominant] execution.
>
> This approach is not without pitfalls, however. ACIR found that the devolution of federal responsibilities to state and local governments was often promising, but frequently required time-consuming state executive and/or legislative action and entailed politically difficult adjustments. *Transition devices, ACIR recommended, were needed to avoid sudden fiscal and administrative shocks; such devices should be consistent with the extent of decentralization, the simplicity of the plan, the certainty of alternative funding, the adequacy of future revenues and the effects on fiscal discipline.*

Procurement alignment and capital financing are appropriate *transition devices*. If intergovernmental and private sector procurement patterns can be identified (through data mandates[92] for example), these procurement patterns offer executives inside and outside of government a vast set of flexible opportunities for cost savings, pooled demand, pooled supply and, in turn, financing of Spatial Data and Spatial Information Services.

[92] Chapter 4 discusses data mandates in more detail.

Chapter 4. The Role for Federal IRM Policy & Existing Data Mandates

> Excluding Treasury Department information collections [for tax returns], regulatory and compliance reporting constitutes roughly ***70%*** of the information collection activity of the Federal Government.
>
> OMB-OIRA, *Information Collection Budget of the U.S. Government (FY 1998)*[93]

> Federal regulatory compliance costs US businesses $721 billion annually. Businesses deserve a return on this investment, and the costs and benefits of new regulatory mandates.
>
> U.S. Chamber of Commerce[94]

Welfare Reform. Environmental Conservation and Management. Healthcare. Transportation Planning. These and thousands of other federal programs[95] rely on state, regional, county, local and tribal governments (collectively, **Non-Federal Governments**, and the agencies within such Governments as **Non-Federal Agencies**) for implementation. Per capita across all state programs, U.S. Census estimates that intergovernmental revenues were $867.30 and intergovernmental expenditures were $989.14 in 1997, leaving a net unfunded obligation of $121.84 or 12.3%.[96]

In order to qualify for each of these federal program mandates and track their results, Non-Federal Agencies must invest in IRM, both from capital and operating budgets. An example of such mandatory IRM is the 1996 Welfare Reform Act[97] that changed welfare from emphasizing accounting (where and how are federal dollars spent), to an adaptive, organic change approach that fosters access to family services, retraining and services that put people back to work (where clients find the services and learn the skills they to return to work).[98] Non-Federal Agencies and their non-profit

---

93 Information Collection Budget of the United States for Fiscal Year 1998 (Office of Management & Budget: Office of Information & Regulatory Affairs), Chapter 1, at http://www.cio.gov/icb/chap1.htm#reg:

> "The Federal Government collects information to verify compliance with Federal requirements by individuals, businesses, educational and nonprofit institutions, and State and local governments. The Federal Government also requires individuals, firms, and other entities to retain information or to disclose information to demonstrate compliance. This information is collected in different ways depending on the requirement."

94 U.S. Chamber of Commerce, *Accountability for Regulatory Mandates*, at http://www.uschamber.org/policy/6-environment/tba/tba_regulatory_mandates.htm, and *Letter to Rep. Jack Metcalf* (March 23, 1998), at http://www.uschamber.org/policy/6-environment/issues/lh032398.htm.

95 See generally Government Printing Office, *Catalogue of Federal Domestic Assistance*, http://www.gsa.gov/fdac/.

96 See, US Census: 1997 State Government Finances, http://www.census.gov/pub/govs/state/97states.xls.

97 The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PL 104-193), at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=104_cong_public_laws&docid=f:publ193.104, and the information collection systems requirements explicit and implicit in, among other provisions, 42 USC §§611 and 654.

98 Terrence A. Maxwell (Executive Director of the New York State Forum for Information Resource Management at the The Nelson A Rockefeller School of Government at State University of New York-Albany), *Welfare Reform and Information Management: Rewiring the Human Service System* (Rockefeller Reports, December 5, 1997), at http://rockinst.org/reports/rr05.html, identifies these hidden mandates:

> The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 places vast new

contractors have had to invest in new IRM capabilities to track welfare results stemming from greater flexibility and autonomy in local settings.[99] The Federal legislation set off a cascade of business

---

information burdens on state and local governments, the nonprofit sector, and even the private sector — and, of course, on the federal agencies responsible for interpreting the act's requirements and for receiving, analyzing, and reporting the data.

Ironically, federal reporting requirements detailed in the law emphasize measures of client behavior while in the welfare system, but do not contain measures of true outcomes, namely, the success of individuals in keeping jobs and improving their lives after welfare benefits terminate.

Information collection must be broader and more flexible, incorporating outcomes, environmental information, client demographics, services provided, and costs related to service provision, so that policy makers and managers in each state and locality can deduce effective treatments through data analysis.

The inter-relatedness of client problems argues for the need to integrate more information at the caseworker's desktop, as they struggle with day-to-day decisions about service delivery for individual families and clients.

In 1997, Dr. Maxwell went on to predict:

The information management challenges outlined above will require significant investments in information system upgrades, modifications and new purchases, as well as investments in worker training and education. A survey of states and territories undertaken in late 1996 by the National Governor's Association, the American Public Welfare Association, and the National Association of State Information Resource Executives, in cooperation with the federal Department of Health and Human Services, found that 27 states will need both new systems and upgrades to existing systems to comply with TANF [Temporary Assistance for Needy Families] requirements. Another 25 states will require upgrades of current systems, while one state reported the need to develop an entirely new system.

However, because of the factors noted in the previous sections, we predict that states will incur even greater changes to their information systems as a result of the Personal Responsibility Act than identified in the original state survey. We feel this because the survey uses traditional system designs as a baseline, and does not take into full account the significant sea changes in the three core areas, summarized below:

	Old Welfare System Design	New Welfare System Design
Infrastructure	Self-contained within welfare offices.	Encompasses the entire welfare service network, including all levels of government, nonprofit agencies, and for-profit corporations.
Applications	Targeted toward eligibility determination and periodic information maintenance.	Focused on active case management, outcome measurement, and continuous tracking.
Data	Data design, maintenance, and analysis contained within individual systems.	Data design, maintenance, and analysis cut across information systems and organizational boundaries.

Effective system design to meet these fundamental changes in the business of welfare services will likely require process re-engineering and development of new systems, not modification of traditional systems designed to meet entirely different business needs.

[99] Janet E. Raffel (The 21st Century League), *TANF, Act 35 and Pennsylvania's New Welfare System: A Review of the First Year of Implementation* (June 1998), pp. 11 and 116, at http://www.libertynet.org/21stcent/assets/tanf35.pdf, reports that caseworkers lack the technology to support the

process reengineering projects that make *open information* the tool for accomplishing *social policy*.[100]

---

increased caseloads and increased workloads per case/functions that have devolved on them.

[100] Government Technology, *Solutions: Welfare Reform Boosts Importance of Open Networks*, http://www.govtech.net/onlineservices/govcenter/solcenter/nortel/welfarereform.shtm [Emphasis supplied]:

> **Lay of the Land**
>
> Understanding the strategic IT requirements for delivering a new breed of welfare is the goal behind a comprehensive study conducted by the North Carolina Department of Health and Human Services. Vince Batts, chief information architect for the department's Division of Information Resources Management, worked with Moore, the division's chief technology officer, to assess the information needs of agency staff and the organizations with which they interact.
>
> Through focus group sessions held with caseworkers and others across the state, they found an overwhelming requirement to share information.
>
> **"[Caseworkers] need to be able to find out what services are available throughout the community ... to achieve the goal of self-sufficiency," said Batts.**
>
> What's more, intake information provided by clients to those caseworkers should flow throughout the health and human services system, he said. "Right now, with all the boundaries, that information doesn't flow. Citizens reveal the same information many times to many people." [Thus, questioning the role of security and privacy of such redundant and inconsistent information versus the efficiency and effectiveness of pooling public and private resources to solve the most needy's problem.]
>
> **Where's the Data?**
>
> Welfare reform also presents challenges that extend beyond information exchange. A significant hurdle involves finding the data needed to meet requirements like time-limited benefits and stay-in-school mandates, according to Russell Bohart, director of California's Department of Health and Welfare Data Center.
>
> "We've never kept track of how long you're on welfare in California, nor has any other state because there's never been a requirement to do that," he said. "We're scrambling to figure out how to get our current systems to track that stuff."
>
> Moreover, linking welfare benefits to school attendance creates the need to connect with hundreds of school districts, including small, rural facilities which may have no computer technology whatsoever, Bohart added.
>
> **"I think the Congress, when they passed [welfare reform], assumed that the data was all out there and available," he said. "And that is a false assumption." [Making welfare reform a set of new data mandates].**
>
> Of course, five-year time limits on benefits also introduce the need to track welfare recipients across state boundaries, a factor which may trigger staggering new complexities of its own.
>
> Bohart said the problem stems from the indefinite nature of the welfare reform initiative, which he describes as a 50-state experiment in improving the traditional social services safety net. While it may produce a number of creative solutions, that creativity makes state-to-state welfare tracking more difficult.
>
> "The state of Wisconsin is going to do their experiment. They're going to define welfare as one thing, and track how long recipients are receiving it," he explained. "But they may have a different definition of welfare than we have in California. What counts, and what doesn't count?
>
> Clearly, a set of national standards will be a necessary ingredient for success, said Bohart, adding that developing those standards demands strong national leadership.

Welfare reform information infrastructure requirements also showcase the changing role of funding IT:

> **Finding the Funds**
>
> Traditional funding processes also present potential roadblocks to reform efforts. "***The long-held practice of paying for IT projects according to the program they support simply doesn't fit anymore***," said [North Carolina Department of Health and Human Services. Vince Batts, chief information architect for the department's Division of Information Resources Management].
>
> That's because effective network infrastructure no longer follows a straight programmatic path, he said. Under welfare reform, information demands are driven by the unique self-sufficiency needs of each benefit recipient and may zigzag across agency and program boundaries.
>
> But financing methods haven't kept up, according to Batts. "**Today, there's not a clean, cross-program funding mechanism. That goes all the way back to the Feds. What we'd like to do is bring those monies in and allocate them across a single infrastructure to deliver various program capabilities."**
>
> **"We think that would be more cost-effective," he added. "But that would be breaking the mold."**
>
> Yet, a number of factors are beginning to crack the old pattern, said [Larry Singer, whose non-profit company, Public Interest Breakthroughs, helps governments use information technology to improve public services.] For example, welfare reform introduced block grants for the Temporary Assistance to Needy Families (TANIF) program, giving states wider latitude in how they use that federal funding.
>
> Another driver for change is the widespread realization that closed, "stovepipe" systems no longer meet the new business objectives of welfare agencies, he said. "Also, technologies have advanced to the point where people can build distributed systems with a higher level of confidence than in the past."

HUD's Consolidated Plan requirements for eligibility and administration display similar characteristics as data mandates reaching across all communities.[101] Likewise planning clean water and sewage treatment projects under EPA rules imposes data mandates.[102] And public health cancer studies impose data mandates.[103]

America includes rural and metropolitan areas. In States with heavy urban population centers, their rural population has the same right to expect Federal program administration using IT as those in the

---

101 HUD's Consolidated Planning approach is summarized in National Low Income Housing Coalition, *1999 Advocate's Resource Guide: Consolidated Plan*, http://www.nlihc.org/advocates/16.html. To see Philadelphia's approach to building an iconography to facilitate GIS in neighborhood modeling in support of community development corporations (CDCs are discussed in Chapter [A 9]), see Liza Casey and Tom Pederson, *Urbanizing GIS: Philadelphia's Strategy to Bring GIS to Neighborhood Planning*, http://pasture.ecn.purdue.edu/~aggrass/esri95/to150/p107.html.

102 CH2MHILL, *Orange Water and Sewer Authority North Carolina Data Reconnaissance* (Technical Memorandum #1 – December 16, 1998), http://www.owasa.org/masterplan/mp1.html.

103 National Cancer Institute, *Long Island Breast Cancer Study GIS Objectives/Task Areas* (from RFP N02-PC-85074-39), http://www-dccps.ims.nci.nih.gov/LIBCSP/objectives.html.

cities.[104] Identifying Federal IRM Mandates as a class of expenditures made by local governments would help understand and balance the rural-suburban-urban mix of IT investment environments needed to deliver a common level of IT infrastructure to all Americans.[105]

It has been estimated that federal regulatory burdens on American business run $721 billion annually,[106] of which some major portion reflects information creation, collection, processing and reporting transfers. When OMB[107] completes the analysis of the total burden of federal regulatory burden, a functional picture will emerge of the dynamic interdependence of Federal Agency IRM investments and compliance costs for federal regulatory burdens on the Other Sectors (business, state and local government, non-profits and academic institutions).

It is likely that the size of Non-Federal IRM Investments dwarf the IRM Investments of Federal Agencies for similar programs, as depicted above.[108]

---

[104] This analysis already applies to Telecommunications access. See, US Department of Commerce NTIA: National Telecommunications and Information Administration, *Survey of Rural Information Technologies* (NTIA Special Publication 95-33, September 1995), at http://www.its.bldrdoc.gov/pub/rural/es12.html

[105] See how the Transportation Equity Act for the 21st Century (TEA 21), takes this equity approach to funding Intelligent Transportation Systems (**ITS**) for urban and rural areas, Sections 5205(a)(2) and 5303(b), at http://www.fhwa.dot.gov/tea21/h2400-v.htm#5202. TEA 21 Section 5206 mandates that ITS be developed with interoperable standards.

[106] U.S. Chamber of Commerce, *Accountability for Regulatory Mandates*, http://www.uschamber.org/policy/6-environment/tba/tba_regulatory_mandates.htm. According to Louis Renjel - Associate Director of the U.S. Chamber of Commerce for Environment & Regulatory Affairs, the Chamber's figure of $721 billion comes from the work of Thomas Hopkins, referenced in SBA's Office of the Chief Counsel for Advocacy Report to Congress, *The Changing Burden of Regulation, paperwork and Tax Compliance on Small Business* (October 1995), at http://www.sbaonline.sba.gov/gopher/Legislation-And-Regulations/Burden/burd9.txt.

[107] Traditionally this requirement to account for regulatory burden has been an annual addition to the Appropriations Bill. Omnibus Consolidated Appropriations Act of 1998, [_____]. The Regulatory Right-To-Know Act of 1999 – HR 1074 (http://thomas.loc.gov/cgi-bin/query/D?c106:4:./temp/~c106N2ZjMe:e1971:) that has passed the House, and S 59 http://thomas.loc.gov/cgi-bin/query/C?c106:./temp/~c106MfaszF) that is pending before the Senate would permanently by statute require OMB (presumably OIRA) to annually inventory the costs and benefits of regulatory mandates with a view to achieving greater efficiency. The distinction between an annual Appropriation Bill mandate and a permanent statutory burden accounting suggest that the implicit IRM Mandates of governing and being governed are receiving more visibility.

[108] The absolute size of the Non-Federal Spatial IRM Investments is not known. In November 1998, Urban Logic, Inc. and OpenGIS Consortium proposed to the Intergovernmental Enterprise Panel that advises the President's GITS Board, that the characteristics of such Non-Federal Investments in spatial information should be more clearly understood.

An example of the Non-Federal investment in data mandates is Federal Energy Regulatory Commission Form 714, *Annual Electric Control and Planning Area Report*,

These Non-Federal investment patterns respond to local - not national - perceptions of need, capacity, financing, priority, standards, and talent.[109] The NAPA Study "identified 12 major public purposes of the federal government that now rely on [Spatial Data]", [110] and found that "[Spatial Data] functions performed by federal agencies and their present locations [inside the federal government] are as much an accident of history as they are a logical choice to meet today's and tomorrow's [Spatial Technology] needs."[111] Estimating that $1 billion is spent annually on narrowly-defined federal Spatial Data,[112] NAPA concluded that the Spatial Data by-products of these federal functions facilitated National Economic Sectors from real estate to insurance to agriculture to defense worth upwards of $3.5 trillion.[113] Due to the distance and faintness of federal Spatial Technology investment decisions and the limited mission of the federal Agency making such investment decision as perceived locally, federal IRM mandates have not resulted in a consistent patchwork of standardized Framework layers to support the NSDI's Goals.[114] Looking at the glass as half-full, however, this $1 billion suggests a pre-existing, perennial driver for Spatial Data demand and supply by the government agencies and businesses historically requiring the most robust level of geo-processing and accuracy that decision support tools can provide.[115]

Increasingly,[116] Federal Agencies will be encouraging comprehensive community IRM investment

---

http://www.ferc.fed.us/electric/f714/F714OVERVIEW.htm. FERC's explanation of its data mandate is compelling and reasonable:

> "The [Form 714] data will be used to obtain a broad picture of interconnected control area operations including comprehensive information of control area generation, actual and scheduled inter-control area power transfers, and load; and to prepare status reports on the electric utility industry including review of inter-control area bulk power trade information. Planning area data will be used to monitor forecasted demands by electric utility entities with fundamental demand responsibility, and to develop hourly demand characteristics."

Thousands of such examples exist, but the compilation of data mandates is outside the scope of this Report. The volume of these mandates should not be viewed as entirely wasteful, only the need to satisfy them separately without taking advantage of data warehousing and pooling techniques.

109 The informational distance in value perceptions between economic units (buyer-seller, borrower-lender, data source-data user) is known as I*nformational Asymmetry*, and is a common feature of financial and consumer market behavior. See generally R. Glenn Hubbard, *Asymmetric Information, Corporate Finance and Investment* (Univ. of Chicago Press 1990).

110 NAPA Study, Tables 3-1 and 3-2, pp. 41-43.

111 NAPA Study, p. xix.

112 NAPA Study, p. 4.

113 NAPA Study, Table 2-1. pp. 12-13.

114 Focusing on data mandates in the context of local NSDI efforts has ample precedent: In 1992, when the EPA's Environmental Finance Advisory Board considered reasons for increased creativity in public finance nationally, the EFAB saw unfunded federal environmental mandates as a key justification. See, EFAB, Public Sector Options to Finance Environmental Facilities (March 1992), at http://www.epa.gov/efinpage/public.htm.

115 See, IDC's Market Segment Analysis, at p. {___].

116 The President's FY 1998 Budget emphasized the value of pursuing these aligning efforts as an Administrative management initiative:

> Consolidate intergovernmental funding streams into Performance Partnerships: Performance Partnership grants with larger, more flexible funding pools [that] can replace small categorical grants, improving financial incentives, rewarding results, eliminating overlapping authorities, and cutting Federal overhead, micro-management, and paperwork. States or Tribes can now combine up to 15 separate Environmental Protection Agency funding streams across water, air, hazardous waste, and similar programs to improve environmental outcomes. Agriculture Department (USDA) State Directors

policies to coordinate and standardize local IRM investments for several federal programs using a single set of database protocols, metadata standards and reimbursement or funding options.[117] This aligning leadership to create robust products and integrate IT purchases that improve business processes and productivity is very similar to those driving Fortune 500 Companies to change their IT procurements.[118] Furthermore, Congress and OMB are sensitive to "identifying and cooperating in cross-governmental IT investments."[119] The White House and Congress are just beginning to tap the

---

can combine funding for 18 programs into three funding streams for rural housing, utilities and business or cooperative services.

See, Budget of the United States – Fiscal Year 1998, *Section IV Improving Performance in a Balanced Budget World*, at http://www.npr.gov/library/misc/budget.html.

With $2.6 million of federal transportation funding, 21 local governments around Grand Rapids Michigan are building a $15 million GIS and expect to achieve $55 million of savings over 15 years. Dan Carney, *Michigan Communities Launch Largest Regional GIS* (Civic.Com, June 1998), at http://www.idg.net/new_docids/michigan/defying/communities/information/developing/geographic/potential/benefits/new_docid_9-62327.html.

[117] The NAPA Study identified 2 major obstacles to achieving these efficiencies: First, serious impediments to coordination and efficiency now that the spatial data production and dissemination process has gone digital, and second, the lack of incentives to direct public and private funding toward ore coordination and efficiency. NAPA, p. 28. NAPA recommended establishing a "National Spatial Data Council" to identify and coordinate these assumed efficiencies. NAPA Study, pp. 74-100.

A part of the delay in investment partnering may be due to the inability to quantify the marginal benefits accruing locally (i.e., one stop data access and dissemination, interoperability with public and private customers and "investors," etc.) that offset the perceived marginal burdens (i.e., organizational interdependency, adoption of multi-participant data standards and procedures, alignment of capital investment priorities, additional IRM commitments, etc.)

The aggregate costs and benefits to individuals is known as the *Pareto Improvement*, and has been used by the U.S. Office of Technology Assessment to study the impacts of technology implementation. See, Kristin Shrader-Frechette, *Economic Evaluations of Technology*, as reprinted in Technology and Values (Rowman & Littlefield Publishers, Inc. 1997), at pp. 196-7. Shrader-Frechette points out that for certain technologies (cars, pesticides), the values ascribed by individual users as benefits and costs of technology change, may under- or over- count them by ignoring the distributional inequalities arising from where the user is. For instance, a farmer who uses pesticides to farm and increase crop yield will not immediately bear the cost to downstream landowners of remediating air pollution or contaminated ground-water. Similarly, the landowners will not enjoy the profits from the sale of farm crops, and can only recoup the diminished value of their land by suing to stop the pesticide use as a nuisance. She argues that the social benefits and the social costs for certain technologies (energy management, railroads) may not be quantifiable by reference to the market price among competing products. Id, at p. 200.

In trying to value such externalities, we are wisely cautioned against the engineer's temptation to define technology opportunities and problems "too narrowly to do justice to the complexity of real situations." See, Dorothy Nelkin, *The Politics of Housing Innovation* (1971), p. 88. Such narrowness of context may account has accounted for the inability of this Study to use the NSDI Framework Survey conducted by NSGIC: The National States Geographic Information Council to better understand where GIS fits in the overall context for investment private and public IT budgets. (Based on discussions in January 1999 with several advisors to and participants in the NSGIC Survey).

[118] Raymond Papp & Jerry Luftman, *Business and I/T Strategic Alignment: New Perspectives and Assessments*, at http://hsb.baylor.edu/ramsower/acis/papers/papp.htm.

[119] OMB Memorandum 97-12 (April 25, 1997), at http://www.cio.gov/docs/omb97-12.htm and OMB Circular A-11, Section 53, at http://www.whitehouse.gov/OMB/circulars/a11/s53.pdf, The Information Technology Management Reform Act of 1996 (**ITMRA**), 40 USC§5001 at http://cio.gov/s1124_en.htm, and the Basic Assumptions (Section 7) and Policy (Section 8) portions of OMB Memorandum A-130, Management of

impact of identifying and using finance mechanisms to weave a Spatial Information Infrastructure through such crosscutting activity.[120]

In the typical enterprise context (as discussed in Chapter 2 and Chapter 5), Spatial Information represents only a subset of the aggregate IRM Investments made by any Federal or Other Sector user. Thus, standards and efforts to coordinate Spatial Information compete for attention at the Non-Federal level with other technologies. For instance, out of a 1999 Capital Budget for IRM approaching $300 million, Massachusetts planned to spend only 3% ($10 million) on classic "GIS"[121] (as opposed to desktop geo-processing and web-enabled spatial query and decision support).

The FGDC's ongoing NSDI Framework development activities and recent interoperability specifications from OpenGIS ease the technical challenge of achieving this Federal vision. However as part of their planning and procurement criteria, planners and financial officers responsible for Non-Federal IRM procurement have not adopted (or perhaps clearly heard) the local financial rationale for leveraging the federal vision of how the Federal Programmatic Mandates they shoulder could be serviced through the NSDI.[122] As governments at all levels embrace electronic delivery of services to businesses and citizens and launch a wave investments in "e-government"/"citizen self-service" platforms, the opportunity again presents itself to spatially-enable these platforms, for other government processes to respond by becoming spatially-enabled and thus to *transactionally* build out the NSDI incrementally and rapidly.[123]

Congressional authority to gather IRM Mandates into their contextual and functional reality may already exist in diverse swatches of legislation aimed at targets beyond IRM. For example, Congress has authorized the Administration to seek opportunities for efficient intergovernmental cooperation in building basic infrastructure and community resources.[124]

Federal Information Resources (February 8, 1996), at http://www.whitehouse.gov/OMB/circulars/a130/a130.html#11. Federal legislation and executive branch guidance are discussed in Appendix B.

[120] A working dialogue among The White House, Congress, Agencies, industry, states, communities and other potential financing "partners" is required to get through the institutional reluctance to find and leverage such cross-cutting possibilities. The *scissors* it takes to cross-cut real world understanding and action in this area range from the June 9, 1999 hearing before the House Government Management, Information and Technology Subcommittee (http://www.house.gov/reform/gmit/hearings/testimony/990609h.htm), to the June 8-9, 1999 GeoData Forum (http://www.fgdc.gov/99Forum/) and the work of hundred of groups too numerous to mention.

[121] Information Technology Division of the Executive Office for Administration and Finance of the Commonwealth of Massachusetts, *Fiscal Year 1998 Report to the House and Senate Ways and Means Committees on Projects Funded by the Information Technology Bonds* (September 30, 1998), p.29. This $10 million represents only a single project, and other current projects (i.e., automated dispatch systems and Boston's Main Artery Relocation Project known as "The Big Dig") in the $300 million Capital Budget include Spatial Information elements as components.

[122] Various interviews with GIS personnel at state, county and city levels of government, utilities and universities are the basis for this statement.

[123] For background on the roots of "e-government", see EPA, *Electronic Delivery Opportunities and Issues*, http://es.epa.gov/program/p2dept/others/otarept.html, and Office of Technology Assessment's full report *Making Government Work: Electronic Delivery of Federal Services* (OTA-TCT-578 - September 1993), http://www.wws.princeton.edu/~ota/disk1/1993/9333_n.html.

[124] The Secretary of the Treasury and the Director of OMB have authority to enter into agreements for financing shared federal-state projects and priorities, and each Agency has the mandate to consult its intergovernmental colleagues on the most expedient use and plans for federal program development and administration. See, 31 USC 6501 et seq. and Executive Order No. 12372. By extension, indeed Congress

The justifications for retooling the ways that existing mandates are satisfied were well stated in Wyoming Governor Jim Gerringer's June 9, 1999 testimony before the House Subcommittee on Government Management, Information and Technology:[125]

> 1. Develop National Standards with Neighborhood Solutions - *Assign Responsibilities at the Most Appropriate Level*
> Geographic Information Systems, the data that enables them and the metadata that qualifies them, need standards of interchangeability and usability. But the standards should be nationally developed, not federally mandated. Local and state governments should collectively develop national metadata standards. Federal agency involvement should be primarily national administration and coordination. GIS programs and the use of the data should not include prescriptive measures on how they are to be used. States should develop data clearinghouses and regional applications to achieve results. A community can tailor plans to meet local conditions and priorities, thereby ensuring broad community support and ownership of the result. National standards could be accompanied by competitive grants and technical assistance to develop local capacity.
>
> 2. Work for Collaboration, Not Polarization - *Use Collaborative Processes to Break Down Barriers and Find Solutions*.
> The federal government in particular, relies on the old model of prescriptive enforcement that frequently leads to highly polarized constituencies. Successful GIS and results-centered applications are best accomplished through balanced, open and inclusive approaches where interested public and private stakeholders work together to develop locally based solutions. When we enable individual citizens and local communities to make decisions, we have collaborative approaches that yield greater satisfaction with the results. We then have broader public support with durable and productive working partnerships. Both private and public interests must have the incentive to provide resources to support these efforts. The primary cost would be borne by the affected public or private entity, with the federal government providing regulatory incentives or competitive grants that reward innovation.
>
> 3. Reward Results, Not Processes - *Move to Performance-Based Actions*
> Everyone wants to do the right thing. This will best be achieved when government actions are focused on results, not processes. Far too often, compliance with nationally developed goals is measured by whether an affected party has rigidly followed processes, rather than measuring whether any substantive goal was achieved. We must allow innovative approaches to achieve standards. Solving problems must take priority over mandated processes.
>
> 4. Credible Science for Proper Priorities - *Separate Subjective Choices from Objective Data Gathering*
> Competing interests too often seek the science that supports their view rather than letting the underlying facts frame the choices to be made. The collaborative process requires scientific

---

may have mandated that the President's Cabinet seek ways to optimize the flow of federal dollars into intergovernmental IRM. Also, see Appendix B.

[125] See, Testimony of Governor Jim Geringer before the House Government Management, Information and Technology Subcommittee, at http://www.house.gov/reform/gmit/hearings/testimony/990609jg.htm, and the discussion at p. 88 below.

evidence to arrive at policy decisions. With credible science, we can move away from debates about whose data is right and instead, contend over values and solutions.

5. Markets Before Mandates - *Let the market determine the most appropriate approach.*
We want to achieve the delivery of public and private services at the lowest optimum cost to society. Governments are especially notorious for requiring the use of specific technologies and processes to achieve results. Prescriptive approaches reward litigation rather than cooperation and delay is the enemy of achievement. Mandates cripple incentives for technological innovation, increase animosity between government, industry and the public and increase the cost of government services. Market-based approaches and economic incentives can result in more efficient and cost-effective results that lead to timely use of data and geographic information systems.

6. Change A Heart, Change A Nation - *Personal understanding of the issues is Crucial to Quality Governing*
Governments at all levels can develop policies, programs and procedures for delivering services. Yet success ultimately depends upon the daily choices and individual perspectives of our citizens. Beginning with the nation's youth, all of our citizens need to be empowered to take greater responsibilities for what they have expected from government. They need to understand the importance of personal responsibility for themselves as well as for future generations. If we enable our citizens with data that enables decisions, they will understand that their direct participation is critical to the social and economic health of the nation. Government can enable local capacity to engage the people.

7. Measuring Marginal Benefits and Overall Costs - *Make Sure Decisions are Fully Informed*
The implementation of policies and programs should be guided by an assessment of the costs and benefits of different options. GIS can enable us to see the interrelationships of data and help measure the cost of attaining our results. The assessment of options should consider social, legal, economic, and political factors and enable a strategy for addressing the major costs.

8. Solutions Transcend Political Boundaries - *Today's Problems Need Regional Solutions.*
The challenges of governing today span political and agency boundaries. Solutions will often affect more than the geography of a single political jurisdiction. Federal and state agencies have concurrent jurisdictions and shared responsibilities. We work best when we consider watersheds, regional air quality issues, and biological and economic systems. Government agencies must recognize that good solutions come from understanding system interactions and interrelationships.

These are the eight principles that can be used to measure the effectiveness of any action you might take, Mr. Chairman, but they can be particularly effective for your consideration of geographic information systems, the data they will use, and the true potential of the solutions they inspire. The[y] map out a course toward cooperative, community-based solutions.

The most prevalent current use of GIS is to aid natural resource management. Geographic Information Systems and data are critical to providing an objective, scientific base of information for natural resource and environmental decisions. With GIS, we can move away from debates about whose data is right and instead, contend over values and solutions.
Let's build on our successes to date and expand everyone's thinking beyond the notion that GIS just means maps, geographic features and natural resource policies. GIS *is* those things, but the potential for GIS is unlimited, since every service of any level of government can in

some way, be associated with a spatial reference. The untapped potential for government means that any agency service that can be referenced to a location, can be categorized, tabulated by a characteristic or evaluated for its impact. For the private sector, we can neither imagine nor limit the extent of potential applications. Linking of tables and databases leverages single application programs to far greater usefulness.

I give my qualified, but enthusiastic, support to the effort to develop the National Spatial Data Infrastructure for broad public and private benefit. My principle qualification is that, as the NSDI is developed, it should be focused on citizen service and the democratization of information. In a Jeffersonian approach, GIS would promote us to another grade in democracy school. It gives equality and equity to each of us.

I support decisions that can be made at the community and regional level. Government's role is one of providing the resources, tools and information to enable our citizens to make good choices based upon reliable and qualified information.

Your actions from this oversight hearing should ensure that, whatever federal government structure comes of this effort, it should be a clearinghouse for quality, accurate, and easy to use information. We don't want a body that would dictate the outcomes of any application of the information nor would dictate the terms and conditions on the use of information other than that needed for proprietary or personal purposes. Government should not be the controller, but the enabler. Empower each of us as citizens.

Empowerment means being able to make decisions. Decisions come from information that has been evaluated and synthesized persuasively. Information that is developed or accumulated from several sources, must be objective and reliable. Quality data is critical. If we are to enable our citizens, we must provide information that is accessible and usable for the individual citizen at the community level.

Along with insuring access to data, we need connectivity to enable achievement. While GIS can use historical information, many applications need to be linked to the newest data that is applied as soon as it is updated. That means we need broadband connectivity within and among our states. Today, while high-density population centers have adequate connectivity, the cost of installation and access is still too high in all other areas. But increased usefulness enables use that, in turn, brings the cost down. Data backbones and increased bandwidth are best supplied by the private sector with government acting as the anchor tenant in using the system.

Mr. Chairman, the small device I'm holding is a commercial, off-the-shelf receiver for signals from the Global Positioning Satellite System, or GPS. The data processed by this GPS receiver can tell me exactly where on the Earth that I am. But unless I do something with that information, just knowing where I am is of little use if I don't know where I'm going. This GPS unit indicates that the Rayburn Office Building is at 38 degrees 58 minutes North latitude, 77 degrees, one minute West longitude. But so what? Even though this is spatial data in the most basic of terms, I need to link all the information, statistics and processes about this building, to enlighten its occupants and guide their actions.

The GPS has become inextricably linked to GIS. I had the privilege back in 1974 of helping to develop the launch vehicle that put the first GPS satellite into orbit in 1978. At that time, GPS was deemed to be useful only for navigation as part of military operations, particularly naval vessels. No one predicted 25 years ago what additional applications would spring from the

ability to determine the location of a person, a place or a map feature that could in turn, be linked to a wealth of economic, social, environmental, recreational, or transportation databases, to name a few. Our challenge is to enable people to make sense out of the data so that they can make decisions.

Change is the by-word of the day. All too often, change, technology, and complexity are synonymous, to many of our citizens. If we are to enabling GIS to serve our citizens, we must understand that technology, best applied, will be transparent to the user. Technology will take care if itself, if we focus on the end result, not the process of getting there. Our citizens will accept change, even profound long-term change if it brings optimism, of being secure in the outcome. People want systems that are easy to use or inviting in their application.

Last night I decided to look up the geographic coordinates for the United States Capitol by way of checking the U. S. Geological Survey data on the Web. Much of the geographic information that the federal government has on line is not really user friendly, nor is it intuitively applicable. I ended up finding the coordinates on two private web sites. Part of your challenge Mr. Chairman, will be to ensure that geographic information systems and data are available in terms that anybody can understand and apply. Just as you don't have to be an engineer to drive a car, neither should you have to be a techie to use spatial data. My experience has been that the private sector has developed more effective presentations and applications of GIS data than government has.

More than any time in history, governments are being asked to work faster, more efficiently, and be more responsive to their citizens. Government can put spatial information on line and automate many existing processes. That alone may increase service to the citizen, but we must substantially change how services are delivered. People need more access to, and more control of government services. Otherwise, we won't improve the quality or the efficiency of government. Simply put, don't just automate functions, TRANSFORM them! Single use applications of data are but the beginning. Understanding interrelationships make information powerful!

In order to enable direct participation, government must empower citizens. Rather than having a government that dictates the result and the process of getting there, why not let the people do that? When we give each individual the option of making life better by their own choices, they can choose how to make better lives for themselves, both socially and economically, with a corresponding decrease in need for government. Our federal government should be driven by and for the people.

The states are not employees of the federal government. We have governing responsibilities under law that cannot and should not be set aside, at the state level and at various levels of local government. I remind you that the federal government was created by the states, not vice-versa. In the public lands states such as Wyoming, we clearly have shared or concurrent jurisdiction with federal agencies. For instance, while the U. S. Forest Service and the Bureau of Land Management oversee much of the physical land management issues in the West, they are not the overall resource managers. The states have primacy over wildlife management, air quality, water quality, solid waste disposal and water rights management on those very same lands. Our shared responsibilities require a full partnership to properly discharge our individual responsibilities. That calls for integrated decisions and shared data. We need standardized approaches to data, with nationally developed standards and government administration. We don't want federally developed standards, but standards that represent our collective wisdom nationally.

The progress made so far by the National States Geographic Information Council, the Federal Geographic Data Committee and the National Association of Counties does begin to address geographic information systems and data issues, but many regional issues, particularly those unique to the West, are not adequately addressed. The Western Governors' Association has initiated a regional GIS Council to coordinate member state activities to facilitate regional and multi-state efforts. We intend to endorse or develop data standards as needed. We are including local governing bodies, tribal authorities, federal agencies as well as our state activities. Your support of regional efforts would be welcome.

We definitely need to improve the understanding by and insure participation of federal agencies for state and local spatial data coordination and development. Wyoming and our federal in-state partners recognized the need for coordination and data sharing when we began entering into various data-sharing agreements. The first was signed between the State of Wyoming and the Bureau of Land Management back in 1996. Since then, we have signed data-sharing agreements with the Forest Service, the Geological Survey, Bureau of Reclamation, Natural Resource Conservation Service and the Army Corps of Engineers. The good news is we've entered into at least six data sharing agreements over the past three years. The bad news is, we couldn't just sign one agreement with the federal government. As a state we have to work with each individual agency of government. That bothers me. Don't we have but one federal government? We should, Mr. Chairman, but we don't. We have allowed a culture to develop wherein each agency of the federal government has its own set of rules and regulations for the delivery of services and they seldom recognize the interrelationship of their data and decisions. The strength of GIS is to understand how databases can be linked and understood relationally. Why can't government be the same?

Our data systems are still structured on a model suited for a time that is past – not one prepared to meet the challenges of the future. The traditional data-and-decision model has a legion of government agencies, each at the center of an issue, often acting independently of each other, each dispensing their internally derived information or services, with citizens restricted to whatever information is doled out. The interrelationship of issues demands that we have coordination and cooperation between and among agencies. Our citizens are captive to government discretion. Our services at any level of government should not be agency driven but citizen drawn.

Our present federal process of resource management denies communities their democratic right to participate in decisions that affect them socially and economically. We don't have to continue that process. We should concentrate on making information available so that communities have the greatest opportunity to participate in decisions. Let them use Geographic Information Systems and related data to make decisions for themselves.

The Centers of Excellence in Rural America project jointly run by North Dakota and Wyoming is an example of empowering people at the community level. By providing connectivity and training, we are enabling people to enhance economic opportunity, provide better health care, improve education and preserve the high quality of life associated with rural America.

No individual person as the head of a federal agency should get to make a decision contrary to the will of our citizens. We have a system and a culture that perpetuates the old notion that data can only be gathered in an hierarchy where only a few at the top have access to the right information. Thus, only a few are allowed to make the substantive decisions. GIS

flattens out the bureaucracy. Government is most effective when it provides information for people to make decisions for themselves.

Our focus should be on enabling people to do more for themselves through improved access to services and information while accepting greater personal responsibility to direct those services. We are overwhelmed with data and inundated with information. We don't necessarily need more information. What we need are tools that enable us to make decisions, to distill information down so that a decision can be made. We are overwhelmed with information. Information is just disconnected until it enables a decision. Then it is powerful.

Geographic Information Systems, properly used, are the most significant applied technology since the advent of the World-Wide-Web and the Web Browser. Geographic Information Systems are also far more applicable than to just natural resource management. In the future, the applications that affect the economy, social programs, recreation and education will be far more widely used than mapping geographic and geologic features.
People will accept technologies such as GIS, when they are able to use them to solve every day problems, first in their communities, then on a national scale as they develop confidence. Remember the saying "Knowledge is Power?" Power is not in the hand of the keeper of knowledge; rather, power is in the hand of the one who applies it.

Our success in applying Geographic Information Systems to issues won't be measured by how much we spend but whether we achieve a desired result. Any proposal to continue to finance a national spatial data infrastructure, whether at the public government level or through the private sector, will depend upon our ability to define end results. Our institutions must deliver data that enables decisions that, in turn, deliver those results. Our society and our culture must change in order for GIS to achieve its full potential.

But you don't just tell people "go use GIS and come back with the results." People need to be trained and leadership encouraged by example. Sharing data is great, but you have to go through a series of quality control steps to assure confidence in the results.

Chapter 5. Y2K Proof of Data Interdependency

The NSDI and Geo-processing investments are part of the larger IT infrastructure for American society. The Year is 1999. In every part of our economy (public/private, federal, state, regional, county, local and tribal, university and non-profit), the Y2K Issue is absorbing vast amounts of energy, debate, contingency planning, genuine worry and IT investment capital to identify, reprogram, replace and remediate the Y2K legacy of heterogeneous computing platforms.

Y2K – A Data Mandate by Default

The Year 2000 bug (**Y2K**) fix, and the liabilities and budget commitments caused by Y2K, represent an IRM mandate by default.[126] International Data Corp. (**IDC**) estimates that from 1996 through 2001 total Y2K spending in the US will exceed $122 billion, and that such Y2K spending represents only 2.6% of overall IT spending ($4.7 trillion) for the period.[127] As the weak link in the IRM chain, the small fraction of total IT spending on Y2K masked its risks to the enterprise and the enterprises' interoperability with others.[128]

Chief among the Y2K vulnerabilities for many systems is *Data Interdependency*: the need for two systems to be Y2K compliant where data from the second system serves as input to the first. Where the second system is owned independently, say by another government or corporation, prioritizing Y2K remediation must be approved and funded by institutions.

Y2K remediation surveys are "mapping" system hardware and software by generic IT function for the first time - giving institutional users and IT policymakers robust reasons to achieve interoperability and data conformance. These Y2K Data Interdependency Maps represent a fertile area for studying institutional linkages, gaps and converging opportunities in our technologically dependent society.

Senate Finds Systemic Data Interdependencies and Intergovernmental Operability At The Heart of Y2K Concerns and Business Processes

Consider data interoperability spatially in the context of the intergovernmental experiences and interdependencies reported by the Senate Special Committee on the Year 2000 Problem of the 105th Congress:[129]

> **STATE AND LOCAL GOVERNMENT**
>
> **Overview** "In addition to the 50 state governments, there are 3,068 county government jurisdictions and approximately 87,000 other local government jurisdictions within the United States. These state, county, and local governments deliver the majority of the essential services upon which citizens rely each day. These include police, fire, and emergency

---

126 For a description of the Year 2000 bug, a review of the costs to identify and remediate it and the liabilities associated with Y2K issues in the federal government, see the President's Council on Year 2000 Conversion at http://www.y2k.gov. For how Y2K impacts everyday citizens and businesses in dealing with the federal government, see http://www.consumer.gov/year2000.htm, and for legal resources on Y2K see http://www.year2000.com/y2klawcenter.html.

127 See *The Worldwide Financial Impact of the Y2K Problem* at http://www.idcresearch.com/F/Ei/091798ei.htm.

128 See National State Auditors Association, *Year 2000: State Compliance Efforts Survey* (January 1999) http://www.state.il.us/auditor/y2k.htm; and, Notice, dated September 25, 1996, to all banks operating in New York State requiring participation in Year 2000 EDP Survey, http://www.banking.state.ny.us/year2000.htm.

129 See, Senate Special Committee on the Year 2000 Problem of the 105th Congress, *Investigating the Impact of the Year 2000 Problem* (February 24, 1999), at pp.113-5, http://www.senate.gov/~y2k/GenGov.pdf.

medical services response; financial support networks, including welfare and Medicaid payments; unemployment insurance payment systems; disability claims; and basic utilities, such as water and wastewater, sanitation, and local transportation systems. While the prospect of preparing federal government systems is daunting, the challenge of assuring the Y2K preparedness of these other sectors of government is even more mammoth. The consequences of failures in this sector are as potentially grave to the public as failures in the vital sectors of power and telecommunications.

Initiatives "Several of the largest intergovernmental councils and professional organizations are actively engaged in Y2K awareness programs. The National League of Cities, the National Association of Counties, and the International City/County Management Association, in conjunction with Public Technology, Inc., are sponsoring a Y2K awareness program entitled "Y2K and You." The Metropolitan Washington Council of Governments has published a Year 2000 Best Practice Manual. These programs are good examples of what an effective dialogue between state, county, and local governments can achieve. In his testimony before the Committee on October 2, 1998, the Honorable Michael O. Leavitt, governor of Utah and vice chairman of the National Governor's Association (NGA), described several NGA initiatives aimed at assisting the states with Y2K preparation. In July 1998, the NGA held a "Year 2000 State Summit" which focused on state, local, and private sector coordination and on establishing a common agenda to increase public confidence in state services. The NGA has also published an issue brief entitled "What Governors Need to Know About Y2K," which Governor Leavitt stated "outlines the steps governors should take as chief executive officers, guarantors of public safety, and public leaders." Both the State of Texas and the State of Pennsylvania have been recognized as having two of the most extensive and well-developed state Y2K programs. New York State Governor George Pataki has also been leading the call for Y2K preparedness in his state.

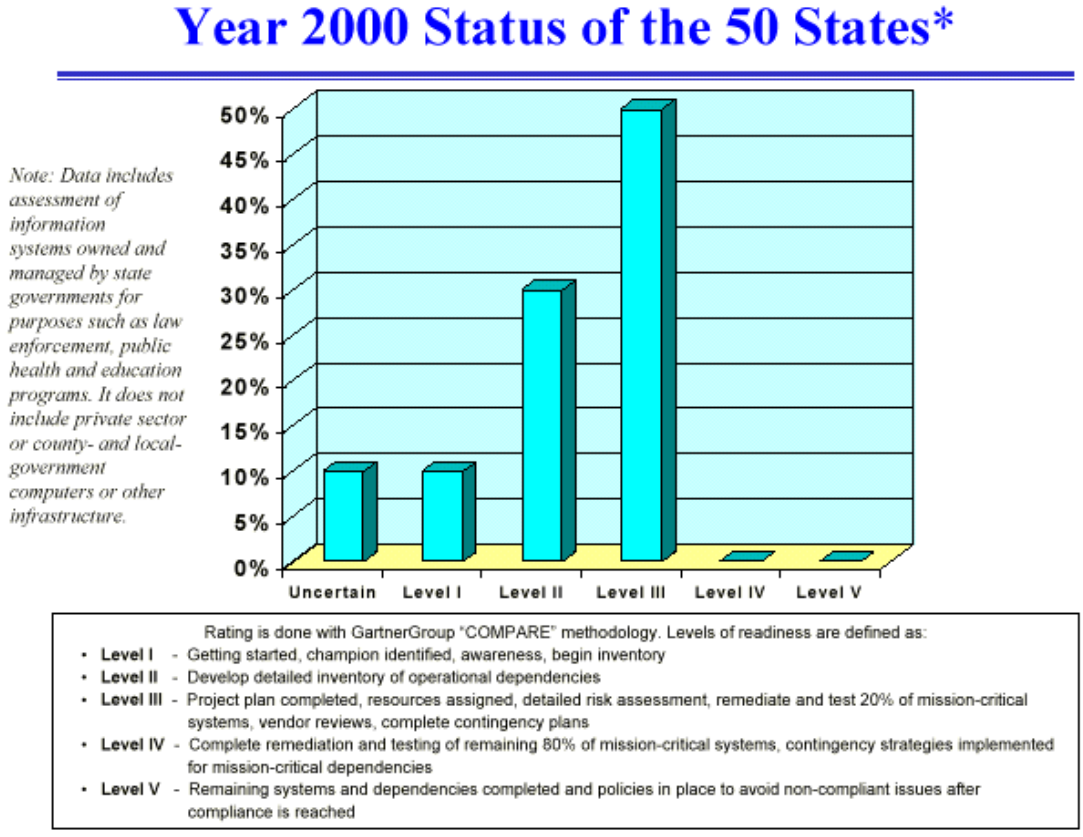
Assessments "The assessments of Y2K progress in the sector of state and local government are not optimistic. The National Association of State Information Resource Executives (NASIRE) is conducting a continuing survey of individual state Y2K preparedness. The Gartner Group has also conducted a state government Y2K survey. The National Association of Counties (NACO) recently commissioned National Research, Inc. to conduct a random survey of the Y2K status of county governments. The General Accounting Office (GAO) is examining the status of federal to state data exchanges. These include the vital connections through which funding from the federal government is provided to the states for various aid programs. Unemployment, for example, is federally funded, but state administered. The Department of Labor reported in December that the following states were behind in remediating their unemployment systems: Connecticut, Delaware, the District of Columbia, Hawaii, Illinois, Kansas, Louisiana, Massachusetts, Missouri, Montana, New Hampshire, New Mexico and Vermont. In his testimony before the Committee on October 2, 1998, John Thomas Flynn, CIO of the State of California, and president of NASIRE stated that compliance among the 50 states with all aspects of mission critical legacy systems ranged individually from under 10% complete, to more than 90% complete. According to the NASIRE survey results, just under half (24) of those responding had completed remediation of at least 50% of their mission-critical systems. Mr. Flynn noted that no state had declared itself 100% complete as yet.

"Data provided by the Gartner Group indicate that only 50% of the states are evaluated as at Level III Status under the Gartner Group's scale. A Level III rating indicates that the state has completed its project plan; has assigned resources; has completed a detailed risk assessment, remediated; and has tested 20% of mission-critical systems, conducted vendor reviews and has completed contingency plans. Thirty percent of the states are listed at Level

II, indicating that they at least have developed an inventory of operational dependencies. Ten percent of the states are evaluated as Level I, indicating that they have begun their projects, are aware of the problem, and have begun conducting their inventories. The remaining 10% are evaluated as “uncertain,” indicating they were unaware of their Y2K preparedness status.

"The GAO has advised that as of November 1998, 33 states had completed 75% of their verification of federal data exchanges. GAO found that as of June 30, 1998, approximately one half of the state disability determination systems had not been renovated, tested, and certified Y2K compliant. Additionally, over 90% of state Medicaid, 70% of state Temporary Assistance for Needy Families and 75% of the state Food Stamp Program systems were not Y2K compliant as of August 1998 according to GAO statistics. Survey data recently released by NACO, collected from 500 counties, indicate that only 50% of the respondents have countywide plans to address Y2K issues. Of the 16 counties with populations over 500,000, all but one have a countywide plan. Seventy-four of the 119 counties having populations below 10,000 reported that they have not prepared a Y2K plan. Fifty-four percent of the counties surveyed reported that they have no contingency plans for Y2K disruptions. Twenty-two percent reported that they had prepared Y2K contingency plans. Fifty percent of the largest counties in the survey stated that they have contingency plans, while only 19 of 119 counties in the smallest population group (population below 10,000) had one. The 500 survey respondents reported a total cost estimate of over $283 million for Y2K compliance. A survey published by the Office of the New York State Comptroller in September 1998 indicates that 100% of New York’s counties have made preparations for Y2K. Twenty-six percent of the cities, 54% of the towns, 48% of the villages and 61% of the fire districts reported that they had not made Y2K preparations.

Concerns "The [Senate Special Committee on the Year 2000 Problem] has serious concern about the Y2K readiness of state and local governments. This concern is supported by all of the previously cited surveys, which, when taken, together indicate a vast disparity in the readiness level of the individual states, and a disturbingly low overall level of preparedness on the part of county and local government jurisdictions."



The Lessons of Y2K for NSDI Implementation

In 1999, the highest priority for many IT professionals was Y2K. As banks discovered during the Savings & Loan Crisis of the early 1990s and the efforts of the Resolution Trust Corporation, crises gives us a chance to examine

- core processes,
- business products, and
- government-industry capabilities, significant participants and their roles.

This re-examination shapes how investment decisions need to be adjusted to institutional, market and technological realities.

For senior management of public government and private enterprise, Y2K may be the first time they confront the true value and dependence of their organization on its IT, as well as how their IT links affect the organization's commerce with the outside world.[130] Knowing what we now know, some observations and predictions can be made:

- NSDI and NSDI Clearinghouse activities may be important as a means to find and quickly bring online alternative Spatial Data for particular Framework layers that an institution or business finds

[130] For a current assessment of these public-private inter-relationships, see *The President's Council on Year 2000 Conversion: First Quarterly Summary of Assessment Information* (January 7, 1999), at http://www.y2k.gov/new/FINAL2.htm.

have become unavailable through Y2K-related problems;

- NSDI for emergency services in a shared, intergovernmental, interoperable platform may become essential to supplement Y2K dispatch concerns and capabilities of individual police, fire, environmental and defense units;[131]
- Y2K Data and Systems Inventories have been produced at enormous expense and in fine detail for the entire economy, and provide a wealth of knowledge as to legacy, incompatible and interoperable IT by functional department;[132] and
- The Data, Systems and Function Interdependency Charts compiled for Y2K map the economic relationships and business processes that drive future NSDI partnerships and other financing.

---

[131] GIS' contribution to filling in Y2K-bred information outages is suggested by studies showing emergency service's growing dependence on geo-processing. See, US Department of Commerce NTIA/TIIAP: The Telecommunications and Information Infrastructure Assistance Program, *Safety Nets: Protecting Lives and Property in the Information Age* (September 1998), at http://www.ntia.doc.gov/otiahome/tiiap/resources/safety1.htm#intro.

[132] For example, within the Federal government, a recent OMB Memorandum to Agency heads required a thorough inventory of mission-critical and other systems accounting for Y2K remediation expenditures and status. Jacob Lew (Director-OMB), Revised Reporting Guidance for Year 2000 Efforts (August 3, 1999), at http://cio.gov/aug3covernote.html. Overall, Y2K preparations costing upwards of $100 billion (roughly $365 per US resident) had a minor positive economic impact in 1999 (about 0.4% increase in GNP) and will likely have a minor negative impact (about 0.7% GNP decrease) in 2000. Robert J. Shapiro (Under Secretary, Economics and Statistics Administration of the U.S. Department of Commerce), *The Economics of Y2K and the Impact on the United States*, http://www.cio.gov/files/Y2k.pdf.

In many studies, most recently the 1998 NAPA Study,[133] financing is listed as a major barrier to widespread use of GIS:

> "Most federal, state, local and tribal government agencies are constrained by competing budget priorities in the pace with which they move forward on meeting the goals of Executive Order 12906 [to create an NSDI]. In particular, there are costs associated with creating metadata and software and data conversion for legacy data…Many states and localities have limited or no capabilities for [GIS] and data sets, and the funding required to have them be meaningful contributors to the NSDI far exceeds the federal resources provided so far…"[134]

FOIL, and the Pricing & Licensing of Public Information

Some communities charge fees for Spatial Data, or have entered into cooperative development arrangements with private companies to supply their government with essential Spatial Data in exchange for the commercial right to sell and license that data to others. This entrepreneurship is explained as government's response to capture for the public the value of its data - in essence, saying that otherwise taxpayers would be subsidizing private companies who take "free public data" and sell it at a profit.

Other communities have a strong policy of making Spatial Data (like any other information such to FOIL disclosure) available for free or virtually for free. They reason that the data was developed and paid for by taxpayers/citizens, so citizens should get what they have already paid for once, without paying for it twice. They see the access to raw Spatial Data as empowering citizens to question their government officials. [135] And they view private companies as performing a distribution service that government is not in business to perform, namely, enhancing and marketing public data so that it can be used outside of governmental agencies for private purposes.

In the context of the NSDI, concerns exist as to the macroeconomic value of assessing fees for access to spatial data developed at public expense.[136] The Federal policy as adopted by FGDC is to make NSDI Framework data available at the cost of distribution (virtually free).[137]

---

[133] Available from National Academy of Public Administration, p. 67, http://38.217.229.6/NAPA/NAPAPubs.nsf/00a36275d19681118525651d00620a03/229b79ae768d77e48525658c0061a3bd?OpenDocument. See also, American Forests, *Geographic Information Technology in Cities and Counties: A Nationwide Assessment* (1998) p. 65, available at http://www.amfor.org.

[134] NAPA Study, pp. 66-7.

[135] In this regard, see David Shenk, *Data Smog – Surviving the Information Glut* (1997), whose Ninth Law of Data Smog is that "the electronic town hall allows for speedy communication and bad decision-making" due to a failure to make access to online information *intelligent access* in the context of the policy issue and community involved.

[136] NAPA Study, *Impact of Pricing Policies and Intellectual Property Rights*, pp.175-177 [Reference Earl Epstein's work & NAPA]

[137] Contrast this approach with the SEC: Security and Exchange Commission's online access to corporate electronic securities filings. For free through SEC's Website EDGAR (http://www.sec.gov/edaux/searches.htm) , anyone can see the previous days' filings. For $19.95 per month through SMART-EDGAR, you can view the filing within minutes of the SEC's receipt of the information, and be automatically notified of your Watch List of company's SEC filings. Bloomberg Personal Finance, *Getting the Inside Scoop: When good information translates into profits, it pays to be an investigative investor* (January 29, 1999), at http://www.bloomberg.com/mag/ft_A9705_scp.html. Depending on the specialization, quality and currency of

The distinction between access to the data and access to online applications tools that manipulate the data is legally meaningful under many States' FOIL: Freedom of Information Laws, in that charging a "convenience fee" (something more than the cost of reproduction) for access online is permitted, while charging "fair use value" for a copy of the data available at City Hall is not.

Licensing follows data pricing as an intergovernmental variable that grows inconsistently as communities recognize copyright,[138] privacy,[139] commercial reuse, data liability, metadata and other

---

Spatial Data demanded and the uniqueness of pre-built applications provided to paying users, free market pricing structures could serve to enhance the politically-dependent funding for Spatial Data.

[138] As more Spatial Data appears online, copyright may become less of an obstacle. For instance, the GeoCommunity.Com website markets spatial data on behalf of its corporate and government sponsors and permits downloads of Spatial data in its GIS Depot *free of copyright*, http://www.geocomm.com/faq/20.html.

[139] Privacy of digital information (not just Spatial Data) is receiving more attention, as the Digital Economy heats up. Generally, EFF: Electronic Freedom Foundation (http://www.eff.org/pub/Privacy/); EPIC: Electronic Privacy Information Center (http://www.epic.org/); TRUSTe (http://www.truste.org/); The States NII Inventory Project (http://www.states.org/contents/access/); The Center for Democracy and Technology (http://www.cdt.org/privacy/); Georgetown Internet Privacy Policy Study for the FCC: Federal Communications Commission (http://www.msb.edu/faculty/culnanm/gippshome.html); Computer Professionals for Social Responsibility (http://www.cpsr.org/program/privacy/privacy.html); World Wide Web Consortium, *Platform for Privacy Preferences Project, http://www.w3.org/P3P/*.

One approach to digital privacy requires that the subject of individual identifying information in government and business records consent to the redistribution of such information for secondary governmental and private/non-governmental uses. Jeff Sovern, *Opting In, Opting Out, or No Options At All: The Fight for Control of Personal Information* (October 1999) 74 Wash. L. Rev. 1033; William Safire, Op-Ed: *The Good Guys Win One At Last* (January 13, 2000), http://www.nyt.com/library/opinion/safire/011300safi.html, commenting on the U.S. Supreme Court's unanimous decision in *Janet Reno (Attorney General of the United States) v. Charlie Condon Attorney General of South Carolina)* (98-1464 January 12, 2000), http://supct.law.cornell.edu/supct/html/98-1464.ZO.html, to uphold the federal Drivers Privacy Protection Act that forbid state's sale of information on state driver's license applications without the driver applicant's consent (opting in). Also see the interoperability specifications for browsers that put users in greater control of the terms upon which they are being invited into individual Web pages and what is likely to be done with the user's individual browsing habit information, Laurence Lessig, *The Architecture of Privacy* (Draft 2 - April 3, 1998), http://cyber.law.harvard.edu/works/lessig/architecture_priv.pdf.

While the law rushes to catch up with technology, commercial advertisers are shying away from websites that fail to post privacy policies:

> Aiming to allay growing fears about privacy intrusions on the Internet and head off possible government regulation, International Business Machines Corp. has decided to pull its Internet advertising from any Web site in the U.S. or Canada that doesn't post clear privacy policies.
>
> Such policies typically tell Web surfers what information about them is being collected when they visit a site, and how it will be used, sold or otherwise disseminated for marketing purposes. IBM, the No. 2 advertiser on the Internet behind Microsoft Corp., estimates that only about 30% of the 800 sites where it advertises world-wide make such disclosures.

Jon G. Auerbach, *To Get IBM Ad, Sites Must Post Privacy Policies* (Wall Street Journal, March 31, 1999).

As of September 1, 1999, Federal Agencies were required to post privacy policies on their websites. See, Jacob J. Lew – OMB Director, Memorandum for the Heads of Executive Departments and Agencies, *Privacy Policies on Federal Web Sites* (OMB M-99-18, June 2, 1999), at http://cio.gov/webprivl.htm. By May 1999, Federal Agencies were required to develop policies and administrative personnel and resources to protect the informational privacy of Americans:

> "It shall be the policy of the executive branch that agencies shall:
>
> (a) assure that their use of new information technologies sustain, and do not erode, the protections provided in all statutes relating to agency use, collection, and disclosure of personal information;

legal issues arising from the distribution and value of government data.[140] It is sufficient for this Report to recognize the competing interests in structuring how traditionally governmental data is created, stored, indexed, disseminated and foreseeably used.

Fiscal, business and social priorities lead each community to these disparate approaches to Spatial Data access. In turn, these decisions erect barriers (practical, legal and financial) to a uniformly accessible *national* Spatial Data Infrastructure. For instance, as each community's experience with GIS leads it to embrace a different licensing policy and amend its State's FOIL to accommodate that policy, the NSDI's accessibility is impacted - positively in some places, negatively in others.

Given the State sovereignty that these data access and pricing issues merit, careful thought must go into using the pricing and licensing models that exist nationally. State disparate approaches (and examples of successful data partnerships built on these approaches) form a permanent "limiting variable" on financing the NSDI and calls for a financing structure that is highly adaptable to pre-existing local considerations of "fair" data access. In turn, it also justifies developing a range of financing tools and incentives (some dependent on user fees, others on cost-savings/intergovernmental transfers, others on online advertising revenues, etc.) that all lead to creating a functional NSDI, because of the underwriting criteria common to such tools and incentives.

NAPA Study's Recommendations on Pricing Data and Data Access

The NAPA Study recommended that Federal Agencies should continue to make their Spatial Data collections available pursuant to the guidelines of OMB Circular A-130 - substantially adopting a cost of dissemination pricing strategy.[141] NAPA also recommended that Non-Federal Governments adopt the federal pricing policies.[142]

A policy of "virtually-free" access to Spatial Data turns Spatial Data from a rare commodity priced in the marketplace to a "public good", like a library or park. Due to intense competition among Websites featuring such content, the Internet's dominance will accelerate such "virtually-free" pricing. According to Forrester Research in commenting on the Internet's impact on financial information

---

(b) assure that personal information contained in Privacy Act systems of records be handled in full compliance with fair information practices as set out in the Privacy Act of 1974;

(c) evaluate legislative proposals involving collection, use, and disclosure of personal information by the Federal Government for consistency with the Privacy Act of 1974; and

(d) evaluate legislative proposals involving the collection, use, and disclosure of personal information by any entity, public or private, for consistency with the Privacy Principles."

See, Jacob J. Lew – OMB Director, Memorandum for the Heads of Executive Departments and Agencies, *Instructions on complying with President's Memorandum of May 14, 1998, Privacy and Personal Information in Federal Records*, (OMB M-99-05, January 7, 1999), at http://www.cio.gov/instrjjl.htm.

[140] As a member of the Legal Workgroup within New York State's GIS Committee, I have seen these issues debated in days of discussion. All stakeholders acting responsibly need to understand these issues and attempt to fashion appropriate policies.

These debates and discussions need not delay development of data sharing capacities. As technology, its costs, the value of non-governmental data and other motivators change, new public and private mechanisms should be used to accelerate the learning curve and to design appropriately protective safeguards. So too, as the Digital Economy's risks take hold, market and governmental "Best Practices" will drive de facto safeguards, setting a shifting floor for the level of safeguards that are reasonable for particular uses and types of data.

[141] NAPA Study, pp. 175-7.

[142] NAPA Study, p. 177.

services: ***The price of raw data in falling to zero***.[143]

If this pricing is assumed, then the search for revenues generated or attributable to NSDI-related IT investments must embrace two options: (1) market users willing to pay or partner with government directly or through data repackagers to increase co-investments in spatial data content that government would ordinarily not collect in its operations, and (2) intergovernmental transfers of funds. As reviewed in Chapter 4, Urban Logic is pursuing this intergovernmental transfers approach by

---

[143] Julio Gomez (Forrester Research), *Facing the Content Challenge* (February 1997), http://www.forrester.com/ER/Research/Report/Excerpt/0,1338,1990,FF.html, as cited in *Impact of the Internet on the Financial Information Services Industry: A Case Study of Bloomberg L.P.*, http://www.stanford.edu/~tmiranow/, which observes:

> In flooding the market for financial information, the emergence of these new information providers has led to a rapid decline in the price for information.
>
> "The price of raw data is falling to zero." [according to Forrester Research]
>
> Content is no longer scarce. Basic financial information has become a commodity. In order to compete, financial information providers must differentiate their offering in some fashion. Three strategies for differentiation have emerged in this new financial information paradigm.
>
> ***Value-added capabilities.*** While web-based sites have flooded the market for basic financial information, value-added analysis is still relatively scarce. Providing complex analytics remains a source of competitive advantage. For example, by strengthening its portfolio of analytical tools with its new Reuters 3000 product, Reuters has maintained a strong position within the industry.
>
> ***Proprietary information.*** In order to develop unique product offerings, many information providers have vertically-integrated to become content providers. As content providers they are able to develop proprietary sources of information, differentiating themselves from sites offering widely available data. Bridge Information has adopted such a strategy, purchasing Knight-Ridder and partnering with Automatic Data Processing (ADP).
>
> ***Quality information.*** While the Internet has helped to diffuse financial information, it has also created an issue of quality. Users of information obtained over the Internet have no way of checking its reliability. In this environment, brand reputation matters more than ever. Traditional players, such as Reuters and Bloomberg, have continued to emphasize brand-building activities in order to capture customers concerned about the reliability of the data they are using.
>
> The Internet has had a dramatic impact on the distribution of electronic financial information, once the exclusive tool of financial professionals. By dramatically reducing distribution costs, the Internet has made real time financial data available to millions at little or no cost over the web. In this environment, information providers must differentiate themselves through value-added capabilities, proprietary content and quality information in order to succeed.
>
> For traditional providers of financial information such as Bloomberg, the advent of the Internet represented a significant threat to existing closed networks. A study of Bloomberg's reaction to the Internet reveals a two-part strategy. First, the company has attempted to secure its core Analytics customer base by adding value-added content to its Professional system. Second, Bloomberg has sought to retain its Information customer base and reach out to a larger audience by using its proprietary content to launch Bloomberg.com.
>
> Available financial information suggests that Bloomberg's strategy has been effective to date. However, the current trend toward web-based delivery of financial information suggests that Bloomberg will eventually have to make its entire product offering available on-line. With a trusted brand name and proprietary content, the company appears well positioned to compete on the Internet. But the transition to the Internet also entails significant risks. Can Bloomberg replicate the functionality and reliability of its dedicated terminals on-line? And perhaps more importantly, can Bloomberg maintain margins in a market with lower barriers to entry? The answers to these questions will determine Bloomberg's success in the new millennium.

researching the "devolution" of federal IT mandates on the Other Sectors.[144]

Charging for value-added services that increase the functional benefits of Spatial Data - instead of trying to charge for the data itself - will become an increasingly important and viable strategy in the Digital Economy.[145] MapQuest.Com delivers interactive maps free to the end-user based on banner advertising and hyperlinks that "map-enable" non-map websites.

Tapping the Cash Flows from Knowing What Spatial Data to Use When

One source of revenues that will become increasingly important will be Portals that reflect the expertise to choose which Spatial Data layers to use, combine and reject for particular general and special applications.[146] The Spatial Data assembled to model New York City for mass mailing purposes (showing household incomes and proximity to retail stores and commuting patterns) will be very different from the model used by insurance companies for actuarial and loss prevention purposes, and different still from the model built to understand the meaning of a new school construction budget's priorities or neighborhood crime watch, and different still from the exactitude of a model used for such critical applications as underground infrastructure maintenance or air traffic flight patterns.

This "knowledge value" (and Internet sites that present a range of intelligent choices to maximize this value) is not new – it is the basis for many service industries and professions.[147] The forms for

---

[144] At the request of Congressman Paul Kanjorski, the Congressional Research Service is reviewing this phenomenon.

[145] Discussion at the NSDI GeoData Finance Thread 2 on June 8, 1999 confirmed this. For the financial information services analogy on this shift in pricing services not data, see *Impact of the Internet on the Financial Information Services Industry: A Case Study of Bloomberg L.P.*, http://www.stanford.edu/~tmiranow/.

[146] These qualitative and subjective decisions were featured in Catherine Greenman, *Turning a Map into a Layer Cake of Information: Linking Geography and Data Can Help Fight Crime, Find Customers and Protect Nature* (New York Times – January 20, 2000), p. G1.

[147] Richard Zeckhauser (John F. Kennedy School of Government, Harvard University), *The Challenge of Contracting for Technological Information* (Proceedings of the National Academy of Sciences Vol. 93, November 1996), at p. 12745 in his Colloquium Paper presented at a colloquium entitled "Science, Technology, and the Economy," organized by Ariel Pakes and Kenneth L. Sokoloff, held October 20–22, 1995, at the National Academy of Sciences in Irvine, California, reminds us that

> Information and knowledge are often labeled intellectual capital. But the services of such capital, say, how to conduct a physical process or design a circuit, does not offer a level benefits stream over time. It often offers its primary benefits almost immediately, subject only to constraints such as time to process and understand.
>
> The story is told of the great Charles Steinmetz, called to repair a giant General Electric generator after many others had failed. Steinmetz marched around the colossus a couple of times and called for a screwdriver. He turned a single screw, then said: "Turn it on," and the machine sprang to life. When Steinmetz was questioned about his $10,000 bill, he responded: "10 cents to turn the screw, $9999.90 to know which screw to turn."
>
> Those who possess intellectual capital, like scientists or lawyers, may even be rewarded with per-period excess wages. However, this arrangement may not reflect the true pattern of productivity, which is extraordinarily high during a brief period of distillation—the colloquial brain picking interlude—and then falls to ordinary levels when the capital is applied to totally new problems. To be sure, firms offer technologies on a per-period basis, but not *the information contained in that technology*. If they did, 1 day's purchase would offer an eternal license. [emphasis added]

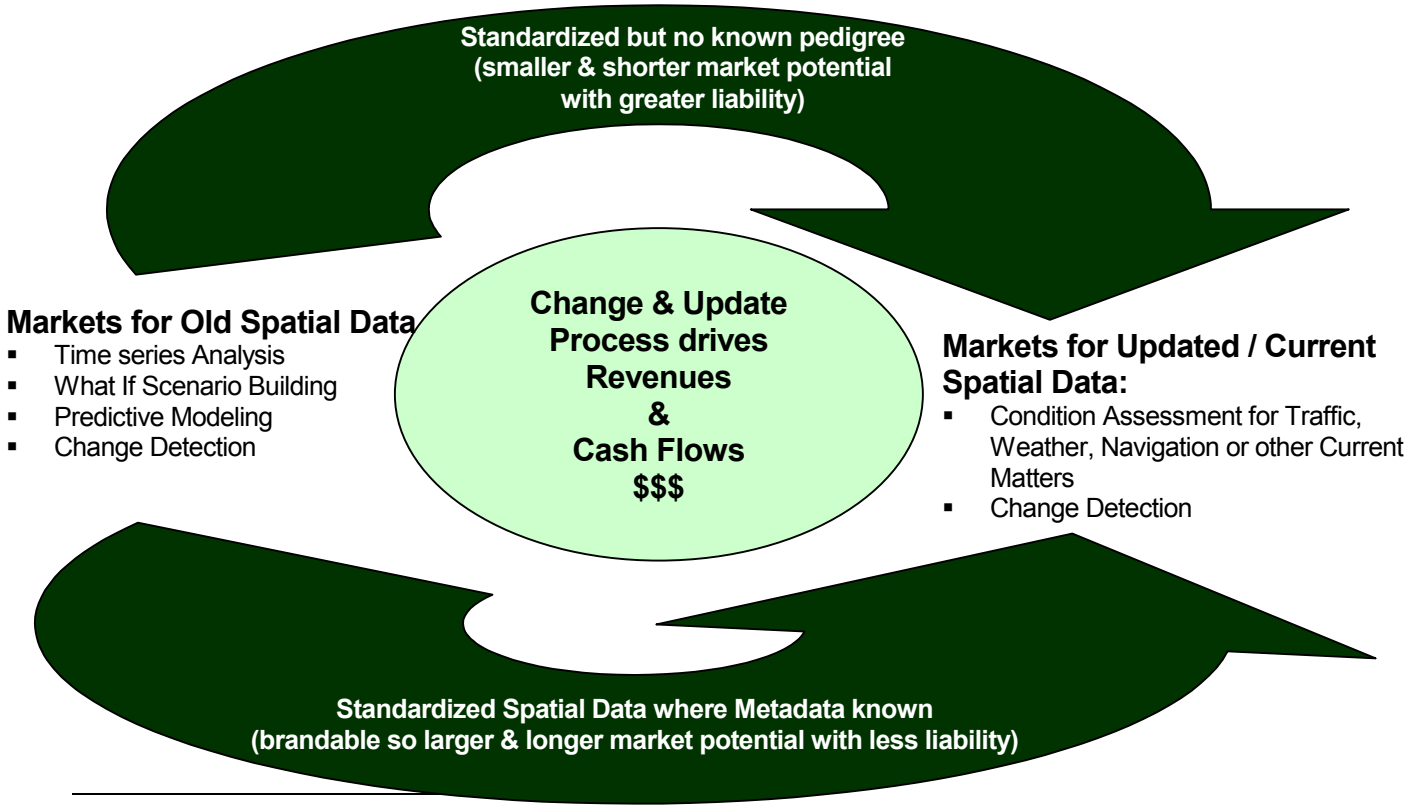
For Spatial Data, the "information contained in the technology" is how and when to use, combine and reject layers of data for particular applications. This expert knowledge can be shared and priced through Portals geared to audiences with particular interests and problems to solve using a view of the spatial relations of

capturing this knowledge value as Spatial Data is put to greater use will be new, varied and led by the private sector. Once captured, the value can be shared with the generators of Spatial Data in the form of royalty or license fees, membership fees in data consortia that keep the raw, unaligned Spatial Data flowing or through "in kind" arrangements to return aligned Spatial Data to the source of raw data.

Obsolescence Drives Market Potential - Spatial Data Ages, that's Valuable for Old & New Data

The 1999 GeoData Forum's Spatial Data Finance workshop[148] found that *Obsolescence Drives Market Potential:*

> The cycle of having to constantly refresh and clean Spatial Data (a process that creates problems for suppliers) actually drives demand and value for companies that host Spatial Information services.
>
> Since Spatial Data ages, companies can justify investments in cleaning and marketing Spatial Data, developing Spatial Information Services and selling and servicing new versions. Because the broader Spatial Information Services market is made up of many smaller markets for particular users (agriculture, infrastructure, navigation, etc.), the need to continually sell replacement Spatial Data to a small number of users in each fragmented market drives private sector investment and profitability.



relevant factors. Beyond Portals, contracts with data analysts and integrators can tap more customized expertise.

By analogy to Steinmetz, pricing Spatial Data by the byte in its raw form from public or private sources (his 10 cent screwdriver) may have nowhere near the return of sharing in the value created by commercial, public-private and intergovernmental relationships that optimize and assure the knowledge to use a quality set of Spatial Data (the $9,999.90 value of keeping GE's generator running smoothly and its factory operating).

[148] [Cite Summary of the GeoData Finance Thread 2 on June 8, 1999].

This temporal (time) value of Spatial Data, and knowing how to mine such temporal value account for new business models. MapTech markets digital nautical charts to boaters showing depth soundings, current and obstacle information in digital form provided by NOAA under a CRADA (Cooperative Research and Development Agreement). The company updates this chart information weekly via the Internet. Boaters are required to carry accurate charts, and as a community they are encouraged to participate in updating the information by emailing inaccuracies or changes in the MapTech chart to NOAA so that those changes can be reviewed, necessary changes to nautical features made and metadata created to describe the updated features. The chart updating process that carries NOAA's "seal of approval" (a brand) assures consistency backed up by metadata, further expanding the future marketplace for old and new Spatial Data owned and distributed by MapTech. (The inter-relationships of these factors are illustrated above.)

Spatial Data about a road, the signage on the road and the traffic patterns occurring in real time illustrate three update cycles for Spatial Data: The road as built is relatively fixed for a number of years after construction. However, for a FedEx logistics GIS knowing the signage and changes in road lanes, pedestrian and light timing help optimize the short few hours for critical evening pickup and morning delivery periods. Of greater significance is the traffic today: Has the road been closed due to a water main break? What alternative route is recommended? What pickup or delivery stops are on the detoured route that would be worth making to yield the largest number of customers receiving timely pickup and delivery?

Yesterday's road information, signage and traffic patterns have little value to the FedEx GIS re-routing the delivery truck today. Or do they? Like other types of historic or time series information, the older information can be used to ask "What if" questions: What if we had re-routing 30% of the trucks when water mains broke for two days annually over the past 3 year? How often are our trucks breaking down on a given route because of poor road surface conditions, and would fleet maintenance improve if they traveled other routes that are newly paved and only slightly more inconvenient?

The Importance of Credit Ratings to Investors

As limited by a community's consensus regarding FOIL, pricing and licensing issues, a stream of cash flows from public and private sources can be identified that represent unaligned investments in Spatial Data and Geo-processing. The Capital Formation Process[149] assumes a stream of cash flows, the amount, timing and certainty of which ranges from Treasury Bonds (very predictable and risk-free) to Market Stock Indexes (unpredictable and requiring careful risk-reward evaluations).

These factors are weighed according to standardized credit quality criteria and underwriting guidelines for bonds, stocks and other debt and equity securities by major credit rating agencies, such as Standard & Poors,[150] Moodys,[151] and Duff & Phelps.[152] Mutual funds are rated by Morningstar.[153] With these ratings, cash flows from investments in diverse public and private enterprises can be compared using standardized evaluation models and techniques. This ratings comparability permits the investments to trade in public securities markets around the world, and most recently over the Internet in "after hours" trading. Once trading stabilizes in a new type of investment instrument, benchmark indexes track the performance of like-kind investments against

---

149 Generally, see Dennis E. Logue & James K. Seward, *Handbook of Modern Finance* (Warren, Gorham & Lamont1998 Edition), Part B: Security Analysis, Pricing and Portfolio Management.

150 See, http://www.standardpoors.com/.

151 See, http://www.moodys.com/ratings/ratdefs.htm.

152 See, http://www.dcr-ratings.com/ratingdefinitions.cfm?FromSearch=Y.

153 See, http://www.morningstar.com/ProductsServices/index.html.

each other.[154] In essence, comparing changes in a given Fortune 500 stock's return historically to the Dow Jones Industrial Average, benchmarks the both the company and its industry against the market valuation for the most widely-held group of companies. For bonds issued by public and private borrowers and borrowing entities, the ratings serve a similar benchmarking purposes - to help the market price the bond's yield and risk. These indices are such important tools of the global financial markets that they are translated into multiple formats and languages, even Chinese.[155]

Cash Flows in Spatial Data

Traditionally, GIS was viewed as an operating expense of the Department requiring the GIS. As the discussion of Procurement in Chapter 3 shows, the commitment of capital to a GIS project anticipates multi-year usage. Costs are spread over the useful life of the project (assuming appropriate data and system enhancement and maintenance).[156] This resembles how Agencies generally structure their investments in IT,[157] using:[158]

1. Operating Budgets
2. Capital Budgets for other infrastructure, where the IT is an integral component (i.e., GIS to plan and maintain a water or sewage system)
3. Lease/Purchase (i.e., hardware leases and software licenses, where the lease payments approximate the interest and servicing costs)[159]
4. Leveraged Commitments from Intra-Institutional Stakeholders (i.e., payroll systems serving multiple Agencies of a State Government)
5. Leveraged Commitments from Extra-Institutional Stakeholders (i.e., "One-Call" GIS Systems among Energy and Telecommunications companies to prevent accidents from street digging operations; a Federal-State collaboration or a State Agency partnerships with Utilities for energy and telecommunications savings in "high tech" or "under-served" areas)
6. Benefits-Funded for revenue optimization (where the revenues produced by enhanced IT justify the costs of i.e., automated parking ticket collection partnership between EDS and Chicago; or

---

[154] The Dow Jones Industrial Average of the 30 most widely held corporations on the New York Stock Exchange is the oldest and most generally used benchmark. These 30 stocks represent about a fifth of the $8 trillion-plus market value of all U.S. stocks and about a fourth of the value of stocks listed on the New York Stock Exchange. See, http://averages.dowjones.com/home.html. Dow Jones now tracks other indices, including Bonds, Internet, REITs (Real Estate Investment Trusts), Transportations, Utilities, and foreign stocks. See, http://indexes.dowjones.com/.

[155] See, Dow Jones' SINAnet Service at http://dowjones.sinanet.com/.

[156] The Information Technology Management Reform Act of 1996 (ITMRA), 40 USC§5001 at http://cio.gov/s1124_en.htm, OMB Memorandum 97-12 (April 25, 1997), at http://cio.gov/omb97-12.htm and OMB Circular A-11, Section 53, at http://www.whitehouse.gov/OMB/circulars/a11/s53.pdf, among other legislative and regulatory reforms, now focus federal Agency CFO and CIO attention on the return on investment (**ROI**) for technologies and the methodologies to consistently gauge costs and benefits over the project's lifecycle.

[157] See, *Government Transforms Tech Financing* in Government Technology Magazine (June 1997), at http://govt-tech.govtech.net/1997/gt/june/june1997-governmenttransfo/june1997-governmenttransfo.shtm.

[158] Interview with William Kilmartin, Comptroller of Massachusetts (December 15, 1999), and Government Technology Magazine (February 1998), at http://govt-tech.govtech.net/publications/visions/feb98vision/kilmartin.shtm.

[159] See the State of California's award-winning GS$mart Lease Purchase & Finance Pooling Program, at http://www.pd.dgs.ca.gov/acqui/gs$mart.htm, and http://www.naspo.org/pubs/Bestpractices/ca.htm.

improving Federal reimbursement of child services for speech therapy)[160]

7. Benefits-Funded for cost avoidance (i.e., automated land records management or automated campsite reservations in Federal or State Parks, where automation reduces manual, multi-step processing and improves customer service)

Some of the ways that GIS cash flows are being *monetized*[161] for outsourcing and more flexible budgeting and investment include:

1. Atlanta Regional Data Consortium (OGETA): Graduated Membership Fees[162]
2. British Ordnance Survey: 90% Cost Recovery Model based on 50-year Crown Copyright Protection and "flexible" licensing structures.[163] Hardcopies are available through Public Offices.[164]
3. MetroGIS (Minnesota): GIS Cost Sharing Agreement among Cooperating Local Governments[165]
4. San Diego Area Governments (SANDAG): Regional governments' GIS Service Bureau[166]
5. Indianapolis' IMAGIS: Consortium pooling joint investments from government and utilities[167]
6. Cincinnati's CAGIS: Consortium pooling joint investments from government and utilities[168]

With a 20 year head start, the pooled approaches in the government and utility-dominated GIS market may serve as precedent for businesses that are geo-coding their in-house business process data and see Spatial Data as adding decision support tools and Internet functionality.[169]

---

[160] See, *How to Finance "Service to the Citizen" Projects*, Government Technology Magazine at http://govt-tech.govtech.net/publications/servicecitizen/financing.shtm.

[161] By *monetized*, I refer to a process by which Spatial processing costs (and sometimes, the benefits) are treated as distinct budget items, separate and apart from general costs of the institution such as IT, personnel or consultants. By monetizing or carving these resource commitments out of the overall budget, capital planning decisions can be made to maximize their value.

[162] See, http://www.ogeta.com/members.htm#members.

[163] See, Coopers & Lybrand, *Economic aspects of the collection, dissemination and integration of government's spatial information* (May 1996), for the British Ordnance Survey, http://www.ordsvy.gov.uk/literatu/external/geospat/index.htm, and http://www.ordsvy.gov.uk/about_us/copyrite/index.htm.

[164] See, http://www.ordsvy.gov.uk/literatu/info/cr78.html.

[165] See, Randy Johnson's Comments, *Framework Organizational and Business Practices Workshop* (January 27-29, 1998) at http://www.fgdc.gov/obp/responses.html.

[166] For 25 years, SANDAG has taken a regional approach to building GIS, at http://www.sandag.cog.ca.us/ris/gis/aboutgis.html.

[167] For 3 years, IMAGIS has concentrated on pulling local "power users" of GIS in the public and private sectors together, at http://www.indygov.org/gis/history.htm.

[168] See, Barbara Quinn, Richard Allen, and Michael Sweeney, *Moving Maintenance Into The Mainstream: The CAGIS Integrated GIS and Permit Management System* (ESRI ArcInfo Users Conference 1997), at http://www.esri.com/library/userconf/proc97/PROC97/TO450/PAP444/P444.HTM.

[169] See IDC's market segmentation analysis in Chapter 2. According to Davis Sonnen of IDC,

> the multi-year funding capital funding process is typical of most major GIS data conversion/acquisition projects. In Business Support Systems "data conversion" generally just involves geocoding a company's transactions.
>
> We see three significant differences in funding. First, costs for geocoding in Business Support Systems

Repackaging Spatial Data Cash Flows

Certainly, Congress, State and City Legislatures, government Agencies and corporations have a choice to restructure the way that they spend public and private funds on Spatial Data and related investments. Specifically, as large IRM users they can, among other things:

1. Enter into "Take or Pay" arrangements with data utilities and other providers assuring a demand for quality Spatial Data
2. Become members paying Membership Fees to local Data Consortia
3. Pool periodic Investments in Spatial Data Warehouses and staff
4. Pool Procurements of Spatial Data Services
5. Outsource the Spatial Data Servicing functions[170]

Or they can continue to purchase in isolation, as single Agencies and Corporations, protecting the interests of the contracting agency and the vendors against the sea-change in market forces driving data sharing economics, open systems and interoperability.[171]

GASB Statement 34: Government Infrastructure Accounting Principles[172]

According to the Government Accounting Standards Board (**GASB**),

> "State and local governments in the U.S. invest approximately $140-$150 billion annually in the construction, improvement and rehabilitation of capital assets, including infrastructure assets like bridges, highways and sewers. These expenditures are significant, representing more than one out of every ten dollars spent by those governments. The majority of infrastructure investment is financed by borrowing—selling municipal bonds and using the proceeds to pay for construction.
>
> "Although the need for information about infrastructure is clearly shown, the primary

---

are a fraction of the cost of a GIS data conversion project. Second, the funding is generally from departmental operating budgets. Third, the geocoded data will generally not be used outside the company. Thus, the value of geocoding (including the use of the base spatial fabric) must exceed the immediate operating cost, since the company will not have other opportunities for recovering the cost.

The point here is that, within Business Support Systems, the economic incentive for capital investment in base spatial fabric is constrained by the need for the lowest possible operating cost – another argument for regional/ industry-specific cooperatives. [Emphasis supplied]

Email, dated September 15, 1999, from David Sonnen (ISSI/IDC).

[170] State and county governments vary in their appetite, experience and success in outsourcing IT. Taxpayers in California appear to favor outsourcing of information technology. San Diego County taxpayers supported County supervisors decision to enter into a $700 million outsourcing contract for county IT. San Diego County Taxpayers Association, *SDCTA Urges County To Move Forward On IT Outsourcing - Association says efforts will result in better, cheaper, faster county services* (October 18, 1999), at http://sdcta.org/content/regional/county/county.outsourcing.101898.htm. Whereas Connecticut legislators stood ready to veto approval of the State CIO's efforts to enter into a 10-year outsourcing arrangement with EDS. Steve LeSueur, *Connecticut Muddies Outsourcing Outlook* (Washington Technology Online July 5, 1999), http://www.wtonline.com/vol14_no7/cover/630-1.html.

[171] A recent example of this dichotomy being the Bureau of Land Management's prudent abandonment of its ALMRS Project, at http://www.fcw.com/pubs/fcw/1999/0412/fcw-newsalmrs-4-12-99.html.

[172] This section grew out of discussions with Dan McHugh (New York City Transit Authority – Information Engineering), and previous discussions on New York City Charter §1110a with Richard Ravitch.

> instruments for demonstrating fiscal accountability—the government's annual financial statements—currently do not include any. The current accounting method for preparing state and local government financial statements focuses on short-term financial resources like cash and investments, which leaves infrastructure off the balance sheet and does not including any charge on the income statement for the cost of using those infrastructure assets to provide services. In light of the significant share of government spending devoted to capital assets, this is a major omission. However, this situation is about to change."[173]

GASB Statement 34 will require state and local governments to account for their infrastructure expenditures in budgets as early as 2001. Two approaches to "depreciation" are contemplated: "historic cost/useful life" and "maintenance/preservation cost." Because these costs will affect the net revenues shown as available to pay state and local bond debt, the impact on credit ratings and interest costs may be significant as these previously unbooked costs are reported in financial statements.

What does GASB 34 have to do with Spatial Data? Without a GIS, the estimates needed to accurately comply with GASB 34 will be cumbersome and may lead to inaccurate or overly generalized conclusions.[174] However, GASB 34 may actually justify Spatial Technology expenditures by automating and reducing the "true" infrastructure maintenance requirements for a governmental unit, thereby enhancing its revenue picture and increasing its credit rating. The increased credit rating translates into interest cost savings that could more than justify deployment or enhancement of the governmental unit's Spatial Data resources. Because of the national nature of GASB 34, it offers NSDI planners a uniquely credit-driven strategy that delivers bond compliance, interest savings and liquidity to state and local public finance borrowers.

---

[173] GASB, http://www.rutgers.edu/Accounting/raw/gasb/repmodel/infrastructure.html.

[174] To better understand the calculations and opportunities for over- or under-estimating the GASB 34 infrastructure costs, see the following example from Terry K. Patton and Penny S. Wardlow, *GASB Viewpoints: Why Infrastructure Reporting?* (GASB Action Report Vol. 16, No. 5, May 1999) http://www.rutgers.edu/Accounting/raw/gasb/repmodel/viewpoints.html:

> Q. At transition, how can I determine the cost of my infrastructure assets?
>
> A. The Statement will provide options for the initial capitalization of major general governmental infrastructure assets, using historical cost or estimated historical cost if actual cost records are not available. Bond documents associated with capital projects, expenditure records of capital projects funds, and engineering documents are possible source documents for establishing initial costs. Practitioners may estimate historical cost by calculating current replacement cost and adjusting for price-level changes by using indexes.
>
> For example, assume that in 1998 a local government has 65 lane-miles of roads in a secondary road subsystem. If the current construction cost of similar roads is $1 million per lane-mile, the estimated total current replacement cost of the secondary road subsystem is $65 million ($1 million × 65). If the roads have an estimated weighted-average age of 15 years, 1983 is considered to be the acquisition year. Based on the U.S. Department of Transportation, Federal Highway Administration's (**FHWA**'s) *Price Trend Information for Federal-Aid Highway Construction* (publication number FHWA–IF–99–001) for 1983 and 1998, 1983 construction costs were about 69 percent of 1998 costs. The estimated historical cost of the subsystem, therefore, is $44.9 million ($65 million × 0.69). This government would report the subsystem in its financial statements at that amount, less any accumulated depreciation.

GASB 34 requires that governments review their infrastructure inventory and expenditures every 3 years. The importance to financial statement users of infrastructure information is evident in comments made by major professional organizations:[175]

> In a letter to the GASB, the Governmental Research Association, a national organization of citizen watchdogs, research groups and taxpayer associations, stated, "As intensive users of financial information, we believe that infrastructure reporting is an essential element in improving the accountability of governments to their citizens…[P]ossessing information about capital asset costs or condition is important in helping policymakers and citizens make better informed choices about the expenditures of public funds and appropriate levels of taxation."
>
> The National Federation of Municipal Analysts (NFMA), an organization of more than 1,000 analysts representing broker/dealers, mutual funds, rating agencies and insurance companies, also has expressed its strong support for infrastructure reporting. The NFMA cites the singular importance infrastructure information to municipal credit analysis: "By their nature, most municipal bonds finance 'capital assets' and as such, the relevance of this information to public finance professionals is paramount."

Thus, GIS' ability to accurately report infrastructure condition and maintenance forecasts will become an essential underwriting assumption for state and municipal bond issuers, underwriters and institutional purchasers.[176] This will bring public finance bankers into greater contact with Spatial Data and Information Systems – a familiarity that should expand the technology's private, market-driven sources of capitalization.

---

[175] See, National Association of State Auditors, Comptrollers and Treasurers (**NASACT**) at http://www.sso.org/nasact/GASBmayinfra.htm.

[176] The budget impacts of these calculations are significant. Take New York City as a case in point: City Comptroller Alan Hevesi recently estimated that an additional $39.75 billion (76% above the current capital budget) is required over the next 10 years to bring the City's infrastructure into a systemic state of good repair. See Comptroller's Infrastructure Report (1999), at http://www.financenet.gov/financenet/state/nycnet/infrasur.pdf.

Chapter 7. The Role that Financing Could Play to Pool Capital Investments in IT

Intergovernmental IT cooperation is difficult because it must typically proceed without legislative mandates or funding. When these mandates exist, however -- as with welfare reform -- activity is more dramatic.

Dr. Jerry Mechling (*Government Technology* Magazine, February 1999)[177]

The NSDI situation today resembles many others where individuals and communities have a common vision that they are trying to launch without a focused financial conduit. Small businesses trying to find seed capital to grow. Schools trying to modernize their unsafe buildings and hook up to the Internet. Communities trying to meet environmental standards that affect their wastewater and landfills.

Banks, pension funds and other financial intermediaries are under significant regulatory mandate and public pressure to intercede with the required loan and investment programs to address these shared problems. The Community Reinvestment Act (**CRA**) and the Home Mortgage Disclosure Act (**HMDA**) force banks to look for under-served but credit-worthy borrowers and communities in need of funds for revitalization. The "alternative investment" allocations for pension funds perform a similar function.

Investment bankers and advisers are finding that Spatial Technology represents a financial opportunity. In May 1999, 3-year-old MapQuest.Com went public in a well-received initial public offering (IPO) that leveraged the company's monthly delivery of 100 million maps to 16% of the Internet audience.[178] By June, the company reached 12 million users or 19.7% of the Web audience, of which 25% browsed MapQuest from work.[179] The $69 million offering (4.6 million shares @ $15/share) was being made through an underwriting group led by BancBoston Robertson Stephens Inc., Thomas Weisel Partners LLC, U.S. Bancorp Piper Jaffray Inc. and Volpe Brown Whelan & Company.[180] On December 22, 1999, America Online announced its agreement to acquire

---

[177] Dr. Mechling took part in a recent Government Technology Magazine panel responding to the Question: Which trend has driven intergovernmental activity the most: public demands for better services or devolution of authority, such as welfare reform?, at http://govt-tech.govtech.net/gtmag/1999/feb/grid/question1.shtm. [***Fix link***]

[178] MapQuest.Com, *Our Company*, at http://www.mapquest.com/cgi-bin/stat_parser?link=/corporate/index&uid=u4a126n78219h5qn:2aqf825fa, and MapQuest Press Release, *More Than 16% of Web Users View Maps and Driving Directions Generated by MapQuest.com, According to Media Metrix* (May 12, 1999), http://www.mapquest.com/cgi-bin/stat_parser?uid=u4a126n78219h5qn:2aqf825fa&link=/corporate/pr_mediametrix.

Although the IPO was well received, the 50% drop in MapQuest's stock price post-IPO reflects, in part, investor concerns that the company will have to work hard to build revenue alliances (like it has with Yahoo!, Palm Pilot Wireless maps and Sprint) and enhanced services that differentiate its online mapping service from competitors like Microsoft's Expedia. See, Big Charts, MapQuest.Com (September 8, 1999), at http://www.bigcharts.com/intchart/frames/frames.asp?symb=MQST&sid=147546&time=, and Beth Lipton (C|Net Staff Writer), *Mapquest's services turn heads on the Street* (C|Net News Service, June 17, 1999, at http://www.news.com/News/Item/0,4,37975,00.html.

[179] MediaMetrix (June 1999), as quoted in Businesswire, *MapQuest.com Network Reaches Over 19% of Web Users; More than 12 million Internet users access MapQuest.com Maps and Directions in June* (Businesswire, August 16, 1999), at http://www.bigcharts.com/intchart/frames/frames.asp?symb=MQST&sid=147546&time.

[180] MapQuest Press Release, *MapQuest.com, Inc. Announces Commencement of Its Initial Public*

MapQuest for $1.1 billion[181]

In August 1999, The Convergent Group, a systems integrator involved in structuring government GIS solutions like IMAGIS in Indianapolis, recapitalized its ownership, buying out EDS' shares, and bringing in as partners InSight Capital Partners,[182] Goldman Sachs, Union Bank of Switzerland and others for $45 million, and adding a $25 million line of credit from Fleet Bank.[183]

Through the Appendix A analogies, this Report looks at the role that financing has played to address shared issues in a nationally or industry-wide consistent way. We will review the effect that these financial intermediaries have had on their customers and what specialized services they offer. While these are not the only examples of financing affecting communities, they represent some of the most common financing approaches mentioned in the context of IRM, and specifically community-based Spatial Information needs. Finally, we will trace out the analogy that each specific financing suggests for funding Spatial Information in every community consistent with the vision of the NSDI.

Offering (May 4, 1999), at http://www.mapquest.com/cgi-bin/stat_parser?uid=u4a126n78219h5qn:2aqf825fa&link=/corporate/pr_mq-ipo.

[181] Bloomberg, *America Online to Buy MapQuest.com for $1.1 Billion* (December 22, 1999 Update5), at http://quote.bloomberg.com/analytics/bquote.cgi?story_num=cf6042e2496fbe7090431f9f6a7d4df0&view=story&version=marketslong99.cfg.

Wit Capital's perspectives on the deal (http://www.witcapital.com/research/researchbody.jsp?Report=aol_19991222) are instructive for those interested in commercialization and public availability of computer mapping (spatial technology) tools. The "buy" recommendation that Wit issued provides insights into Wall Street thinking [Emphasis supplied]:

> MapQuest is a leading online mapping and destination information solutions company. According to Media Metrix, MapQuest receives 3.7 million unique visitors monthly to its Web site and is ranked among the top 50 Web properties. According to the company, MapQuest generates the majority of all Internet mapping page views and is linked to more than 170,000 Web sites. **MapQuest benefits from substantial barriers to competitive entry due to the detailed and comprehensive nature of its mapping software, and due to license agreements with over 950 business partners**.
>
> We believe that the acquisition solidifies AOL's local commerce and advertising platform. In combination with AOL's Digital City and MovieFone assets, MapQuest will create a true critical mass of local advertising and commerce opportunities. **For ads targeted to consumers within specific zip codes, AOL should command advertising rates (CPMs) 2-3x higher than broader, run of site ads.** According to Jupiter Communications, local and regional advertising will account for 24% of all Internet advertising by 2003, up from 14% in 1999, implying a growth rate that far outpaces the growth of online advertising as a whole.
>
> We also believe that this acquisition advances the company's AOL Anywhere strategy by providing maps and directions on various devices [i.e., Palm, Web or other delivery of content].

This development is not a recommendation to buy or sell any company's stock. Yet, it serves as a benchmark or check on the pulse of the financial market's accelerating appetite for spatial technology. The "pooling of assets" form and market justifications for the AOL-MapQuest deal underscore the competitive forces unleashed by robust supplies of reliable spatial data and open specifications, Web-enabled applications that bring "Where I am awareness" (geoprocessing power) into consumer and business-to-business Websites. With the Y2K crises behind us, this corporate transaction should serve as a "wake-up" call for those discussing the NSDI, data consortia, aligning capital investments in maintenance and use of spatial data, privacy, public access, security, data malpractice and many other aspects of the technology.

In preparation for broadening the bandwidth of spatial data files, on January 10, 2000, America Online announced its agreement to acquire cable provider and media giant Time Warner for $156 billion.

[182] InSight Capital Partners, at http://www.insightva.com/alphabet.html.

[183] Wall Street Journal (August 20, 1999), and The Convergent Group, (Press Release August 13, 1999), at http://www.convergentgroup.com/NewsStory.cfm?SelectedStory=133.

In reading the analogies described in Appendix A, the reader should be aware of several common functions served by each financing mechanism:

1. *Background of Need as Opportunity* - Each investment or business mechanism grew out of unmet needs that formed the opportunity for the targeted strategy.
2. *Functional Role(s)* - There are a number of roles played: What are the roles, and why are they necessary?
3. *Use of Non-Governmental Organizations* - Private corporations, non-profit organizations or other public benefit corporations that are free of governmental civil service, procurement, Freedom of Information and other requirements often are used. However, the public's interest is often assured by the power to appoint directors or other senior management. These NGOs are highly accountable to the market and their shareholders or non-federal owners for mission-based results and performance.[184] In Chapter A 11, new government-sponsored structures called PBOs: Performance Based Organizations are discussed.
4. *Focused Underwriting Standards* - Investment criteria are clear, have defined boundaries and serve the mandated mission.
5. *Leveraging Private Funds* - Even where taxpayer funds are used, those funds are leveraged (matched) multiple times with funds supplied by private parties. This Report uses the term **Apparent Federal Leverage** to describe such multiplier effect.
6. *Facilitating Tax, Guarantee or Other Regulatory Advantages* - From the use of low income tax credits to tax exempt bond financing to small business investment loan guarantees, these mechanisms have harnessed and pooled investor access to federal laws and regulations that increase the effective yields on such investments.[185]
7. *National Approaches to State Legal Structures* - Many federal programs deal in real estate or other state specific legal issues. Fannie Mae for example is a national mortgage program that adapts 50 states' mortgage foreclosure laws to achieve a uniform

---

[184] Corporations increasingly discuss "Governance", "Competitiveness" and "Accountability", and large shareholders (such as CALPERS: The California Retirement System) now regularly push for management decisions to achieve value based on corporate product development, service and judicious use of internal and external financing options. For technology-intensive corporations, large shareholders inside and outside experts acting as monitors of the technology product's market context and deployment demonstratively improve the corporation's share value. See Richard J. Zeckhauser & John Pound, *Are Large Shareholders Effective Monitors?*, in *Asymmetric Information* at pp. 164-5, 171.

[185] For a current example of these incentives, see Vice President Gore's Proposal for a $10 billion "Better America Bond" Program using interest-free bonds to address urban sprawl, http://www.washingtonpost.com/wp-srv/politics/campaigns/wh2000/stories/gore011199.htm.

The Proposal includes:

- Community-Federal Information Partnership -- A new $40 million program funded by several agencies to provide communities with grants for easy-to-use information tools to help develop strategies for future growth.
- Regional Crime-Data Sharing - $50 million will be provided to expand programs to help communities share information to improve public safety. These programs will: (1) improve and continue to computerize national, state, and local criminal history records; and (2) develop or upgrade local communications technologies and criminal justice identification systems to help local law enforcement share information in a timely manner.

See, Press Release, dated January 11, 1999, http://library.whitehouse.gov/PressReleases.cgi?date=0&briefing=1.

comfort level of enforceability. GIS data sharing strategies necessarily involve separate state FOIL (Freedom of Information Law), Privacy, Data Malpractice/Negligence and Intellectual Property laws, and separate attitudes about cost recovery through state copyright.[186]

8. *Lessons for Financing the NSDI* - Instead of thinking about new finance mechanisms that might be established in every State, County or City, several of these analogies (for instance, State Infrastructure Bond Banks and Community Development Corporations) might adapt their existing missions, investment interests and underwriting expertise to originate financial products that represent part of a national approach to financing Spatial Information.

The analogies prove that the Federal government and the financial markets have vast experience, structures and tools to serve as catalysts for Other Sectors to develop a nationally consistent, locally maintained infrastructure building activity like the NSDI.

[186] These debates are not unique to America. For the British view of such issues, see *Beyond Chorley*, http://www.agi.org.uk/pages/publications/chorley.html.

Chapter 8. Using Brand Identification of Framework Data & Interoperable Software Solutions to Make the NSDI Financeable

Common Growth Patterns

Many of the Service Bureau Analogies presented in this Report (BLOOMBERG Financial Information Services, MEDLINE Medical Information Services, LEXIS-NEXIS Legal Information Services, VISA Payment Services, CUSIP Securities Coding Services, SABRE Travel Information & Reservation Services and UPC Product Bar Coding Services) followed a common pathway to market acceptance and success:

1. Identified a Business Process common to an Industry that could be converted from Manual/User-Unique to Automated/Standardized (BLOOMBERG grew out of Michael Bloomberg's personal experience as a bond trader requiring financial market information and calculations; MEDLINE grew out of the National Library of Medicine's understanding of health professionals' needs for authoritative treatment and diagnostic research; VISA grew out of Bank of America's desire to have its credit card accepted for payment at more retail establishments and their banks; UPC grew out of the grocery industry's desire to automate food check-out lines and manage and price inventory)
2. Adapted Existing Technologies, some originating in the Defense or Intelligence Communities (i.e., LEXIS-NEXIS grew out of Data Corp's full-text search engine for aircraft parts inventory at Wright Patterson Air Base; SABRE's programming concepts grew out of SAGE)
3. In the Pre-Digital Economy, involved the Industry Users/Consumers of the Automated Process in identifying functional requirements and the minimal amount of coordinated activity to accelerate manual business transactions (i.e., SABRE's continual process for confirming that the System would be designed to work with and anticipate user requirements for accessing and sharing travel and traveler information, CUSIP's 9-digit code for identifying tradable bonds and securities)
4. As an ongoing test-bed for the Digital Economy, used this End-User Advisory Group to check Functional Requirements and to improve and enhance Shared Technology Platforms (i.e., VISA now offers EDI and credit card fraud protection mechanisms in addition to credit card payment processing; SABRE helps designers of airports)
5. Offered Business Services Solutions, not just Standards (i.e., CUSIP is serviced as part of Standard & Poors support for the process of creating, rating and distributing financial securities; SABRE is a travel industry system, not just a provider of flight schedules and fares)
6. Wrapped their Technology Solutions into an immediately recognizable Brand, uniquely representative of each Solution's Package of Standards, Information Market, Users, Cooperating Suppliers and Technology

Brand Identification of Service Bureau Capabilities

All of these examples of shared business processes, standards, software and data identify their messages by a registered Trademark or Product or Service Brand. This Branding makes identification of the sponsoring Company or Association's capabilities readily understood by industry and consumers. The Brand connotes trust in the consistency and quality of the process for data content, where it comes from and how it is stored and disseminated. As the Brand's offerings of related services to customers grow, the Brand also becomes an immediate way to recognize and

reward contributors to the Brand's data and software services. The Branded process' value proved intuitively and financially with each transaction that uses (or depends on having the information sent through a network set up to implement) the Brand's efficiencies. Finally, the Brand imbues trust as to its ability to be the basis for large End-User Investments in software customization, worker training and shared analysis, development and payment methods.

Government Roles in Building Brand Loyalty

Typically, government develops, administers and funds policy initiatives. These initiatives rarely achieve "Brand" status, but have great economic impact when standards originate inside of Government as a large End-User of automation. The Internet Protocols originating in ARPA/DARPA Net [187] provide the example of such standards.

But *standards* are not *Brands*. Fannie Mae is both a standard for issuing compliant residential mortgages, and a Brand representing an automated financial system for buying, selling and hedging those mortgage investments. Fannie Mae is not a purely governmental entity. Indeed, it might be hard to use taxpayer funds to promote any particular Brand.

Notwithstanding Government's limited role in standards and Brand development, Government is a great beneficiary of Brand Identification for technologies on which it – like the rest of the American economy – depends. COTS products and services with Brand names represent (A) a consistent set of specifications, supporting services, networks and established user communities, that (B) attract capital to profit from the resulting marketplace.

Lessons for the NSDI

To date, the NSDI, Framework Data and Metadata Standards represent a robust vision for Spatial Data sharing. In large part, the products being developed by commercial vendors like ESRI, Intergraph, MapInfo and other members of OpenGIS Consortium assume access to digital piles of trustworthy Spatial Data neatly organized and online. The markets for geo-processing in general settings (i.e., business decision support, personal productivity and Internet Portal design and servicing) have similar expectations for functional Spatial Data.[188]

Spatial Data activities of the FGDC, Stakeholders and Industry and the tangible solutions and capabilities those efforts yield must be bundled into and promoted in the marketplace as a recognizable Brand. The digital explosion of Web-enabled Information makes the concept of "Trusted Sites" a key determinant of Site hit ratios, and thereby of market penetration.[189] Therefore, the Brand would likely denote Websites and Portals featuring NSDI-compliant Spatial Data and Metadata.

From a finance viewpoint, Brand Identification immediately denotes market acceptance and demand. Thus, Branding (i) the *Process* of making Spatial Data that is sharable, relevant, interoperable and trustworthy using (ii) commercially standardized software platforms should align the streams of Public and Private investments supporting NSDI capabilities.

---

187 There are many versions of the short history of the Internet, here are two: Association for Computing Machinery, at http://www.acm.org/crossroads/xrds2-1/inet-history.html, and Hobbes' Internet Timeline (Version 4.2), at http://info.isoc.org/guest/zakon/Internet/History/HIT.html.

188 See IDC's market segmentation analysis in Chapter 2

189 This is the core business philosophy of the Yahoo.Com Portal's search engine, that human editors continually qualify the sites indexed by Yahoo to assure the speed and relevance of search results. Jerry Yang, *A Conversation with Charlie Rose* (PBS, September 2, 1999).

Chapter 9. Conclusions and Recommendations

The Current State of the Spatial Data

The demands for quality Spatial Data have grown due to the Digital Economy and its dependence on trustworthy data.[190] That is not to say that Spatial Data is independently important or that its growth as an island of technology can or should be encouraged. Instead, businesses and governments are using Spatial Data and geo-processing to complement and expand existing business processes – to spatially enable them.[191]

Now that 71% of Internet users find online maps more valuable than traditional media,[192] Spatial Data needs market-driven channels that enable business and government sites to be more effective and to provide online content for offline use. Some offline use may be predictable map-enabled functionality, other uses (like GASB 34)[193] will grow out of emerging interoperable geo-processing technologies. Channels that pool, share or warehouse the wide variety and depth of Spatial Data available, that network it and that finance it seem to be missing.

As a precursor of the Digital Economy, the President and FGDC framed the NSDI as an early architectural vision for a set of such channels. Now, almost 5 years later, the architecture for those channels merits reconsideration, and should seek to leverage the Digital Economy, the Internet and Data Mandates.

What We Learned from the Analogies

This Report inventoried lessons for building, financing and structuring such channels and components into an NSDI and that work for other industries and investments.

Key features of their success include the following:

	Characteristic	Analogies[194]
1.	Start by looking at a Single Industry or Profession	Mortgage Industry (Fannie Mae) Grocery Stores (UPC Bar Coding)

190 Interview, David Sonnen (Analyst - International Data Corporation), September 7, 1999.

191 David Sonnen, *Structure of the Spatial Information Management Industry - Part I* (Directions Magazine, September 1999), at http://www.directionsmag.com/article.asp?ArticleID=32.

192 See, fn. 22 above.

193 See p. 70 above.

194 Multiple analogies display these characteristics, so the analogy selected illustrates the characteristic's role in the analogy's success. Nothing should be inferred from including or excluding an analogy to illustrate a given characteristic, nor from excluding unique characteristics of one analogy that may merit consideration. The reader interested in particular shared characteristics or in finding unique benefits of one analogy over others is encouraged to review the more detailed description of the analogies in Chapter A 1 through Chapter A 21.

	Characteristic	Analogies[194]
2.	Identify the manual Business Processes in the Industry that ▪ create Transactions or other Value-Added in that Industry ▪ increase processing costs ▪ tie up capital / reduce liquidity ▪ have no competitive opportunity or advantage unique to the enterprise that needs to perform that process	Booking Passengers (SABRE) Finding Small Business Investments to generate CRA credit (SBIC) Searching case law for legal precedents (LEXIS/NEXIS) Updating business news developments (BLOOMBERG) Tracking Securities (CUSIP)
3.	Sort the Business Processes and find those that would benefit most from Cross-Industry Coordination	Exchange of Mortgages (Fannie Mae) Exchange of Electricity (Power) Airport Facility Construction (Airport Authorities)
4.	Determine the Coordination Incentives & Capabilities that Exist & are Missing	Banking CRA (SBIC, CDC, Non-Profit Facilities Fund) Tax Credits (LISC) Environmental (EPA Revolving Loans) Universal Acceptance & Remote Processing (VISA, NY Clearinghouse)
5.	Prove the Business Case by comparing: (A) the Value produced by Coordination of each Business Process, (B) the Costs of Coordination at that Business Process level using existing Capacities, (C) the Costs of Coordination at that Business Process level using new Capacities & Technologies, (D) the Investment required to achieve the new Capacities & Technologies, (E) the Net Present Value return for the entire Industry of making the Investment (D) to achieve the Benefits of (A) and the reduced costs (B – C)	Volume Acceptance & Processing (Fannie Mae Home Mortgages, VISA Credit Card payments) Increased Search, Indexing, Content Qualification & Content Analysis (BLOOMBERG, LEXIS/NEXIS, MEDLINE, CUSIP) Increased Market Transactions in Commodity at reduced costs (SABRE Passenger Reservations, CUSIP Bond sales) Better Inventory Management to improve Pricing & Supply (UPC Bar Coding for consumer products)
6.	Form an Association of Users to congeal a core group of Advisors, Users, & Investors who understand this Business Case	Banks & Investment Banks (CUSIP, Fannie Mae, LISC, SBIC, VISA) Bar Associations & Law Schools (LEXIS/NEXIS) Non-Profit Grass Roots Organizations (LISC, Nonprofit Facilities Fund) Transportation (Airlines for IATA & Airport Authorities, Contractors for EPA Revolving Loans & TEA-21) Utilities (Electric Power ISOs) Banks as members of VISA's Association

	Characteristic	Analogies[194]
7.	Translate the Missing Incentives/Capabilities into concisely described new Capacities	Volume Acceptance & Processing (Fannie Mae Home Mortgages, VISA Credit Card payments) Increased Search, Indexing, Content Qualification & Content Analysis (BLOOMBERG, LEXIS/NEXIS, MEDLINE, CUSIP) Increased Market Transactions in Commodity at reduced costs (SABRE Passenger Reservations, CUSIP Bond sales) Better Inventory Management to improve Pricing & Supply (UPC Bar Coding for consumer products)
8.	Design the Capacities in Teams of Designers + Users to assure that the real world business processes embed in the Capacity's design & implementation – assuring user adoption later	Airport Improvement Program CUSIP – Am Bankers Association + Standard & Poors EPA's Financial Advisory Board's Financing Guidebook Electric Power Pooling Arrangements SABRE Reservations System
9.	Review opportunities for Technology Transfer & Generalize Advanced Technology or Bandwidth from Military or Government	LEXIS/NEXIS (Wright Patterson Aircraft parts inventory software) MEDLINE (bandwidth) SABRE (SAGE air defense project)
10.	Use Federal Grants, Guarantees, Procurement, Regulation or other support to foster Capacities for Transactions that achieve National Efficiency, Equity or Effectiveness Public Policy goals Where Federal Guarantees are provided, the private investor's capital provides "first loss" protection, and payment on the Federal Guarantee historically has been minimal. Let States & local governments dedicate future federal programmatic support as their share in matching formulas. Alternatively, licensing & user fees may represent non-Federal matching funds. Optimize & tailor Federal financing support programs & their capabilities through pilots & demonstration projects.	CUSIP – Federal Reserve System standards EPA Revolving Loans – Grants to State Bond Banks Electric Utility Power Exchanges – FERC Regulations FAA's Passenger Facility Fee Fannie Mae Home Mortgage Loans – "Implicit" Federal Guarantee FHWA State Infrastructure Bank Pilot – States can use 10% of their future federal funding. Nonprofit Facilities Fund – Treasury CDFI Grants Power Industry – federal regulations fostering competition at wholesale level Transportation - TEA 21 Grants SBIC – Guarantees US Investigations ESOP – Primary Contract
11.	Build a Test-Bed environment to optimize the technology application in a real world environment	MEDLINE at National Library of Medicine SABRE at Tulsa Oklahoma UPC Bar Coding Test Bed VISA

	Characteristic	Analogies[194]
12.	Adopt & Share Quality Assurance & Underwriting Criteria that standardize best practices for growing transactions	BLOOMBERG Editorial Review EPA's Financial Advisory Board's Financing Guidebook Fannie Mae Mortgage Lending & Delegated Authority Criteria NY Clearinghouse Member Agreements SBIC Lending & SBA Certification Guidelines
13.	Leverage Existing State & Local Interest Groups as financing intermediaries, customers, development partners & early adopters of the benefits of a new shared solution (*If you build it, they will come.*) *Flip side of the coin:* Respect State sovereignty on issues of citizen concern that may be impacted by the technology or financing solutions and to the extent feasible work within existing State legal frameworks.	Non-Profit Housing Groups (LISC) Non-Profits (Nonprofit Facilities Fund) Bar Associations (LEXIS/NEXIS) State Bond Banks & Metropolitan Planning Organizations (EPA Revolving Funds, TEA-21 Transportation Funds, FAA Airport Improvement Funds) SBA's SBIC, CDC & RLF Networks of State Banking Departments, Banks, Economic Development & Non-Profit groups. VISA Members issue credit card & set interest rates in accordance with State (or Federal) Banking & Consumer Protection laws.
14.	Leverage Federal interest in Targeted Programs with and across several Agencies This Federal interest can include: ▪ pooling federal resources to simplify local partnering ▪ maximizing the diffusion of know-how & other benefits of the Federal program ▪ reducing waste & delayed implementation ▪ showcasing American solutions globally	Fannie Mae + HUD Sustainable Community Development Initiative EPA's work with Transportation Agencies LISC certification by Treasury Department & role in banks CRA investments MEDLINE was created to inventory & rapidly disseminate the fruits of federally funded research across many Agencies, Universities and researchers. It serves as a global ambassador for American medical research.
15.	Delegate Origination & Pool Smaller Loans or Investments into Securitizable Pools to achieve Efficient Servicing of Investments	Fannie Mae Warehousing of Whole-Loan Portfolios SBIC Debentures VISA Credit Card Receivables
16.	Adopt & coordinate the Minimal Data & Metadata required to Index & Self-Identify a product, service, investment or other information	CUSIP's 9 digit code for Bonds & Securities MEDLINE's Abstract links to Publisher's site for purchase of journal article UPC Bar Code's 12 digits VISA's 16 digit Credit Card number

	Characteristic	Analogies[194]
17.	Outsource Redundant or Non-Core Metadata, Inventory, Distribution & Servicing Functions	AOL/Netscape sale of Network operations to MCI/Worldcom Fannie Mae – Mortgage Servicing NY Clearinghouse Assn formed Small Value Payments Company to process small-dollar electronic payments on behalf of 21 major banks Standard & Poors' maintains CUSIP under a contract with Am Bankers Assn VISA Member's Credit Card Issuance & Processing functions
18.	Operate the Common Technology Process under a Brand name to assure Users of Quality, Integrity & Longevity of Standardized Processes	Internet Access, Content & Users – AOL Financial News – BLOOMBERG Mortgage Processing & Pooling – Fannie Mae Legal Information Search & Analytic Services – LEXIS/NEXIS
19.	Foster Technologies & Processes that let Association Members build Portals that enable Proprietary Intranet Applications to be publicly accessible through the Internet	CUSIP – Internet Accessible 7 million securities' registrations help automate online brokerage & investment sites Fannie Mae – HomePath.Com SABRE – Travelocity.Com SBICs – Angel Capital Electronic Network
20.	Privatize or offer Shares to the Public to grow capital base Alternatively, create a Performance-Based Organization (PBO) within the government to retain & attract quality employees and make the enterprise more flexible and adaptive to market conditions.	Fannie Mae (NYSE: FNMA) US Investigations Service ESOP Federal Student Loan Program (PBO)
21.	Above All, build in support for the Human Factors (management and employee training & consistency)	FAA's Human Factors Initiative across small, medium and large airports SABRE's understanding of how travel industry participants work

The 21 Analogies displayed 21 central characteristics that may be of considerable benefit in designing (and experimenting with the design) of institutional and technical arrangements for the NSDI appropriate in the different government, regional and industrial settings where Spatial Data is created and used.

An Inventory of Existing Capabilities

If the 21 central characteristics were a blackboard filled in on the left side using the table above, then what would it look like to fill in the blank spaces on the right of the table for translating the analogies into the financing challenge of the NSDI? The blackboard might look like this based on currently existing and potential capabilities that would support financing of the NSDI:

	Characteristic	Capacities- Existing & Needed[195]
1.	Start by looking at a Single Industry or Profession	Government need for environmental or transportation data
2.	Identify the manual Business Processes in the Industry that ▪ create Transactions or other Value-Added in that Industry ▪ increase processing costs ▪ tie up capital / reduce liquidity ▪ have no competitive opportunity or advantage unique to the enterprise that needs to perform that process	Data Mandates on Non-Federal Sectors Investments in non-productive Spatial Data that necessitates constant maintenance and fear of legacy status. Spatial Data & Technologies are just a tool to create or drive government & private business processes (permitting, real estate development, environmental protection).
3.	Sort the Business Processes and find those that would benefit most from Cross-Industry Coordination	
4.	Determine the Coordination Incentives & Capabilities that Exist & are Missing	Existing: Data Mandates Internet/Digital Economy Missing: Financing Incentives Mechanisms to align Investments in Spatial Data

[195] Multiple capabilities display these characteristics, so the capability or institution selected illustrates a potential candidate for the given role. Nothing should be inferred from including or excluding a capability or institution to illustrate a given characteristic, nor from excluding unique characteristics of one institution that may merit consideration.

	Characteristic	Capacities- Existing & Needed[195]
5.	Prove the Business Case by comparing: (A) the Value produced by Coordination of each Business Process, (B) the Costs of Coordination at that Business Process level using existing Capacities, (C) the Costs of Coordination at that Business Process level using new Capacities & Technologies, (D) the Investment required to achieve the new Capacities & Technologies, (E) the Net Present Value return for the entire Industry of making the Investment (D) to achieve the Benefits of (A) and the reduced costs (B – C)	*** Needs further study *** Recommendations: Track participants in FGDC's Funding Programs[196] for these metrics Find communities of similar size to those participants, and assemble metrics for those communities If a proposal such as C/FIP: Community/Federal Information Partnerships[197] is launched, include its partnerships in metrics formulation activities.

[196] FGDC offers 3 programs: Cooperative Agreements Program, Framework Demonstration Program and NSDI Framework Benefits Program (http://www.fgdc.gov/funding/funding.html) whose recipients and participants should have an interest in helping to define these metrics.

[197] C/FIP was a $39.5 million proposal in the FY2000 Presidential Budget to promote smart growth and livable communities using GIS. C/FIP was not passed as part of the FY2000 budget. See HUD, *The State of the Cities 1999 Part 2: The 21st Century Agenda for Cities and Suburbs, D. Promoting Smart Growth and Livable Communities* (Third Annual Report - June 1999), http://www.huduser.org/publications/polleg/tsoc99/part2-4.html:

> **Community/Federal Information Partnership (C/FIP).** This program will make new information tools, such as geographic information systems (GIS) technology, more readily available at the local level to help communities make informed, collaborative decisions about regional growth. The C/FIP includes the 15 federal agencies that make up the Federal Geographic Data Committee, chaired by the Secretary of the Interior, working in partnership with State, local and tribal governments, the academic community, and the private sector. The National Partnership for Reinventing Government -- in cooperation with the Departments of Interior, Agriculture, Commerce and the Environmental Protection Agency -- is sponsoring six pilot projects to demonstrate how geospatial data and maps from various government agencies can enhance community decision making on local issues ranging from crime control to water quality management. The FY2000 budget requests $39.5 million for C/FIP, distributed among six agencies.

As a federal example of multiple agencies negotiating the benefits and burdens of data sharing, the contemplated inter-Agency formula for funding C/FIP at $39.5 million was described at the FGDC Coordination Group Meeting (March 2, 1999), http://www.fgdc.gov/fgdc/coorwg/1999/cwgmar99.html, and for historical research purposes is shown below [percentages columns added]:

Agency/Bureau	New Funds	%	Base Funds	%	Total Funds	%
Agriculture – NRCS	$5.00	21.74%			$5.00	12.66%
Commerce			$10.00	60.61%	$10.00	43.48%
Census			$3.00	18.18%		
NOAA			$7.00	42.42%		
Interior	$12.00	52.17%	$2.00	12.12%	$14.00	60.87%
BLM	$2.00	8.70%				
USGS	$10.00	43.48%	$2.00	12.12%		
Transportation	$6.00	26.09%			$6.00	26.09%
EPA			$2.50	15.15%	$2.50	10.87%
HUD			$2.00	12.12%	$2.00	8.70%
Totals	$23.00	100.00%	$16.50	100.00%	$39.50	100.00%

	Characteristic	Capacities- Existing & Needed[195]
6.	Form an Association of Users to congeal a core group of Advisors, Users, & Investors who understand this Business Case	Build on Existing Capacities: FGDC GeoData Forum Mapping Science Community Add: Business Leaders from environmental, insurance, transportation, healthcare, petroleum, energy and other sectors
7.	Translate the Missing Incentives/Capabilities into concisely described new Capacities	We want to build a Network of Data Consortia to support government, industry and interest group operations
8.	Design the Capacities in Teams of Designers + Users to assure that the real world business processes are embedded in the Capacity's design & implementation – assuring user adoption later	Environmental Team Candidates Aurora Partnership GDIN Transportation Team Candidates ITS America
9.	Review opportunities for Technology Transfer & Generalize Advanced Technology or Bandwidth from Military or Government	Engage Intelligence Community NIMA – Spatial Technology Engage Government Process Reform Communities OSTP OMB / OIRA House GMIT Subcommittee
10.	Use Federal Grants, Guarantees, Procurement, Regulation or other support to foster Capacities for Transactions that achieve National Efficiency, Equity[198] or Effectiveness Public Policy goals Where Federal Guarantees are provided, the private investor's capital provides "first loss" protection, and payment on the Federal Guarantee historically has been minimal. Let States & local governments dedicate future federal programmatic support as their share in matching formulas. Alternatively, licensing & user fees may represent non-Federal matching funds. Optimize & tailor Federal financing support programs & their capabilities through pilots & demonstration projects.	Choose several Pilot Data Consortia Project types to fund on varying structural models: - Public-Public/Intergovernmental - Public-Private - Purely Private - University/Academic - Non-Profit Offer several options of Federal support that can be used exclusively, or in combination subject to an aggregate maximum cap on support per project to test the most useful and administrable form(s) of support - seed grants - matching grants - take or pay arrangements - data consortia membership fees guaranty of marketable debt

[198] This Report has focused on the financial aspects of NSDI. The social impacts of unequal access to Spatial Data and geo-processing are suggested by general studies on telecommunications, computer and Internet access such as NTIA, *Falling Through the Net: Defining the Digital Divide*, Part II: Internet Access and Appendix: Trendline Study – B. Internet Access, at http://ntia.doc.gov/ntiahome/fttn99/contents.html.

	Characteristic	Capacities- Existing & Needed[195]
11.	Build a Test-Bed environment to optimize the technology application in a real world environment	Existing capabilities: OGC Testbed UCGIS NIMA/NIDL Labs
12.	Adopt & Share Quality Assurance & Underwriting Criteria that standardize best practices for growing transactions	Review the outcomes of the Pilots in Step 10 every 6 months for 2 years.
13.	Leverage Existing State & Local Interest Groups as financing intermediaries, customers, development partners & early adopters of the benefits of a new shared solution (*If you build it, they will come.*) *Flip side of the coin:* Respect State sovereignty on issues of citizen concern that may be impacted by the technology or financing solutions and to the extent feasible work within existing State legal frameworks.	Existing Capabilities: State Bond Banks Environmental Advocacy Groups Industry Environmental Groups EPA & EPA's Financial Advisory Board Environmental Consultants, Contractors & Developers Metropolitan Planning Organizations (MPOs) for Transportation Transportation Consultants, Engineers, Contractors
14.	Leverage Federal interest in Targeted Programs with and across several Agencies This Federal interest can include: ▪ pooling federal resources to simplify local partnering ▪ maximizing the diffusion of know-how & other benefits of the Federal program ▪ reducing waste & delayed implementation ▪ showcasing American solutions globally	Intergovernmental Agencies for - Environment - Transportation - Urban Planning
15.	Delegate Origination & Pool Smaller Loans or Investments into Securitizable Pools to achieve Efficient Servicing of Investments	***Needs further study, based on Pilot Project experience*** Start discussions with Public Finance Association State Comptrollers Association ABA Public Finance Section
16.	Adopt & coordinate the Minimal Data & Metadata required to Index & Self-Identify a product, service, investment or other information	Existing Capabilities FGDC Metadata Standards OpenGIS Simple Features, GetMap, specifications
17.	Outsource Redundant or Non-Core Metadata, Inventory, Distribution & Servicing Functions	Solicit RFI (Request for Information) from OpenGIS Membership
18.	Operate the Common Technology Process under a Brand name to assure Users of Quality, Integrity & Longevity of Standardized Processes	***Needs further study based on market metrics reviewed in Step 5***

	Characteristic	Capacities- Existing & Needed[195]
19.	Foster Technologies & Processes that let Association Members build Portals that enable Proprietary Intranet Applications to be publicly accessible through the Internet	Existing Capabilities Internet OpenGIS
20.	Privatize or offer Shares to the Public to grow capital base consistent with national science and technology policy.[199] Alternatively, create a Performance-Based Organization (PBO) within the government to retain & attract quality employees and make the enterprise more flexible and adaptive to market conditions.	Organize a For-Profit entity to perform 6 sustaining functions on behalf of the Association: - Internet Portal Development - Financing - Bulk Procurement - Technology Transfer - Systems Quality Strategies - Legal Solutions Reconstitute FGDC or an Interagency Spatial Technology optimization team as a PBO
21.	Above All, build in support for the Human Factors (management and employee training & consistency)	Existing Capabilities UCGIS URISA NSGIC

The foregoing table is intended merely to demonstrate a way to model the characteristics for an Association that helps deploy and finance the NSDI, and to suggest known capabilities for certain of the characteristics. It is not a complete or comprehensive listing of required characteristics, capabilities or how to achieve them. A "straw-man" proposal incorporating these characteristics for such an Association is attached as Appendix C and was received enthusiastically when presented at the Aurora Partnership Conference on September 28, 1999.

Translating these characteristics and the research in this Report into a coherent set of public-private initiatives attuned to the potential of the Digital Economy deserves executive leadership, further study and input from business, government, community, university and nonprofit groups. Prior studies that were not as aware of the Digital Economy (and programs and policies based on such studies) may merit re-examination to fully understand and leverage new ways of achieving (and bases for financing) component parts of the NSDI.

Developing a Set of Recommendations for Financing the NSDI

The work and insights represented in this Report were developed through research inspired by numerous formal and informal discussions and meetings stretching over 18 months. The Finance Thread held on Tuesday, June 8, 1999 as part of FGDC's 1999 GeoData Forum presented a special day-long opportunity to review the subject matter of financing the NSDI, to present this Report's preliminary recommendations and to vet them before a distinguished group of 35 finance, legal, industry and government leaders.

In hearings on June 9, 1999, the Subcommittee on Government Management, Information and Technology of the Committee on Government Reform of the House of Representatives heard

---

[199] President's Committee of Advisors on Science and Technology, *Principles on the U.S. Government's Investment Role In Technology* (June 18, 1996), http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/PCAST/61896.html#principles.

testimony from 11 federal, state and local officials, business and GIS industry leaders, and non-profit witnesses as to the potential of Spatial Technologies, and the justifications for Federal research, capacity-building and financial support.[200] The recommendations and personal experiences of the witnesses at the GMIT Hearing and the goals and action items identified at the GeoData Forum form a powerful set of policy considerations and recommendations.

Preparing to chair the GeoData Finance Thread (with Dr Terry Keating), focusing the expert presenters, presenting the work of this Report, leading the Finance Thread's discussion and hearing the participant's creative response, summarizing the Finance Thread's work for the GeoData Plenary session and for FGDC's GeoData Forum Website, preparing Congressional testimony for the GMIT Hearing and responding to questions of Chairman Horn and Rep. Kanjorski provided an intensive context for considering all aspects of this subject matter with federal, state, local, tribal, international government, industry, finance, non-profit and university stakeholders.

A Set of Recommendations for Financing the NSDI

Much of this Report focused on communities and how they organized capacities to build homes and businesses, improve the environment, improve infrastructure and revitalize their economies. The focus was for and towards a *community of users*. Spatial Data has multiple communities of users, sharing the same region, industry or issue. The research bears out the wisdom of approaching the NSDI as a **Network of Data Consortia** organizable by region, industry and thematic issue with its own audience of data providers and users looking to make that Spatial Data accessible as part of the Digital Economy. The recommendations in Urban Logic's GMIT Testimony reflected a Data Consortia approach and previewed what was learned in preparing this Report.[201]

The context set by (A) research regarding pertinent settings for and Digital Economy impacts on the NSDI, (B) the characteristics of success for the analogies identified in this Report, (C) the review process that culminated in the GeoData Forum and the GMIT Hearings, and (D) the conclusions of the GeoData Finance Thread, leads to the following recommendations to facilitate financing the NSDI:

A. Finance is an available, potent and largely untapped dimension for achieving the NSDI vision. Financial engineering of cash flows and investments in Spatial Information Services would benefit from organizing a range of commonly desired strategies that affect the timing, amount, recurrence and credit quality of those investments. Finance makes meaningful and depends on the work of standards-development organizations by using technical specifications for Spatial Data, interoperability and other responsible design elements as underwriting criteria. Financing

---

[200] Generally, House Government Management, Information and Technology Subcommittee (June 9, 1999), at http://www.house.gov/reform/gmit/hearings/testimony/990609h.htm.

Among the most passionate, concise and eloquent presentations by a state official came from Wyoming Governor Jim Geringer, who took the time and had the insight and foresight to translate Spatial Technology into the Enlibra Principles of collaborative government environmental management advocated by the Western Governor's Association. See, Testimony of Governor Jim Geringer before the House Government Management, Information and Technology Subcommittee, at http://www.house.gov/reform/gmit/hearings/testimony/990609jg.htm and excerpted beginning at page 50 above, and Western Governors Association, *Principles for Environmental Management in the West: Enlibra Vision Statement* (Policy Resolution 99 – 013, June 15, 1999), at http://www.westgov.org/wga/policy/99/99013.htm.

The author also testified at the Hearing (**Urban Logic's GMIT Testimony**), at http://www.house.gov/reform/gmit/hearings/testimony/990609bc.htm.

[201] A more complete summary of the justifications for these recommendations in the national (as opposed to the financing) context are set forth in Urban Logic's GMIT Testimony, at http://www.house.gov/reform/gmit/hearings/testimony/990609bc.htm.

that uses such standards will create liquidity for investment decisions, transactions and operational dependence reflecting the "NSDI" in the Digital Economy's market-driven context.

B. Users in the Internet marketplace for Spatial Data value finding trustworthy data at reliable sources.[202] ***Branding*** a Spatial Dataset's quality will implement minimal federal Metadata & Data Content Standards by building user and vendor familiarity with quality accessible Spatial Data

C. Use parallel consortia of privately-led, publicly-accountable Service Bureaus to leverage Spatial Data transactions into the NSDI just like Service Bureaus process credit cards, mortgages and many other commercial transactions

1) Basic Consortia types
   a) Regional – an adaptable concept, scalable from a single county to multiple states and nations, and scalable from centralized[203] to decentralized depending on the economics and politics of organizing data in the relevant community
   b) Industry-Specific
      (i) Energy, Gas & Oil Pipeline
      (ii) Insurance[204]
      (iii) Telecommunications
      (iv) Real Estate
   c) Interest Group
      (i) Environmental Advocacy & Conservation (such as The Nature Conservancy's 80 data centers to track and preserve Biodiversity)
      (ii) Health Care Constituencies for each genetic, environmental or accidental condition (such as spatially-enabling the etiology of breast cancer through data collections sponsored by the National Alliance of Breast Cancer Organizations and National Action Plan on Breast Cancer)[205]
      (iii) Labor quality of life issues
   d) Federal Agencies – become members of such consortia
   e) Private Data Developers & Suppliers – service the outsourced needs of such consortia as a new line of their business

2) Association Network – an Association of the Basic Consortia
   a) Helps remarket, finance and procure Spatial Data for the Basic Networks
   b) Owns the Brand for reliable Spatial Data specifications & procedures
   c) Develops public policy implications, initiatives & guidance
      (i) Public Access requirements
      (ii) Security for data access environments
   d) Use the National public/private Association/organization[206] to
      (i) support the Network of Data Consortia as Service Bureau initiatives

---

202 Recall America Online's $1.1 billion acquisition of Web spatial enabler MapQuest and its market justifications, fn 181.

203 The "Area Integrator" approach and decentralized approaches are described and contrasted in FGDC, NSDI Framework Part 1: Introduction and Reference (19___), p. 38. [***Get Cite***]

204 Allen Munroe (RiskInfo), *GIS in Risk Management* (Risk & Insurance - March 1997), http://www.riskinfo.com/tech/feature5.html.

205 National Action Plan on Breast Cancer, *Etiology Work Group Action Plan: Activity 6: To draft a concept for a Request for Applications for a Model Spatial Statistical Analysis* and *Activity 7: Improving Federal and State Capacity To Investigate Potential Environmental Associations With Elevated Breast Cancer Rates: Developing a Coordinated Response*, http://www.napbc.org/napbc/etioplan.htm#6.

206 Refer to the "straw-man" proposal in Appendix C.

(ii) create financial, procurement, federal contracting and other solutions on behalf of its state, county, regional and local client/members

(iii) treat the 6 Capacities (in Recommendation D below) as creating 6 lines of business well-suited for the private sector to lead, co-develop and co-fund

D. Develop parallel sets (at both National Association and Basic Data Consortia levels) of 6 crucial capacities to foster Spatial Technology transactions to adopt consistent investment standards while leaving each Basic Consortia and its members free to perform these services on its own or through its own arrangements

1) Internet Portals of Functional Spatial Data
   a) Public Access for basic Spatial Data and geo-processing tools – Option to FOIL and shows the public how useful geo-processing can be
   b) Instead of metered or "data by the byte" pricing of Spatial Data, consider the larger revenues available from online banner advertising, flat-rate monthly/annual subscription fees and other revenue options
      (i) Association can negotiate "floor" arrangements for any Basic Network to use in remarketing or arranging banner advertising or remote Website access to its Spatial Data
      (ii) Simplifies creating a marketplace for the interoperable Spatial Data being developed by the Basic Networks
   c) Branding of "Quality" Spatial Data/geo-processing Websites essential to let market price the data quality it needs for a given application or customer base

2) Finance Options & Optimization on behalf of Basic Networks and the Association
   a) Organize a National Information Technology Development and Finance Corporation – like a specialized "banker" - to service Basic Data Consortia and their Members
   b) Finance portions of the NSDI like physical infrastructure using bonds, revolving loan programs and other debt structures that provide capital to build the Network of Data Consortia as Service Bureaus
   c) Use a Financial Advisory Board to vet options for debt, equity, CRADA, partnering and other formats for investment pooling
   d) Conduct regular surveys of the functional requirements of users, their investment plans and commitments, their in-house expertise and desire to use that expertise for data assembly, decision support tool-building, both or neither, and other IT capital planning "metrics" that help frame and prioritize Consortia roles, outsourcing, member data - supply commitments, financing and staffing
   e) Following-up inquiries would enhance investment alignment & pooling opportunities

3) Bulk Procurement Strategies and Purchasing Expertise
   a) Serve as the "first negotiator" on behalf of non-federal units desiring to enter into data sharing/IT partnerships across multiple federal Agency missions, simplifying the partnering process, and creating a strong local/industry/interest group balance to federal partnering activity. Non-exclusivity of Consortia's role leaves non-federal units (Consortia members) free to negotiate separate partnerships and data sharing mechanisms with federal agencies, if the situation or context serves them better.
   b) Could reinforce Commercialization of Spatial Data/geo-processing so that outsourcing to another Basic Network is regularly considered as an option to internal development of stovepipe systems
   c) "Best Practices" guidelines would spare less-expert users the learning curve of buying

and upgrading Spatial Data and GIS/IRM systems[207]

d) Following up of inquiries would enhance procurement optimization and joint bidding opportunities
e) Creates a large market mechanism for the GIS vendors, consultants and integrators to go after, thereby economizing their sales and marketing effort, letting companies compete based on after-sales service and product differentiation

4) System & Data Quality and Underwriting Criteria
   a) FGDC Metadata and Data Content Standards and OpenGIS and other industry interoperability specifications processes fit in here
   b) Technical advances (such as the "reduced set" of Standards elements necessary to drive PC-driven transactions in Spatial Data) are made known here. For instance, the smaller set of query items driving the GetCapabilities/GetMaps interoperable web mapping specifications of OpenGIS to allow the query to pass through JAVA script over (and displaying the map in) a Netscape or Internet Explorer web browser without a PC having GIS software on it.
   c) Design elements for enhancing Security and Privacy across multiple Basic Data Consortia Networks
   d) Limits product and tort liability by creating "normative" floors for Spatial Data and geo-processing design, quality control and appropriate use
   e) "Best Practices" guidelines would spare less-expert users the learning curve of assembling, building and maintaining complex data appropriate to routine tasks
   f) "Watermarking," cookies, data "traps" and other techniques could address Copyright and Cyber-terrorism concerns from misuse of Spatial Data

5) Public Policy & Legal Strategies
   a) Research & Promulgate Model Spatial Data Licensing
   b) Craft Model Privacy Policy Guidelines for Internet Portals with Spatial Data/geo-processing Characteristics
   c) Review Copyright and database protection issues
   d) Understand the role of Consortia and Consortia member training in reducing the liability in transactions that build and use Consortia data

6) Operational and Technology Transfer Strategies
   a) As data acquisition, integration, e-government, e-business, e-citizen and decision support tools are built in one Consortia, transfer those tools as "best practices" to other Consortia
   b) Funnel advanced military/intelligence capabilities to Consortia to improve "consequence management" in emergency response and give American citizens and businesses the benefits of using advanced techniques on a daily basis in appropriate non-military settings

E. Permit the commercializable aspects of the NSDI to flourish
   1) Emphasize Private Sector Innovation and Entrepreneurship in organizing and driving 6 Capacities
   2) Clarify Copyright protection for Spatial Data developed or shared by Private Sector[208]

---

207 One Finance Thread participant noted:

There is an increase in outsourcing of government services, however the federal acquisition regulations (FAR's) are still cumbersome and outdated. What is going on in the federal contracting sector to modernize procurement of goods and services?

208 One Finance Thread participant asked:

3) Review government and private Data Pricing and Data Licensing patterns across the country for similar types and quality of data.
4) Broaden and adapt CRADA and other procedures for growing the Private Sector's role

F. Organize appropriate Public Sector support:
1) Federal Government
a) Conduct a thorough study of the Spatial Data marketplace and Spatial Data's value-added to the Digital Economy
b) Recognize the Spatial Data portion of Data Mandates imposed at all levels of government on subsidiary levels, corporations and citizens
c) Convert data mandates in stove-piped programs to membership fees, revolving loan grants to states or other credit enhancement for the Association and Data Consortia
d) Consider the appropriateness of deeming Spatial Data of the mandated scale and coverage developed by eligible Basic Network Data Consortia (i.e. those providing consistent Spatial Data) as per se appropriate for use in response to data mandates absent a showing by the mandating Agency that the Spatial Data developed by the Consortia is out of date, or fails to adhere to the quality standards
e) Where appropriate to (1) drive market investment, (2) reduce government outlay and (3) increase Spatial Data supply and quality choices for government, recharacterize Data Mandates as "Take or Pay", "Revolving Loan" or other arrangements that represent cash flow revenues that attract capital. This would expand procurement and regulatory options and foster private equity investment in Spatial Technology.
f) Use Pilot programs to optimize the benefits of various financing scenarios as was done with procurement pilots under ITMRA (Information Technology Reform Act).[209]
g) Clarify Internal Revenue Code so that bonds issued in support of Consortia will be deemed issued for a "public purpose" and accorded tax-exempt status
h) Re-examine with through Federal membership in the Association the minimal Spatial Data standards and Interoperability specifications required as "underwriting criteria" sufficient to align public and private investments and create Web-based transactions for Spatial Data.
i) Review how to make Federal imagery products accessible to Private Sector and Intergovernmental users to reduce cost and delay of Spatial Data updates and improve accuracy of geo-processing for decision-making purposes
j) As another enabler of public access and Digital Citizenship feature available to the Basic Network of Data Consortia, reestablish a Geographer for Congress as existed in 1830s to help Congress use Spatial Data/geo-processing to assess the impact and effectiveness of past and future legislation

---

Most foreign countries practice copyright on government data. Is there any evidence that they are getting better results [i.e. better Spatial Data or geo-processing] than we are on spatial data because of that policy?

Although short of an economic study of its macro- and micro-economic impacts, Xavier Lopez found that federal open access policies for spatial data (i.e. absence of government copyright, absence of licenses and marginal pricing) were more conducive to access and commercialization and growth of the national spatial geographic information community than those information policies that attempted to restrict access and protect government franchise. Xavier Lopez, The Impact of Government Information Policy on the Dissemination of Spatial Data – A North American – European Comparative Study (Thesis - University of Maine Graduate School August 1996), at pp. 207-8.

209 The Information Technology Management Reform Act of 1996 (ITMRA), 40 USC §5311 and §5401(c)(1) at http://cio.gov/s1124_en.htm,

2) State Government
   a) Issue Bonds in support of regional or local Data Consortia
   b) Host Federal revolving loan fund for Spatial Data/geo-processing development
3) County / Local / Tribal Government
   a) Structure Service Bureaus or Utilities to oversee Spatial Data pooling and geo-processing investment alignment
4) Major Institutional Public & Private Sector Spatial Data Users
   a) Subscribe as members in the Consortia
   b) Use One-Call Laws to fuel Infrastructure user support
5) Investment Banks & Financial Intermediaries
   a) Consider the appropriateness of making purchases of a small annual amount of obligations of Data Consortia eligible for Community Reinvestment Act (CRA) credit

A "National Spatial Data Council" was recommended in the NAPA Report and referenced in Secretary Bruce Babbitt's GMIT testimony.[210] This assembly of stakeholder groups could take the form of an association that creates, finances and manages the recommended capacities (A through E above) and implements the successful use of the 21 characteristics identified in this Report. A proposal for such association appears as Appendix C to this Report.[211]

Based on the research in this Report, a special effort to use Spatial Data standards as criteria for part of the investment and underwriting process may do more to promote existing standards.

Creative financing options, mirroring some of the service bureaus and structures described herein, may attract more public and private sector participants to the NSDI through regional and industry data consortia or other architectures, launching new financial instruments, and building practical steps out of foundation laid through the art of persuasion in previous studies, conferences and hearings. Eventually, as the market understands investments in Spatial Data-based securities, the Federal investment in them will be saleable, just as Fannie Mae shares now trade on the New York Stock Exchange.

Embedding public access requirements within the underwriting criteria for such Federally-led financing options may overcome the permutations in State Freedom of Information Laws that treat Spatial Data access different than regular data, and thus spawn enough basic Spatial Data and geo-processing access to support a more meaningful Digital Democracy and a better equipped 21st Century populace.

The Human Lesson for the NSDI is to encourage the Futurists who come from the Public and Private User and the Technology Communities: Visionary, practical people were at the heart of the Analogies cited in this Report. They understood the Technology and End-User bases for implementation. They also understood how to explain and build the natural partnerships, franchises, contractual arrangements and technology paths. With those explanations as underwriting criteria, funding the investments involved came just as naturally.

---

[210] Testimony of Secretary of the Interior Bruce Babbitt before the House Government Management, Information and Technology Subcommittee (June 9, 1999), at http://www.house.gov/reform/gmit/hearings/testimony/990609bb.htm.

[211] The attached proposal was heavily influenced by the research for this Report and resulted from discussions of an informal meeting in support of The Aurora Partnership held on January 21, 1999 in Shepherdstown, West Virginia, and reflects input from a number of professionals, including Joseph Lees, Esq., Louis Hecht, Lance McKee and Lawrence Ayers.

Appendix A Analogies & Their Lessons for Financing NSDI

Chapter A 1 Securitizable Loan Analogy: Retail Level - Fannie Mae Mortgage

Background of Need as Opportunity

Before the Federal National Mortgage Association (**Fannie Mae** or **FNMA**), no secondary market[212] for home mortgage loans originated by banks and savings & loan associations (**S&Ls**) existed. In this era, the capital limits of a bank or savings & loan and the reserve requirements imposed by federal and state regulators dictated the mortgage loans that bank or S&L could make at any given time. The entire loan often was held until maturity by the bank or S&L that made (i.e., *originated*) the loan. The origination process was not tightly coordinated among banks. Due to federal laws on interstate banking and bank holding companies, territories of lending meant segmentation and islands of mortgages resulting in mortgage capital supply and home interest rates being controlled by local financial institutions.[213]

Functional Role

As a federally-chartered financial services company, Fannie Mae operates in several roles:

1. *Issuer of Non-Governmental Corporate Debt* - Fannie Mae is 100% privately held. It issues bonds with different maturities and interest rates, and uses the proceeds of its debt offerings to initiate and provide lines of credit to its mortgage loan programs.
2. *Non-Governmental Guarantor* - Fannie Mae guarantees the repayment of interest and principal of certain borrower in certain pools of mortgage loans. In its Delegated Underwriting and Servicing Program, Fannie Mae shares the risk of borrower or pool default with designated program lenders and mortgage brokers.[214]
3. *Warehouser* - Fannie Mae assembles individual mortgages and "warehouses" them until they for a pool of sufficient size, diversity and credit quality to form the basis for a securitization through a mortgage-backed securities structure.
4. *Securitizer*[215] - Fannie Mae brings to the financial market pools of loans that its banks and brokers have originated by selling bonds and participation certificates in trusts that hold the pool of mortgages as collateral. The resulting securities are called **Mortgage Backed Securities** or **MBS**.

Use of Non-Governmental Organizations

Fannie Mae uses 2,500 banks and mortgage brokers (**Loan Originators**) to originate mortgage loans by holding closings across the country for first-time buyers and refinancing home owners.

---

212 The secondary market is one where loans or other contracts are standardized, pooled, securitized and sold to investors. 100% of a loan can be sold, or a piece of the debt service payable to the lender under the loan can be sold in "tranches." [Reference discussion in Logue's Handbook of Modern Finance and Fabrozzi's Treatise on Mortgage-Backed Securities]

213 The plot in Frank Capra's *It's a Wonderful Life* captures the public's perception of this control by showing the town's curmudgeonly banker, Mr. Potter, anxious to drive mortgage rates up by threatening the survival of the cash-strapped Bailey Savings & Loan, thereby securing Potter's monopoly for home mortgages in Bedford Falls.

214 See, http://www.fanniemae.com/multifamily/products/prod_delegated.html.

215 Securitization is financial alchemy: It refers to a range of legal and tax structures aimed at splitting the ownership, revenues and collateral of an underlying mortgage loan or other security.

Fannie Mae also works with state and local housing authorities and private developers to qualify particular housing projects (such as affordable housing) for end-loans so that the developer can readily sell new housing to buyers having the targeted income levels.

Each mortgage needs to be serviced: a monthly bill must be generated, fire insurance for the lender must be confirmed annually, taxes must be paid, lien searches must be made to confirm that Fannie Mae's mortgage is a first mortgage, and the mortgages must be amended, and when paid off or refinanced, released and their promissory notes returned. These functions of holding a mortgage are provided by banks and other private loan servicers as agents for Fannie Mae or the MBS Trustees.

Fannie Mae works with outside institutional funds, bankers, lawyers, credit rating agencies and brokers to create, market and repurchase Mortgage-Backed Securities to replace the capital used to purchase the mortgage loans from Loan Originators.

Focused Underwriting & Quality Assurance Standards

Loan Originators use standardized Fannie Mae underwriting requirements and loan documentation and procedures, and have no authority to change or eliminate any document or closing requirement.[216] By standardizing the promissory note, mortgage/deed of trust, title policy coverages, environmental diligence and other aspects of the home loan closing, homeowners pay less in attorneys' fees and other costs, and the loan originators can process a higher volume of loans faster and with less risk of human error. So too, homebuyers and borrowers enjoy a nationally uniform standard of care, legal practice and pooled interest rate discount environment for home mortgage lending. In 1998, Fannie Mae participated in $15.5 billion of multifamily mortgage loans.[217] Loan Originators used Web-based templates to receive Fannie Mae's online commitment to purchase and guaranty much of this conforming portfolio.[218] Applications such as Desktop Underwriter™ now allow Fannie Mae to process 30,000 mortgages per day from 2,500 Loan Originators across the country.[219] To make sure that these underwriting criteria and tools reflect the marketplace and are being used consistently by participating lenders, Fannie Mae's Housing Finance Institute sponsors regular courses and conferences available as teleconferences in as many as 5 states at once.[220]

Leveraging Private Funds

From its formation in 1938 by President Franklin D. Roosevelt as a part of the Federal Housing Administration, the history of Fannie Mae[221] is full of innovative techniques for pooling residential home mortgage loans, thereby increasing the liquidity and broadening credit access for home buyers and construction companies.

---

216 See Fannie Mae's Delegated Underwriting & Servicing Guide as well as mortgage forms and exhibits, at http://www.fanniemae.com/multifamily/doingbusiness/underwriting_and_servicing_gui.html.

217 See Fannie Mae's Press Release (February 16, 1999), at http://www.fanniemae.com/news/pressreleases/0171.html.

218 For example, Fannie Mae's MortgageLinks™ Multifamily Committing and Delivery System is described as "A powerful tool that streamlines the commitment and delivery of your Multifamily loans," at http://www.fanniemae.com/multifamily/doingbusiness/mcodes.html, using standard office computer equipment, http://www.fanniemae.com/multifamily/doingbusiness/mortgagelinks_equipment_inform.html.

219 See Fannie Mae Technology Review, at http://www.fanniemae.com/singlefamily/news/techreview/technology_review.html. This is part of a suite of technology underwriting, closing, pooling and securitization tools. See, http://www.fanniemae.com/singlefamily/technology/technology_tools.html.

220 See, http://www.fanniemae.com/singlefamily/education/institute/housing_finance_institute.html.

221 See http://www.fanniemae.com/company/history.html.

As a result of Fannie Mae's innovations in standardizing the home mortgage application and mortgage pooling processes, Fannie Mae has helped 31 million Americans become homeowners by providing $2.5 trillion in mortgage finance.[222]

As the demographics of certain gateway cities shift to absorb high levels of new immigrants, affordable home ownership becomes increasingly important to social welfare and citizen involvement in local community redevelopment efforts. Launched in 1994, Fannie Mae's Trillion Dollar Commitment through 1997 served 5.6 million families most in need, with close to $440 billion in mortgage financing. The rate of homeownership in the United States reached its highest annual level in 1997 (67.5 percent) in part because of the innovative products, services, and financial investment tools inspired by Fannie Mae's Trillion Dollar Commitment initiatives.[223]

Recently to foster Sustainable Community Development,[224] Vice President Gore recognized the inter-relationship between how ownership and mass transit's environmental benefits, by announcing a specific Fannie Mae program to encourage home purchases near mass transit facilities. This emphasis on Location Efficient Mortgages[225] reflects Fannie Mae's ability to translate environmental and community benefits into easier underwriting criteria for homebuyers trying to stretch their monthly debt service payments.

Facilitating Tax, Guarantee & Regulatory Environment

Fannie Mae obligations are perceived by the marketplace as having the implicit guarantee of the U.S. Government.[226] In that regard, any Federal Reserve Bank may act as Association's fiscal agent to issue and transfer FNMA securities, giving Fannie Mae access to large lines of credit.[227] Due to this reduced cost for borrowing its funds and its standardized underwriting requirements and loan documentation and procedures, Fannie Mae loans cost homeowners less to close and less in debt service than conventional home financing. As the secondary market for jumbo or non-Fannie Mae eligible residential loans has become more efficient, the spread between Fannie Mae and non-Fannie Mae interest rates has narrowed. As the largest mortgage credit provider in the nation, Fannie Mae has relied on its Federal Charter to reduce the overall mortgage interest payments for all residential borrowers between $7 and 14 billion per year.[228]

---

222 See http://www.fanniemae.com/news/pressreleases/9988.html.

223 See http://www.fanniemae.com/neighborhoods/commitment/trillion_dollar_commitment.html.

224 See http://www.whitehouse.gov/PCSD/Publications/TF_Reports/energy-chap1.html#sustainable.

225 See HUD, *The National Homeownership Strategy: Partners in the American Dream Chapter 5: Building Communities*: Action 55 – Location Efficient Mortgages, http://www.huduser.org/publications/affhsg/homeown/chap5.html; David G. Goldstein PhD, National Resources Defense Council, *Making Housing More Affordable - Correcting Misplaced Incentives in the Lending System*, http://www.igc.apc.org/nrdc/search/fzintr.html and http://smartgrowth.sustainable.org/library/housing_afford_goldstein.html. Also see, Center for Neighborhood Technologies, at http://www.cnt.org.

226 Richard W. McEnally, *The Long-Term Bond Market*, Chapter A5.03[2], Handbook of Modern Finance (1998 Ed.), p.A5-9.

227 See 24 CFR 81.93, and generally, 24 CFR Part 81. The Secretary of HUD: Housing and Urban Development oversees Fannie Mae's mortgage lending policies and programs. http://www.hud.gov/fha/gse/gserule.html.

228 "Numerous studies have shown that the benefits provided by [Fannie Mae's] Federal charter are passed on to home buyers in the form of lower mortgage rates. In fact, when the lower mortgage rates, which Fannie Mae's presence in the market creates, are measured over the average life of a loan, [Fannie Mae] will help save Americans who buy homes this year alone between $7 and $14 billion." From

National Approaches to State Legal Structures

Notwithstanding the trend toward Uniform Commercial Codes, each State's contract, real property and mortgage foreclosure laws are unique. Fannie Mae's form of promissory note, mortgage and other documents consists of a uniform main document and a rider to cover unique aspects of state statutory and case law. Because of the thousands of mortgage transactions documented this way, Fannie Mae has over time improved their documentation to increase enforceability in case of default. This documentation (in combination with the underwriting criteria and portfolio management) meant that in 1998, Fannie Mae's default rate was less than 1/3 of 1% (0.29%),[229] and its overall loss rate as a percentage of the mortgages and MBS held was 0.027% down from 0.041% in 1997, and was the lowest since 1982.[230]

Lessons for Financing the NSDI

The Fannie Mae Model optimizes these characteristics:

- publicly-chartered and monitored credit provider;
- privately-owned with its shares traded on the NYSE;
- innovator of retail and wholesale financial products as the dominant market maker for mortgage credit in the country;
- uses underwriting criteria that reflect market needs and technology platforms;
- works with State & Local Authorities, Banks and NGOs to incubate, underwrite, pool and rehabilitate communities through mortgage availability and affordability initiatives;
- uses online technologies to increase volume processing of standardized investments in mortgage loans;
- shares the risk of underwriting with delegated underwriters; and
- outsources the servicing of mortgages to banks and private loan servicers.

Like the national home mortgage program, the NSDI as a continuing enabler exists in the individual and collective decisions of all participants in the process. Everyone wants to buy the best home they can afford in a clean neighborhood where their family can be safe and their children attend the best schools. Neighborhoods renew (or deteriorate) block by block, one house at a time. NSDI facilitates similar "sustainability" goals, and could benefit from the aggregation of construction quality, loan underwriting and transactional support infrastructure concepts that Fannie Mae has so successfully used to increase the market capital for home mortgage lending at the lowest possible interest rates. "Fannie Mae" is the name for participants who every day have individual and institutional incentives to make a cascade of the best decisions that maximum liquidity in the system deserves.

---

http://www.fanniemae.com/news/media/faqs/faqs.html.

229 See, http://www.fanniemae.com/news/pressreleases/0171.html.

230 See, http://www.fanniemae.com/news/pressreleases/0137.html.

Chapter A 2 Pooled Loan Analogy: EPA's Environmental Revolving Loan Funds and State Infrastructure Bond Banks

Background of Need as Opportunity

The cost, expertise and time required to issue infrastructure bonds is significant. Local town finance managers who only used the capital markets occasionally, lacked continual credit rating supervision and thus found that their cost of issuance and interest rates suffered from the infrequency of this access and the special technical and legal characteristics of the infrastructure projects they tried to finance. Especially in rural and less populated areas, infrastructure funds can take 30 years or more to arrive.[231]

Particularly in the environmental area, the Clean Water Act of 1987 and other federal legislation recognized that local resources to finance the identification and clean-up of water, sewer and air pollution were limited, and not uniformly available nationwide. Research by NACo and other organizations in the early 1990s focused national attention on the plethora of federal environmental mandates that went unheeded and unfunded at the local level.[232] Even now, an intergovernmental tug of war rages in how to fund required environmental programs.[233]

EPA found that businesses and industry did not understand the implicit costs of their separate polluting decisions, and in 1992, launched an Environmental Accounting Project to improve commercial understanding of pollution prevention efficiencies and economies of scale.[234]

Functional Role

State Infrastructure Bond Banks come in several varieties:

- General Bond Banks - Pool the Infrastructure Bonds by amount and maturity from multiple governmental authorities within a state

---

[231] Fanny Seiler, *Bond projects get cash: Pratt gets $8.16 million for long-awaited sewer* (West Virginia Gazette, December 3, 1998), at http://www.wvgazette.com/News/BOND1203.html, reporting in part:

> Kanawha County [WV] Commissioner Kent Carper said, "these people have been waiting for 30 years" for the project that he said was promised by the late Sen. Jennings Randolph, D-W.Va., and others.
>
> "It was a very tough fight," he said, to get the bond money for Kanawha County.
>
> Carper and the other two commissioners, Duke Bloom and Henry Shores, went directly to Gov. Cecil Underwood to plead their case.
>
> "*When you're from Kanawha County, you have to go the extra mile*," Carper said, giving credit to the county's delegation in the Legislature and to the governor for getting the money for the project.
>
> Carper said the project will improve the value of the homes in the area.

[232] See generally, Martin R. Lee (Congressional Research Service: Environmental Protection Section - Environment and Natural Resources Policy Division), *Environmental Protection and the Unfunded Mandates Debate* 94-739 ENR (September 22, 1994), and references collected there.

[233] See Background Materials for February 23, 1999, Hearing of the House Water Resources and Environment Subcommittee on the Clean Water Act (CWA) to allow Governors, on their own behalf and on behalf of the National Governors' Association and the Western Governors' Association, the opportunity to describe principles and priorities for implementation and reauthorization of the CWA, at http://www.house.gov/transportation/water/02-23-99/02-23-99memo.htm, and the Statement of New York Governor George Pataki, at http://www.house.gov/transportation/water/02-23-99/pataki.htm.

[234] See, http://www.epa.gov/opptintr/acctg/eaproject.htm, and the Stakeholders' Action Agenda of December 1993, at http://www.epa.gov/opptintr/acctg/envacagn.htm.

- Special Bond Banks - Pool specific types of bonds, such as bonds used to fund environmental conservation, pollution-control, drinking water or transportation projects
- State Revolving Loan Funds (**RLF**s) - More flexible than Specialized Bond Banks, these RLFs lend for the same sorts of projects as Bond Banks.[235]

Use of Non-Governmental Organizations

Recognizing the complexity and scope of financial needs presented in environmental arena, EPA uses a federally-chartered advisory board, the Environmental Financing Advisory Board (**EFAB**), to develop financing options for specific environmental problems and initiatives.[236] The EFAB's members include major public and private stakeholders in environmental finance and project management, as well as NGOs historically expert in conservation and finance matters.[237] The EFAB has subcommittees working on special topics such as Brownfields, Drinking Water, etc.

Focused Underwriting & Quality Assurance Standards

Each of EPA's Finance Programs has a specific set of goals, but increasingly leaves loan and grant eligibility requirements up to the state agency or local authority responsible for certifying that EPA's goals have been met.[238] This approach has led to increased federal-state cooperation and even trust as co-stewards of natural resources and public health.[239]

Informational requirements for environmental financing are as much a national as a local concern. Stated another way, the same underwriting considerations for a Brownfields project in one city appear to be questions to ask and answer in any other city.[240]

Leveraging Private Funds

To assist local governments in leveraging private capital, EFAB produced its *Guidebook of Financial Tools* (June 1997 revision)[241] cataloguing 250 financial structures that federal, State, and local governments and the private sector can and do use to pay for environmental programs, systems, and activities.[242] By some estimates, EPA's Clean Water RLF was capitalized by $14 billion of federal grants as seed money, and has been matched by $23 billion of state funds, approximately 164%

---

235 The EPA's Office of Wastewater Management oversees the Agency's $27 billion State Revolving Funds Program of Loans and, as proposed for FY 2000, Grants, http://www.epa.gov/owm/factsht2.htm.

236 See, http://www.epa.gov/efinpage/efab.htm.

237 See, http://www.epa.gov/efinpage/efabmem.htm.

238 Historically, States set up 2 independent RLFs: one under the federal Clean Drinking Water Act and a second under Safe Drinking Water Act. See, how State RLFs use their leverage differently, and how this difference affects cross-collateralization between the funds that increases the credit rating of both RLFs, http://www.epa.gov/efinpage/efabcoll.htm.

239 See EPA, *The Clean Water State Revolving Fund - Funding Framework Policy and Guidance Document (*EPA 832-B-96-005, October 21, 1996), at http://www.epa.gov/OW/regs/frame5.html, and EPA, Drinking Water State Revolving Fund Program Guidelines (EPA 816-R-97-005, February 1997), at http://www.epa.gov/ogwdw/docs/guidetoc.html.

240 See, EFAB, *Information Needs of Capital Providers in Brownfields Redevelopment* (September 1995), http://www.epa.gov/efinpage/efabinfo.htm.

241 The 1997 EFAB Guidebook followed the 1992 report of the State Capacity Task Force on Alterative Financing Mechanisms, and is seen as a work-in-progress to spur innovative financing, at http://www.epa.gov/efinpage/guidebk/guidefor.htm.

242 See, http://www.epa.gov/efinpage/guidebk/appa.htm.

leverage.[243]

In turn, states have used the EPA's Clean Water and Drinking Water RLF grants to issue bonds as public agency bond debt to institutional investors (such as life insurance companies, pension funds and publicly traded, tax-exempt bond funds) to result in private capital purchasing the loans made by the RLF's to cities, towns and counties for water and wastewater projects.[244]

Facilitating Tax, Guarantee & Regulatory Environment

Bond Banks typically offer tax-exempt rates to their governmental customers on loans of small denominations. By offering tax-exempt rates borrowers save on interest, and improve their credit availability. The Bond Bank uses the credit quality, project diversity and borrower diversity and other factors to concoct bond pools that the credit rating agencies as having higher credit quality than most individual borrowers. Maine's State Infrastructure Bond Bank is provides fairly typical example:[245]

> "The Maine Municipal Bond Bank was created by the legislature in 1972 to provide a unique financing program allowing Maine towns, cities, counties, school systems, water districts, sewer districts or other governmental entities access to national money markets for their public purpose borrowing needs. It was established as an independent agency administered by a board of commissioners, including the Treasurer of State, Superintendent of Banking and three commissioners appointed by the Governor. Working closely with its municipal clientele, the Bond Bank sells tax-exempt and taxable bonds issued under its own name and uses the proceeds to purchase municipal borrowers' bonds. The Bond Bank's high investment grade rating from both Standard & Poor's Corporation and Moody's Investors Service allows it to obtain lower interest rates and issuance costs than most local governmental entities.
>
> "A locality wishing to borrow money for any governmental purpose submits an application form, which is reviewed by both commissioners and staff. The board's lending decisions are based on such factors as project purpose, estimated cost, construction schedule, state and local valuation, tax levy or user charges, demographic trends, recent financial and debt history, and economic stability. Applications are accepted at any time during the year in advance of the desired bond sale deadline. Once the board approves the application, the applicant is eligible for inclusion in an upcoming bond sale.
>
> "An applicant must enter into a loan agreement with the Bond Bank, and obtain a preliminary legal opinion from a recognized bond counsel to assure the legality of the bond's purpose. Borrowers must get authorization to sell bonds through a vote by its governing body (town meeting, council, board). Each of these actions is necessary before the Bond Bank bonds are sold.
>
> "At least twice a year, the Bond Bank consolidates eligible applicants and sells bonds on their behalf. This larger sized sale attracts buyers who are interested in large purchases, creates a wider distribution and broadens demand on a national and state level. For a borrower requiring more than $10,000,000 the Bank will undertake a free standing sale if it meets the borrower's best interest."

---

[243] See, Governor Pataki's Testimony, at http://www.house.gov/transportation/water/02-23-99/pataki.htm, quoting the EPA's 1997 Clean Water State Revolving Fund Summary.

[244] See, 1996-7 Annual Report of New York's Environmental Facilities Corporation, http://www.nysefc.org/investors/96-97annual.htm.

[245] Discussion taken from http://www.mainebondbank.com/about.html.

National Approaches to State Legal Structures

While State Environmental Agencies and Departments take on distinctly local flavor, local authorities are now more actively managing environmental programs for wastewater treatment, safe drinking water, stormwater management and even Superfund cleanup[246] - reducing the emphasis for *command and control* from Washington. This has led to federal environmental programs that put funding tools into the hands of state and local officials. Specifically, EPA has leveraged its ability to administer a multi-state program of community loans by designating State Bond Banks to serve as issuers of loans from Safe Drinking Water and Wastewater State Revolving Funds, thus permitting State Bond Banks to issue these loans at 2% below their own cost of funds.[247] In States with Bond Banks in operation, the Bond Banks (and their relationship with bond underwriters, bond counsel and credit rating agencies) let EPA focus on national environmental programmatic goals instead of state public finance differences. EPA continues to rely on revolving loan funds for water and sewer projects in its Action Plan on Clean Water for Vice President Gore[248] and as a Pilot program for Brownfields redevelopment.

Lessons for Financing the NSDI

State Bond Banks and EPA's use of them:

- leverages existing publicly-chartered, monitored and owned Bond Banks created by State law, avoiding the need and expense of creating new conduit structures in the 50 States;
- displays an intimate understanding of the financing needs and expertise of in-State agencies and local authorities;
- uses underwriting criteria that reflect a national policy of environmental quality by bringing all communities up to a common level of financing access and interest rate subsidy;
- works with State & Local Authorities, Banks and NGOs to incubate, underwrite, pool and rehabilitate communities through environmental infrastructure loan availability and affordability initiatives;
- uses technology for underwriting and processing eligible loans that varies nationally across all Bond Banks;
- averages out risks of underwriting across a given State and nationally given the relatively small size of each EPA-sponsored loan made, and the cross-collateralization of pools of loans being brought to market; and
- outsources to the State Bond Banks the servicing of EPA-sponsored loans.

There is an economically dynamic process at work in the EPA's use of the RLF Structure: The EPA is seeding State Bond Banks with capital to be leveraged in return for State Bond Bank loans at below-market rates to local communities for water and wastewater cleanup. This EPA/Federal

---

246 See, GAO, *Superfund: Stronger EPA-State Relationship Can Improve Cleanups and Reduce Costs* (Chapter Report, 04/24/97, GAO/RCED-97-77), http://frwebgate.access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=162.140.64.88&filename=ns98128.pdf&directory=/diskb/wais/data/gao.

247 For instance, Maine's Municipal Bond Bank serves these environmental functions as part of its overall expertise and capability for issuing debt on behalf of Maine's towns, villages and counties, at http://www.mainebondbank.com/dwsrf.html and http://www.mainebondbank.com/wwsrf.html. For the most recent fiscal year ended June 1998, Maine's Bank held only 17.85% ($139.1 million) of its $779.7 million loan portfolio as EPA Wastewater Loans, with the balance of its loans being General Tax Exempt Bonds issued for other (non-EPA) purposes, at http://www.mainebondbank.com/page3.html.

248 See, EPA Clean Water Action Plan (February 14, 1998), at http://www.epa.gov/owowwtr1/cleanwater/action/cwap.pdf.

capital is "recycling," to be reborrowed from the RLF as prior loans are repaid.

The degree of this capitalization of State Bond Banks for water projects might not be necessary or as valuable for the NSDI. The Bond Banks could serve as existing 50-state infrastructure for a more market-driven, less-subsidized loan pooling program. After all, Congress' funding of community drinking water is more pressing and easily understood than NSDI's local priority. However, Congress' reauthorization of RLFs for EPA water purposes might be another opportunity to leverage local environmental information resources.

Also the governmental and quasi-governmental authorities who borrow from the RLFs typically impose water, sewer, drainage or other fees on their community users, which fees are pledged to the State's RLF as collateral for the project loan, in addition to the plant or other physical infrastructure mortgaged by the borrower.

From an institutional outreach perspective, EPA has developed an impressive architecture that fosters finance innovation across all environmental, inter-governmental and public-private borders:

- EPA's Financial Advisory Board brings public and private finance and operational expertise together;[249]
- EPA's Financial Advisory Board continually develops its Financing Guidebook of best practices, sources, methods and contacts,[250]
- State infrastructure bankers in all states (grouped by EPA Regional offices) act to pool local constituencies requiring financing innovation,[251] and
- EPA pioneered accounting methodologies for individual public and private enterprises to get a clearer environmental picture of their [polluting] decisions, and laid the groundwork for using such costs to reinvest, remediate or redesign business operations that carried such previously hidden costs.

No doubt, NSDI liquidity and organizational issues would greatly benefit from a similar Financial Advisory Board to formulate cross-cutting financial structures, accounting methodologies (for underwriting use of data mandates) and ingenuity.

---

[249] EPA Environmental Financial Advisory Board, Membership List (January 1999), at http://www.epa.gov/efinpage/efabmem.htm.

[250] EPA Environmental Financial Advisory Board, Environmental Finance Program, *A Guidebook of Financial Tools: Paying for Sustainable Environmental Systems* (April 1999), at http://www.epa.gov/efinpage/guidbk98/index.htm.

[251] List of State Infrastructure Banks, at http://www.epa.gov/OWM/srfcon.htm.

Chapter A 3 Community Infrastructure Analogy: Surface & Mass Transportation

While the way we plan, build, and provide for our nation's transportation services has been improved and modernized continuously, the way we pay for transportation infrastructure has been slower to change. To a large degree, we are still using a single strategy that has not changed since the 1950s to finance transportation infrastructure improvements.

Jane F. Garvey, *The National Highway System - Financing Its Future: The Role of Innovative Finance*[252]

Background of Need as Opportunity

After decades of federal financing, Congress recognized that sustainable communities depend on the *intermodalism* of their transportation systems. Air, automobile, bus, freight, rail, ship and subsurface all help move people and goods through cities and regions. In response, Congress enacted ISTEA: The Intermodal Surface Transportation Efficiency Act of 1991,[253] and most recently TEA-21: The Transportation Equity Act for the 21st Century. [254]

The National Highway Designation Act started the pilot State Infrastructure Banks (**SIB**) Program in 1995,[255] and 15 States answered FTA's Notice of Request for Participation.[256] TEA-21 leaves existing SIBs in place, but continues to capitalize SIBs in 4 States.

Functional Role

The key benefit that States find in the SIB structure is the ability to provide larger financing that accelerates completion of transportation infrastructure projects with more comprehensive planning than having to await annual Federal transportation allotments.[257]

TEA-21 continues to fund pilot SIBs through cooperative agreements in four states: California, Florida, Missouri and Rhode Island.[258] Each SIB is permitted to:

(A) provide credit enhancements;

(B) serve as a capital reserve for bond or debt instrument financing;

(C) subsidize interest rates;

---

252 See, PUBLIC ROADS Online (April 29, 1997), at http://www.tfhrc.gov/pubrds/spring96/p96sp39.htm.

253 Pubic Law 102-240, at http://thomas.loc.gov/cgi-bin/bdquery/z?d102:HR02950:|TOM:/bss/d102query.html| or http://iti.acns.nwu.edu/clear/infr/istea_lst.html.

254 Public Law 105-178, at http://www.fhwa.dot.gov/tea21/h2400.htm and http://www.fhwa.dot.gov/tea21/suminfo.htm.

255 The success of SIBs in environmental funding apparently led to adopting the mechanism in transportation. Comments of Fred Warner, FHWA-Atlanta Office of Innovative Finance (404) 562-3680 on July 8, 1999.

256 Participation in the State Infrastructure Bank Pilot Program -- (Federal Register, December 21, 1995 (Vol. 60, No. 249)), at http://www.bts.gov/ntl/DOCS/bnkpilot.html. Also see, US GAO, *State Infrastructure Banks: A Mechanism To Expand Federal Transportation Financing* (O/RCED 97-9, October 1996), p. 2, at http://www.bts.gov/ntl/data/rc97009.pdf.

257 See US GAO Report at fn. 109, pp. 9-10, at http://www.bts.gov/ntl/data/rc97009.pdf. .

258 Generally, TEA-21 Section 1511, at http://www.fhwa.dot.gov/tea21/h240sube.htm#1511. .

(D) ensure the issuance of letters of credit and credit instruments;

(E) finance purchase and lease agreements with respect to transit projects;

(F) provide bond or debt financing instrument security; and

(G) provide other forms of debt financing and methods of leveraging funds that are approved by the Secretary [of Transportation]and that relate to the project with respect to which the assistance is being provided.

Use of Non-Governmental Organizations

SIBs use the public finance markets to sell their bonds and other obligations. TEA-21 spawned TIFIA: Transportation Infrastructure Finance and Innovation Act of 1998[259] to work with financial markets to grow their expertise in financing public and private surface transportation projects.

Focused Underwriting & Quality Assurance Standards

SIBs complement the priority and use the feasibility standards for transportation projects included in the State Implementation Plan (**SIP**s) required under ISTEA and now TEA-21.[260] They add as underwriting standards proof that individual projects will support repayment of the loan or other credit support provided by the SIB.[261]

Federal suggestions for state underwriting criteria include:[262]

a. The transportation problem the proposed project addresses;
b. Impact of the proposed project on public mobility and safety;
c. Ability to leverage new funding sources;

---

259 23 USC §181. As the US Department of Transportation explains,

> "Credit assistance programs such as TIFIA are designed to assist financial markets in developing the capability to supplement the role of the Federal Government in financing the costs of large projects of national significance. Developing, implementing, and evaluating financial assistance programs is a crucial mission of the DOT. To help ensure financial and programmatic success, the DOT has established a multi-agency Credit Program Steering Committee and Working Group. The Steering Committee and Working Group are comprised of representatives from the Office of the Secretary, the Office of Intermodalism, the FHWA, the FRA, and the FTA, as well as other DOT agencies and offices. The Steering Committee and Working Group will coordinate and monitor all policy decisions and implementation actions associated with this Federal credit assistance program."

Regulations, (Federal Register Volume 64, Number 105; June 2, 1999), pp. 29741-53, at http://frwebgate1.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=8372523781+0+0+0&WAISaction=retrieve.

260 See, Ohio Department of Transportation's State Infrastructure Bank, http://www.dot.state.oh.us/sib1/guide.htm. Also, Statement of Phyllis F. Scheinberg, Associate Director, Transportation Issues, Resources, Community, and Economic Development Division, General Accounting Office, *Surface Transportation: Prospects for Innovation Through Research, Intelligent Transportation Systems, State Infrastructure Banks, and Design-Build Contracting*, Testimony Before the Subcommittee on Transportation and Infrastructure, Committee on Environment and Public Works of the U.S. Senate (March 6, 1997), at http://www.bts.gov/ntl/data/rc97083t.pdf.

261 As the GAO Report noted, the SIB program assumed a supply of profit-producing toll road and other revenue generating projects. However, many states surveyed by GAO doubted that the "public goods" nature of their transportation projects would generate the revenues assumed in SIB underwriting criteria. GAO Report, at p. 16, http://www.bts.gov/ntl/data/rc97009.pdf.

262 FHWA, *SIB Primer* (1995), at http://www.fhwa.dot.gov/innovativefinance/sibprimr.htm.

d. Ability to accelerate completion of a high priority transportation project;
e. Technical and financial strength of the proposed project sponsor and the viability of the proposed financial plan; and
f. Status of necessary environmental and construction approvals.

SIBs helped identify the multiple financial and operational programs that State and sub-state governments and authorities stitch together to finance their transportation facilities. As one commentator observed in describing the potential for pooled credit and widely-available, uniform credit assistance:[263]

> "To date [1997], federal credit activities in the surface transport sector have been characterized by ad hoc efforts. For example, Congress in recent years has passed several pieces of special legislation assisting three major projects in California. The success of these transactions has stimulated considerable interest and created demand for a programmatic structure to a broader range of projects. An important objective of federal assistance, therefore, could be to establish uniform, objective, and transparent criteria for states, local governments, and other sponsors to obtain federal credit, and to set forth an orderly process for evaluating, selecting, and funding projects."

Leveraging Private Funds

Existing federally funded transportation projects have a 1:4 ratio (20% local/80% Federal). That is, one new dollar is invested for every four Federal dollars. Simple revolving loan funds (**RLF**s) would likely achieve a leverage ratio slightly above 1:1.[264] Leveraged SIBs were projected to achieve ratios in the range of 2:1 to 4:1 recognizing that the ratio should increase over time and that local management decisions will affect the actual leverage ratio that is achieved.[265]

A GAO Report found that private investment is a very attractive reason for States to form SIBs.[266] As was anticipated, every $1 of federal money invested in an SIB was matched by an estimated $4 from state, local and private sources.[267]

Experience with the SIB program led analysts to propose a broader range of federal credit support for transportation that leveraged budget funds 35:1, leveraging $35 non-federal dollars for every $1 in federal transportation budget funds.[268]

---

263 Cambridge Systematics, Inc., Apogee Research, Inc. and Fitch Investors Service, L.P., *Draft Policy Discussion Paper: Federal Credit for Surface Transportation: Exploring Concepts and Issues* (sponsored by Federal Highway Administration, November 1997), Chapter 6, at http://www.fhwa.dot.gov/innovativefinance/chp6_04.htm.

264 Simple RLFs convert Federal deposits into direct project loans. While this approach does leverage the Federal funds more effectively than traditional grants, the leveraging is limited by the speed at which loan repayments can be recycled by the RLF into new projects. US Department of Transportation - Federal Transit Administration, *Innovative Financing Techniques in Transit* (April 9, 1998), at http://www.fta.dot.gov/library/policy/IFT/ift5.htm.

265 Generally, US Department of Transportation - Federal Transit Administration, *Innovative Financing Techniques in Transit* (April 9, 1998), at http://www.fta.dot.gov/library/policy/IFT/ift5.htm.

266 See GAO Report, pp. 11-2, at http://www.bts.gov/ntl/data/rc97009.pdf.

267 Statement of Gordon J. Linton, Administrator of Federal Transit Administration, Department of Transportation, Before the House Appropriations Subcommittee on Transportation (March 19, 1997), at http://www.bts.gov/ntl/DOCS/open2.html.

268 Cambridge Systematics, Inc., Apogee Research, Inc. and Fitch Investors Service, L.P., *Draft Policy Discussion Paper: Federal Credit for Surface Transportation: Exploring Concepts and Issues* (sponsored by Federal Highway Administration, November 1997), Chapter 6, at

Facilitating Tax, Guarantee & Regulatory Environment

Each State is required to contribute 25% of the capital of its SIB as the matching contribution to the federal grant. Each State is required to maintain an "investment grade" rating on the debt of its SIB, which might mean repurchasing loans or other obligations made by the SIB to public or private borrowers in an amount sufficient to keep the pool of obligations rated appropriately. Also, States may meet their contribution requirement by investing up to 10% of their Federal transportation funds allotted under TEA-21 Sections 5307, 5310 and 5311 as well as with Federal highway funds.[269] This last provision works well with TEA-21's 5 year funding for the 4 pilot SIBs, letting States budget their matching contributions out of future federal allotments.[270]

National Approaches to State Legal Structures

The 1995 SIB Program began as a pilot project with an additional $150 million in federal transportation funding to capitalize 10 state banks. All together 34 states participated in SIBs for transportation, and currently 4 states receive SIB funding.[271] In practice, SIB flexibility in pooling state, local and regional transportation funding led to expansion of the transportation financing initiatives program in subsequent federal legislation and agency action.

At the Federal level, a National Infrastructure Development Corporation (**NIDC**) has been proposed that would perform similar pooling and insurance underwriting functions for roads, bridges and other physical infrastructure.[272] The importance of Information Infrastructure to the nation is certainly analogous to the statistics that would be elevated for coordination, reorganization and reform in a pending Senate Bill.[273]

This NIDC Proposal appears to follow success with 10 pilot State Infrastructure Banks to provide

---

http://www.fhwa.dot.gov/innovativefinance/chp6_04.htm.

[269] US Department of Transportation - Federal Transit Administration FTA Transit, *Program Changes and Final Funding Levels for Fiscal Year 1998 Under the Transportation Equity Act for the 21st Century*, Part VIII(E), (Federal Register, June 24, 1998 (Volume 63, Number 121)) at page 34513, http://frwebgate1.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=8612011485+0+0+0&WAISaction=retrieve.

[270] US Department of Transportation - Federal Transit Administration, *FTA Fiscal Year 1999 Apportionments, Allocations and Program Information*, Part XVIII, (Federal Register: November 6, 1998 (Volume 63, Number 215)), at http://frwebgate1.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=8612011485+1+0+0&WAISaction=retrieve.

[271] FHWA TEA-21 Fact Sheet on State Infrastructure Bank Program, at http://www.fhwa.dot.gov/tea21/factsheets/sibs.htm.

[272] National Infrastructure Development Act of 1999, proposed as 1999 H.R. 115; 106 H.R. 115 available at http://thomas.loc.gov/cgi-bin/query/C?c106:./temp/~c106W3u4fu

[273] Federal Commission on Statistical Policy Act of 1999, proposed as 1999 S. 205 IS available at http://thomas.loc.gov/cgi-bin/query/D?c106:1:./temp/~c106tT9Slx::

In his remarks introducing S. 205, Senator Daniel P. Moynihan framed the role that good information plays in modern governmental decision-making:

> President Kennedy once said:
>
> > Democracy is a difficult kind of government. It requires the highest qualities of self-discipline, restraints, a willingness to make commitments and sacrifices for the general interest, and also it requires knowledge.
>
> That knowledge often comes from accurate statistics. You cannot begin to solve a problem until you can measure it.

Congressional Record (January 19, 1999) p. S637, at http://frwebgate.access.gpo.gov/cgi-bin/getpage.cgi?dbname=1999_record&page=S637&position=all.

seed money for states to pledge as leverage for revolving loan funds that provide transportation capital from the private sector.[274]

Lessons for Financing the NSDI

FHWA's State Infrastructure Bank pilot program experimented with maximizing the flexibility states need to develop leverage to bring major infrastructure projects online faster:

- permitted states to "dedicate" 10% of their ***future federal transportation allocations to capitalize the SIB*** – this is a method for converting and leveraging "federal mandates" to capitalize current infrastructure
- gave the primary federal agency, its non-federal public and private financial counterparts, the financial markets and Congress experience underwriting and administering a leveraged federal-state-local finance program – paved the way for other, bolder innovations in funding transportation and non-financial projects[275]

Given the data mandates[276] inherent and funded in federal programmatic outlays, pledging a portion of such future federal subsidy now to capitalize local data pooling and partnering activity would provide increased liquidity now to "spatially-enable" local communities, in turn helping them satisfy federal regulatory information requirements.

---

274 See, US Department of Transportation - Federal Transit Administration, *Innovative Financing Techniques in Transit* (April 9, 1998), at http://www.fta.dot.gov/library/policy/IFT/ift5.htm.

275 Brownfields EPA PILOTS News, *State Infrastructure Banks: What's in Them for Brownfields?*(Volume 1, Issue 4, June 1997) , at http://www.instrm.org/bfnews/v1i4/4sibs.htm.

276 Federal data mandates are discussed in Chapter 4.

Chapter A 4 Community Infrastructure Analogy: U.S. Electricity Power Exchanges & ISOs

Background of Need as Opportunity[277]

In many communities internationally, the placement, capacity and enhancement of power plants is a key determinant of sustainable economic development. The growth of New York City[278] and Bombay[279] are constrained by energy access, pricing and reliability. Starting with the Edison Electric Light Company in 1878,[280] the planning, construction, operation and financing of energy supply grew up within the monopoly finance and ownership structure of regulated utilities.

Deregulation of the domestic power generation/supply industry began in 1978 with cogeneration and renewable power under the Public Utility Regulatory Policies Act of 1978 (**PURPA**).[281] Deregulation in the energy industry separated energy *supply* from energy *distribution and marketing*. PURPA encouraged a process for traditional electric utilities to stay in the distribution and marketing business, and enter into long-term supply contracts with independently operated and financed Qualifying Facilities (**QF**s).

The pricing of those 20-30 year supply arrangements reflected the "avoided cost" that the utility saved by not having the risk and capital commitment of building and running additional electric generation facilities. Early QF/utility "take or pay" contracts guessed at the avoided cost over the life of the contract (20-30 years). The foresight required of market supply, demand and utilization factors became too great. Experience with "avoided cost pricing" showed the difficulty of entering into long-term contracts at predetermined prices, unrelated to future market supply and demand. By the mid-1990s, this "maladaptive" experience with QFs under PURPA frustrated regulators, utilities and the QFs alike, and utility partners were buying their way out of their contracts with QFs.[282]

---

277 Much of this discussion comes from Wayne P. Olson, CFA, Director of Finance, Maine Public Utilities Commission, *From Monopoly to Markets: Milestones along the Road* (The National Regulatory Research Institute of The Ohio State University NRRI 98-19 Occasional Paper # 25, August 1998) (**Olson's Paper**), at http://www.nrri.ohio-state.edu/download/9819.pdf, and U.S. Department of Energy (**DOE**) Energy Information Administration, *Changing Structure of the Electric Power Industry: Selected Issues 1998*, at http://www.eia.doe.gov/pub/electricity/chg_str_issu.pdf (**DOE Overview**).

278 Richard Perez-Pena, *Power System Use is Pressing Limits on New York City Area* (New York Times July 9, 1999), http://www.nytimes.com/yr/mo/day/news/national/regional/ny-blackout-power.html.

279 Anil K. Malhotra (Regional Energy Adviser in the Asia Infrastructure Unit of the World Bank's Asia Technical Department), *Private Participation in Infrastructure: Lessons from Asia's Power Sector*, at http://www.worldbank.org/fandd/english/1297/articles/071297.htm. World Bank Effectiveness Studies, Table 19F, at http://www.worldbank.org/html/oed/ardet19f.htm. Energy insufficiency appears from these 1995 figures and is cited as a constraint to India's modernization in The CIA World Fact Book, at http://www.odci.gov/cia/publications/factbook/in.html#econ: India produced 398.28 billion kWh of Electricity in 1995 and consumed 420.17 billion kWh, 5.5% more than it produced.

280 "On September 4, 1882, Edison's Pearl Street Station began operating in New York City, marking the beginning of the investor-owned electric utility industry. The Pearl Street Station provided service to 85 customers and their 400 lamps. Because of the overall cost of such projects, the inability of most people to afford electric service, and banks' hesitancy to lend money, only two cities had a central power station by the end of 1883." Edison Electric Institute, Early Electric Systems, at http://www.eei.org/Industry/history.htm.

281 Pub. L. No. 95-617, 92 Stat. 3117 (codified as amended at 16 U.S.C. §§ 2601-2645 (1978)). "PURPA encouraged renewable power and cogeneration and thereby facilitated the emergence of independent power producers." Olson's Paper, at http://www.nrri.ohio-state.edu/download/9819.pdf.

282 For example, Niagara Mohawk Power Corp. raised about $3.2 billion in junk bond debt to buy out

Functional Role

Over two-thirds of the electric utilities in the United States do not generate electricity and depend upon other utilities for their supply of electricity.[283]

An Independent Systems Operator (**ISO**) builds, maintains and operates the transmission grid for power to be bought, sold and exchanged within its territory. Many utilities have formed ISOs to reduce the cost and increase the traffic of their transmission grids. FERC certifies ISOs through a conditional approval mechanism that permits adjustment in an ISO's governance, pricing, access and services.

FERC requires that the core functions and principles of ISOs include basic public policy, market efficiency and fairness elements:[284]

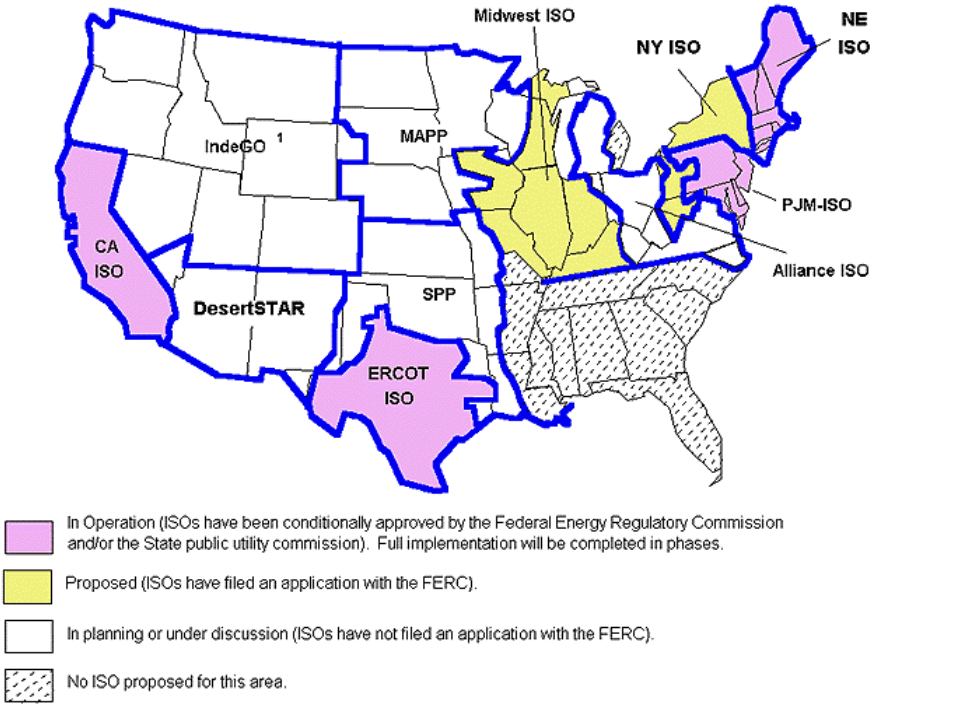
- The ISO's governance should be structured in a fair and nondiscriminatory manner.
- An ISO and its employees should have no financial interest in the economic performance of any power market participant. An ISO should adopt and enforce strict conflict-of-interest standards.
- An ISO should provide open access to the transmission system and all services under its control at non-pancaked rates pursuant to a single, unbundled, grid-wide tariff that applies to all eligible users.
- An ISO should have the primary responsibility in ensuring short-term reliability of grid operations. Its role should be well defined and comply with applicable standards set by the North American Electric Reliability Council and the regional reliability council.
- An ISO should have control over the operation of interconnected transmission facilities within its region.
- An ISO should identify constraints on the system and be able to take operational actions to relieve those constraints within the trading rules established by the governing body. These rules should promote efficient trading.
- An ISO should have appropriate incentives for efficient management and administration and should procure the services needed for such management and administration in an open competitive market.
- An ISO's transmission and ancillary services pricing policies should promote the efficient use of, and investment in, generation, transmission, and consumption. An ISO or an Regional Transmission Group (RTG) of which an ISO is a member should conduct such studies as may be necessary to identify operational problems or appropriate expansions.
- An ISO should make transmission system information publicly available on a timely basis via an Open Access Same Time Information System (OASIS).
- An ISO should develop mechanisms to coordinate with neighboring control areas.
- An ISO should establish an Alternative Dispute Resolution (ADR) process to resolve disputes in the first instance.

---

contracts with many of its independent power suppliers and enter into cheaper arrangements. Charlene Lee and Tom Sullivan, *Details Emerge for Big Niagara Junk-Bond Deal* (The Wall Street Journal, May 29, 1998, at C18. (Cited in Olson's Paper at his fn. 146 p. 38, http://www.nrri.ohio-state.edu/download/9819.pdf.)

[283] DOE Overview, Conclusions, at http://www.eia.doe.gov/cneaf/electricity/chg_str_issu/chg_str_iss_rpt/chapter2.html.

[284] DOE Overview, Chapter 3 summarizing FERC Order 888, http://www.eia.doe.gov/cneaf/electricity/chg_str_issu/chg_str_iss_rpt/chapter3.html.



[1]As of March 1998, continued development of IndeGO has been postponed, and its future is uncertain.
IndeGO: Independent Grid Operator; MAPP: Mid-Continent Area Power Pool; SPP: Southwest Power Pool; PJM: Pennsylvania, New Jersey, Maryland; ERCOT: Electric Reliability Council of Texas.
Note: ISO control of the transmission grid is incomplete in many of the regions shown on the map. Data are not available to show specific areas covered within regions. For example, the California ISO currently controls approximately 75 percent of the power grid in California.
Source: Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

As of 1998, four ISOs were operating and seven ISOs were in different planning stages.[285] With the exception of the Southeast region, ISOs were planned in all regions of the United States although, in most cases, regional coverage was still incomplete. In the Midwest, for example, portions of the transmission grid in Michigan, Indiana, Ohio, Kentucky, and Missouri will be controlled by the ISO, while other sections of the grid in the same States will not. Incomplete regional coverage will limit the gains in efficiency of operation expected from an ISO-administered, region-wide transmission tariff.

Use of Non-Governmental Organizations

The new framework for the electric power industry shifts some authority from regulators to markets and market mechanisms. Wholesale and retail consumer choice in electric suppliers will increase the market's efficiency as a mediator of current and future value. So too, NGO energy conservation programs,[286] more efficient production techniques, better insulated conductivity of distributional wiring

---

[285] The chart of ISO coverages) and this discussion are from DOE Overview, Chapter 3, at (http://www.eia.doe.gov/cneaf/electricity/chg_str_issu/chg_str_iss_rpt/fig13.html and http://www.eia.doe.gov/cneaf/electricity/chg_str_issu/chg_str_iss_rpt/chapter3.html.

[286] DOE and other executive Agencies have energy conservation assistance programs for the public and private sectors. Regional workshops showed that financing is a typical program faced by companies converting older electric manufacturing plants to make them more efficient. DOE maintains a Financing Toolkit to help companies identify federal, state and private financing sources and techniques. See, DOE Office of Industrial Technologies, *Tool Kit for Financing Energy Efficiency and Pollution Prevention Technologies*,

and appliances that draw less energy are factors that combine to reduce demand – thereby affecting supply and pricing.

Transmission costs make up only 2% of the costs of investor-owned utilities. Although transmission costs are relatively small compared to generating costs (74%), transmission prices can produce signals that create efficiencies in the power generation market.

Focused Underwriting & Quality Assurance Standards[287]

The reliability, capacity and speed of an ISO grid are subject to government regulation, and re-assessment by market participants who use the ISO's facilities.

The industry-sponsored North American Electric Reliability Council (**NERC**) and its 10 regional reliability councils are responsible for the establishment of standards, policies, and guidelines for coordination of the bulk power supply. Where FERC oversees the market fairness and efficiency of ISOs, NERC oversees mechanisms to assure the quality and reliability of energy output. NERC's criteria establish the requirements for adequacy of supply and security (reliability) of the electrical system or, from another perspective, the adequacy of all integrated transmission services operated above distribution-level support needed for customer load. These councils must regularly exchange operating and planning information among regions and the utilities that maintain control of electrical dispatch and have system operational responsibility.

Leveraging Private Funds

ISOs leverage the efficiencies for all market participants in optimizing equal access to transmission of electric power and the rate at which such power is being used, bought, sold, exchanged and produced. In effect, ISOs create an Intranet regionally for electric power suppliers and users.

Facilitating Tax, Guarantee & Regulatory Environment

In 1992, the Energy Policy Act (**EPAct**)[288] represented a tuning point in the evolution of the electric utility industry.[289] EPAct (1) gave new authority to FERC to order utilities to provide transmission service at fair rates; (2) exempted wholesale power generators from PUHCA; (3) eased PUHCA regulation of foreign utilities; and (4) directed the states to consider wholesale power market issues under PURPA.

---

http://www.oit.doe.gov/toolbook/. As an example of portal design, the Toolkit compiles actual case studies to show the business case, deal structure and financing participants and programs actually used by energy consumers, http://www.oit.doe.gov/toolbook/casestud.shtml, and links to banks, government programs, utilities and other finance sources, http://www.oit.doe.gov/toolbook/sponsors.shtml. DOE's Energy and Renewable Energy Network Financing (**EREN**) page, http://www.eren.doe.gov/financing/ details an even wider array of financing options available in each state suitable for public and private energy consumers.

[287] Discussion taken from DOE Overview, Chapter 2, http://www.eia.doe.gov/cneaf/electricity/chg_str_issu/chg_str_iss_rpt/chapter2.html.

[288] Pub. L. No. 102-486, 106 Stat. 2776 (1992). For a survey of EPAct see Jeffrey D. Watkiss and Douglas W. Smith, *The Energy Policy Act of 1992 — A Watershed for Competition in the Wholesale Power Market*, (10 The Yale Journal on Regulation, Summer 1993, at pp. 447-492. See also Kenneth W. Costello, Robert E. Burns, Daniel J. Duann, Robert J. Graniere, Mohammad Harunuzzaman, Kenneth J. Rose, *A SYNOPSIS OF THE ENERGY POLICY ACT OF 1992: NEW TASKS FOR STATE PUBLIC UTILITY COMMISSIONS* (Columbus, OH: National Regulatory Research Institute, June 1993).

[289] Denise Warkentin, *Electric Power Industry in Nontechnical Language* (PennWell, 1998), p. 65 (**Warkentin**)

Under three Orders of the Federal Energy Regulatory Commission (**FERC**),[290] federal and state regulators are embracing a more market-led, open and adaptive supply structure to mediate spot and future price fluctuations for wholesale energy. The elements of this structure include

1. assure that an open-access, nondiscriminatory transmission grid is available (i.e., FERC Order No. 888);
2. develop Open Access Same-time Information Systems (OASIS) and prescribe standards of conduct and communication protocols for transactions conducted through OASIS (i.e., FERC Order No. 889);
3. implement the independent system operator (ISO) model; and
4. establish power exchanges.

Over time, these and other intergovernmental activities should reduce vertical integration in the electric services industry, and increase market opportunities for independent generators.[291]

National Approaches to State Legal Structures

The energy industry has moved away from fixed, contractually-dependent (and therefore risky and maladaptive) arrangements with QFs, to a more open mechanism of an exchange that can intermediate any electric supplier's spot (today) or forward (future) demand for electricity. PURPA and EPAct gave the industry and regulators the common experience that a competitive environment for wholesale electricity supply was technically and economically feasible and desirable.

EPAct led state public utility commissions to questions the scope and adequacy of their regulatory frameworks and historic rulings.[292] Indeed states are experimenting with many regulatory

---

290 FERC has issued three Orders, which are referred to as Orders No. 888, 888-A, and 888-B. FERC Order No. 888, Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Docket Nos. RM95-8-000 and RM94-7-001, April 24, 1996. 61 Fed. Reg. 21,540 (1996). Order No. 888-A was issued on March 4, 1997. Order No. 888-B was issued on November 25, 1997. (Cited in Olson's Paper at his fn. 171 p. 45, http://www.nrri.ohio-state.edu/download/9819.pdf.)

291 The competitive market, user empowerment and alternative technology innovation issues are ripe for controversy and debate. For the range of such views, compare

> Clyde Wayne Crews Jr. (Fellow in Regulatory Studies at the Competitive Enterprise Institute in Washington, D.C., Electric Avenues: *Why "Open Access" Can't Compete* (Cato Policy Report No. 301 April 13, 1998), at http://www.cato.org/pubs/pas/pa-301.html

to

> Public Citizen, *Comments In response to the Federal Energy Regulatory Commission Notice of Proposed Rulemaking issued on May 13, 1999* (August 16, 1999), http://www.citizen.org/CMEP/restructuring/rtocmnts.htm .

292 Warkentin describes the evolutionary thinking in California, at p 79:

> As an example, the California Public Utility Commission (**CPUC**) ordered that a comprehensive examination of the regulatory programs explore alternatives to the current regulatory approach based on conditions and trends identified in its Decision No. 92-09-088 of September 1992 [pre-EPAct]. This directive became known as the *Yellow Book* and was submitted to the CPUC in February 1993.
>
> The Yellow Book study concluded that the state should reform its regulatory program. It suggested redefining the prevailing regulatory compact and offered strategies to address shortcomings. The CPUC would later open rule-making and investigative proceedings in order to consider its proposed restructuring policies. These initiatives, which would become known as the *Blue Book* proposals,

approaches and pilot programs.[293]

Lessons for Financing the NSDI

The history, markets and stakeholders in domestic electric power industry resemble the growth and diffusion of Spatial Data suppliers today.[294] Trends for both power generation and digital Spatial Data creation follow similar paths:

- High costs initially led few producers to assemble the resources and expertise necessary to create the product;
- These few producers operated until recently as monopolies or oligopolies to price products in institutionally large bundles, and leave the ultimate consumer few choices in price or product types;
- Technology, government policy and market mechanisms now support dissemination to consumers through more market-controlled and dominated mechanisms;
- The movement to a market-led structure for product pooling, purchasing and "value-added" servicing is changing the role of established producers and adding new entrants as producers, assemblers, exchangers, distributors and co-generators;
- A contractually-driven, vertically-integrated structure will supplant a market-led structure if consumers (especially institutional consumers) find that the reduced transaction costs promised by market access are not in fact obtained due to lack of market supply, continuity, expertise in product grading, product complexity, skill in use or other factors. This means that open markets, once created, must constantly lower the barriers to using the goods exchanged through the market.

If the country were setting out to build an energy capacity today, the resources, stakeholders and distribution strategies would be quite different than the capacity that has evolved over the past 100 years. ISOs and the principles for certifying and operating an ISO under FERC Order 888, may prove instructive for regional and other data consortia. The energy generating industry is adapting to partial deregulation and the future it promises for consumers. Because Spatial Technologies are just now reaching consumers in large numbers beyond the traditional GIS institutional user, a robust national Spatial Data production and distribution network can start with (instead of evolve into) an organization of an open, accessible, low-cost, market-mediated set of capacities.

How markets organize determines the way they can be financed. Power plants are financed with a view not only to their local customers, but also the "wheeling" customers who trade energy like a commodity to supplement any user or producer's supply as demand and peak use requires. Weather, population growth, economic development and other factors can forecast this increased demand for energy over time.

Nothing here is suggesting that government regulate "data" or organize franchised utilities to provide

---

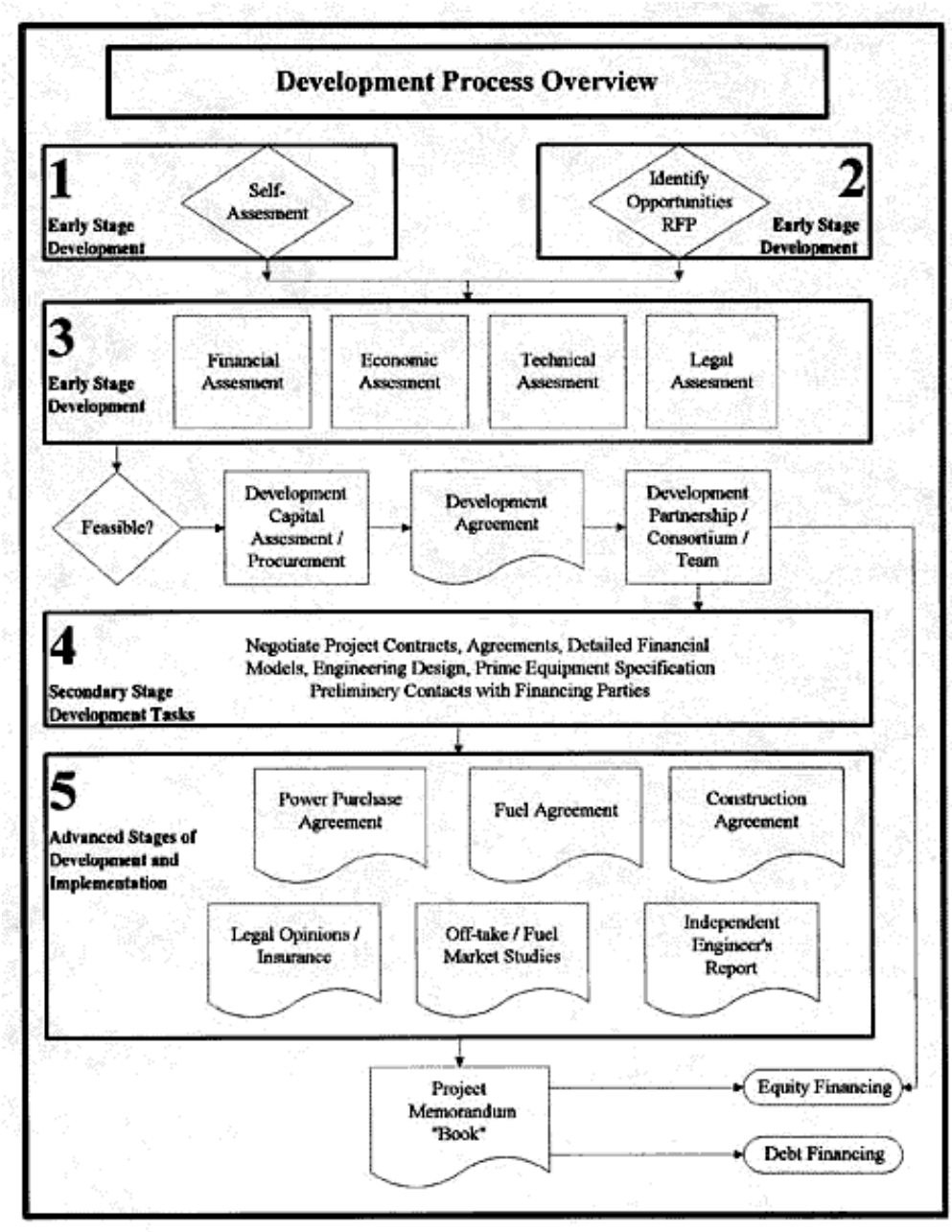
outlined a strategy to replace the traditional cost-of-service regulatory framework with alternatives focused on utility performance and market discipline.

[293] DOE Overview, at http://www.eia.doe.gov/cneaf/electricity/chg_str_issu/summary/chg_str_issu_sum.html.

[294] For readers interested in how utility markets and firms organize production and consumption of products and having the optical fortitude to read through the material a few times until its meaning for Spatial Data sinks in, I highly recommend reviewing the market principles summarized in Section 2 of Olson's Paper, at fn. 281 above, http://www.nrri.ohio-state.edu/download/9819.pdf.

it. What is suggested is that consortia be considered self-organizing and adaptive open systems responsible for assembling and using the capital needed to maintain Spatial Data that is publicly beneficial and accessible, leaving it to private companies to more efficiently (1) sell services to the consortia, (2) build additional Spatial Data, and (3) build the decision support tools appropriate for government and private users.

An illustration of this process for energy project finance may help:[295]



[295] Power Project Financing, *Power Plant Finance Roadmap*, at http://www.slip.net/~ppf/roadmap.html.

Chapter A 5 Community Infrastructure Analogy: Airport Authorities

Background of Need as Opportunity

Interoperability has long been a guiding principle in the design, construction, maintenance and usefulness of Airports. Following World War II, the federal government recognized the value of establishing a coherent system of Airports to accommodate the growth in civil passenger and freight aviation industries.

The growth of air travel and the congestion in getting to, through and out of an Airport has led to a capacity problem. The United States has 4,400 public-use Airports, heliports and seaplane bases.[296] During the next 10 years, passenger trips from these Airports will increase by over 60%.[297] $100 billion in investments may be needed to support this growth in air passengers, their baggage and freight.[298] Since 1982, the federal Airport Improvement Program (**AIP**) and related legislation represent a multi-modal, integrated approach to federal assistance for Airport expansion and maintenance.

Functional Role

An Airport Authority is a classic Project Finance entity, used to improve the long-term management, ownership and financing of a specific facility that requires ongoing development to serve a community. As a Special Purpose Entity (**SPE**), the Airport Authority typically:

- Owns and manages the land, gates, warehouses and other physical space constituting the Airport;
- Provides operations control facilities to the Federal Aviation Administration Flight Controllers;
- Licenses take-off, landing and runway space to airlines and private aircraft operators;
- Leases or licenses space to concessionaires for the convenience of passenger shoppers;
- Operates garage and parking facilities;
- Operates intermodal mass-transit bus and rail facilities for passengers and freight moving to and form the Airport; and
- Keeps the revenues, assets, equipment and franchise value of the Airport separate from that of the regional governments served by Airport access.

Use of Non-Governmental Organizations

Airports are typically owned by a special authority or public benefit corporation, and are now being privatized. In today's world, Airports consist of landing areas, passenger gates, a shopping mall connecting gates and freight delivery and warehousing systems.

In addition to Airport Authorities, major airlines and freight forwarding companies have made substantial investments in facilities housed on or around Airport properties.[299] Industrial Parks, Container Ports and Foreign Trade Zones have sprung up around major Airports to take advantage

---

296 NASAO: National Association of State Aviation Officials, http://www.nasao.org/center/.

297 United States Commercial Air Carriers and Regionals/Commuters Total Scheduled Passenger Traffic - Table 11, *FAA Aviation Forecasts Fiscal Years 1998-2009* (March 1998), http://www.api.faa.gov/forca98/foac1198.pdf.

298 GAO, Testimony of Gerald Dillingham before the House Committee on Transportation and Infrastructure (February 4, 1999), http://www.house.gov/transportation/aviation/02-04-99/dillingham.htm.

299 The Airport Council International – North America represents business and regional government interests in airport facilities. For activities in North America see, http://www.aci-na.org/, and for Business Partnerships internationally see, http://www.airports.org/partners/index.html.

of economies of scale from such proximity.

FAA's most recent Strategic Plan succinctly states the Agency's interdependence with NGOs:[300]

> "FAA influences but does not perform most aerospace activities. While FAA has important tools to lead and influence aerospace, including regulation, guidance, grants, technical assistance, and operation of the world's foremost air traffic management system, FAA does not fly or repair aircraft, launch space vehicles, or own and operate airports, heliports, and spaceports. Only through close partnership among FAA, aerospace, and other transportation modes that serve aerospace shipments or trips can the goals of a safe, secure, efficient transportation system be achieved. FAA must be a global partner to share research and intelligence and gain assistance developing a global aerospace system. Multilateral influence and leadership involves ensuring that difficult issues such as national sovereignty and international trade do not deflect aviation authorities' focus on safety, security, and system efficiency. Finally, FAA must be a close partner with its employees and unions, without whom little could be accomplished."

Focused Underwriting & Quality Assurance Standards

Safety and high-speed air traffic require that Airports be designed consistently across the country. From arranging and marking their runways, to designing their gates and locating landing and take-off routes away from densely populated areas, the Airport planning considerations and process requires uniform quality and standards. The FAA publishes Advisory Circulars as *nationally standard planning documents*.[301] Airport grantees receiving federal funds must use these standards in designing, maintaining and expanding their facilities.[302]

Beyond Airport design, to improve aircraft capacity the FAA is emphasizing the *human factors* that need to be leveraged to achieve a coherent, nationally-uniform system that supports Airport operations and safety.[303] These factors include consistent information entry and communications, the ergonomics of software and hardware tools used to perform Airport operations and air traffic control functions and other psychological factors affecting worker job performance, longevity and productivity.

In order to understand the cost/benefit of investment options available to federal, state and local operators of Airports and Aircraft owners, pilots and passengers, FAA annually compiles its *Economic Values for Evaluation of Federal Aviation Administration Investment and Regulatory Decisions*.[304] The underwriting criteria derived from this Technical Report serve as a benchmark for improving investment decision-making and for achieving a cross-cutting multi-participant process of Airport and aircraft design and construction.

Leveraging Private Funds

Of the estimated $7 billion invested in Airports annually, banks and institutional investors hold $3.5

---

300 FAA, 1998 Strategic Plan, http://www.api.faa.gov/apo120/98sp-fin.pdf.

301 Generally, http://www.faa.gov/arp/arphome.htm, and for the AIP Program Grants see the requirements of Advisory Circulars listed at http://www.faa.gov/arp/aipaclst.htm.

302 The FAA's Office of Airport Planning oversees these issues. Chapter 80 of FAA Order 1100.2D, at http://www.faa.gov/arp/arpmiss.htm#aas-300.

303 See, Mark A. Hofmann, Ph.D., CPE, *U.S. National Plan for Civil Aviation Human Factors* (March 1995), at http://www.hf.faa.gov/docs/speechnp.pdf. Generally, http://www.tc.faa.gov/hfbranch/products.html.

304 Technical Report FAA-APO-98-8 (Form 1700, June 1998), at http://www.api.faa.gov/economic/toc.htm.

billion of bonds and other obligations issued by Airport authorities.[305] This compares to $1.38 billion in federal investments provided to Airports in 1996 (the most current AIP figures available),[306] and a requested $2 billion annually for AIP capital investments in Airports over the next 5 years.[307]

Given the large federal investments overseen in the AIP, FAA has carefully assessed the investment decisions of various participants in the Airport, Airline and Aircraft industries.[308] FAA has considered the role that user fees should play in financing the Air Traffic and Airport Facility operations of FAA.[309]

Since 1992, FAA oversees the use of Passenger Facility Charges (**PFC**s) of $3 per passenger ($1.1 billion annually)[310] that Airports collect to make sure that such revenues are reinvested in Airport and Air Traffic Control systems.[311] These PFCs are pooled in a Trust Fund to be disbursed for approved projects. It is worth noting that the Congressional AIP Funding levels and the PFC Revenues from passengers nearly balance.[312]

Facilitating Tax, Guarantee & Regulatory Environment

Airport Facility Bonds issued by public authorities typically pay tax-exempt interest and provide more than 50% of all "new construction" capital for Airports. Because holders of Airport Authority tax-exempt debt are willing to accept interest rates below the rate on equivalent taxable bonds, infrastructure financing costs are reduced by several percentage points over the life of the project. This reduction in debt service payments permits the Airport Authority to meet required underwriting criteria (such as debt service coverage, reserves for maintenance, etc.) easier.

National Approaches to State Legal Structures

Airports are crucial to regional economies, and State Airport Authorities reflect local and regional politics and priorities.

In order to facilitate uniform respect for air corridors and the path of development, FAA has published Model Zoning provisions regarding building heights around Airports to preserve a safe buffer between aircraft and objects on the ground.[313]

Lessons for Financing the NSDI

Depending on the concentration of their population and the number of air miles flown to/from them,

---

305 National Civil Aviation Review Commission (**NCARC**), *Avoiding Aviation Gridlock and Reducing the Accident Rate - A Consensus for Change* (December 1997), Chapter VI(B), http://www.faa.gov/ncarc/consensus/index.htm.

306 FAA, *Statistical Handbook of Aviation* (1997), at http://www.api.faa.gov/handbook/1996/sh3-696.pdf.

307 FAA 1998 Strategic Plan, p. 36. The House Committee on Transportation & Infrastructure unanimously recommended $5 billion for AIP annually, http://www.cnn.com/TRAVEL/NEWS/9903/11/airlines.congress.reut/.

308 FAA, *Economic Analysis of Investment and Regulatory Decisions--Revised Guide* (January 1998), http://www.api.faa.gov/apo3/tofc.htm.

309 See, *Financing the FAA: Comparisons of Existing and Alternative Systems to Provide Funding for Development and Operation of the National Airspace System*, at http://www.bts.gov/ntl/data/fin-nas.doc.

310 NCARC Report, Chapter VI(B), http://www.faa.gov/ncarc/consensus/index.htm.

311 NCARC Report, Chapter I(D), http://www.faa.gov/ncarc/consensus/index.htm.

312 NCARAC Report, Chapter VII - Figure 8, http://www.faa.gov/ncarc/consensus/seven.htm.

313 FAA, *Advisory Circular - A Model Zoning Ordinance to Limit Height of Objects Around Airports* (AC: 150/5190-4A, December 14, 1987), at http://www.faa.gov/arp/5190-4a.pdf.

most communities are served by one regional airport.[314] The need for Spatial Data in a region is like an airport in that:

- Every carrier wants access to landing and take-off slots
- Every passenger and freight forwarder requires frequent (24 hour/7 day per week) arrival and departure opportunities for connectivity to other places
- A common set of protocol for access are required
- They are expensive to build initially and maintain over time (especially in light of the high volume traffic in data possible on the Internet and through spatially enabled e-government/e-business/e-commerce)
- They require constant enhancement technologically and commercially
- They combine public and private capital investments, staffs and facilities in a shared operating environment
- They use public authorities to master plan these shared facilities, negotiate slot, gate and facility lease agreements, and to arrange financing
- They represent an inter-governmental economic development platform upon which is built a $750 billion air transport industry that accounts for 8 million jobs and 6% of the GDP. Aviation is the largest export sector of our economy, with a $25-billion trade surplus in 1994. The industry expects to deliver over 14,000 transport aircraft valued at $1 trillion over the next 20 years. Without airports to emplane and deplane, the aircraft, pilots, mechanics and travel industry benefits would be theoretical. [315]

FAA's appreciation of *human factors* is also noteworthy. The Human Factors needed to increase consistency and quality controls in communicating and transferring information is as essential to the NSDI in data and metadata quality as for a coherent, nationally uniform system for Airport operations and safety.[316]

There is a marked difference in financing sources for the 71 large and medium-sized Airports versus their 3,233 smaller counterparts, as shown below:[317]

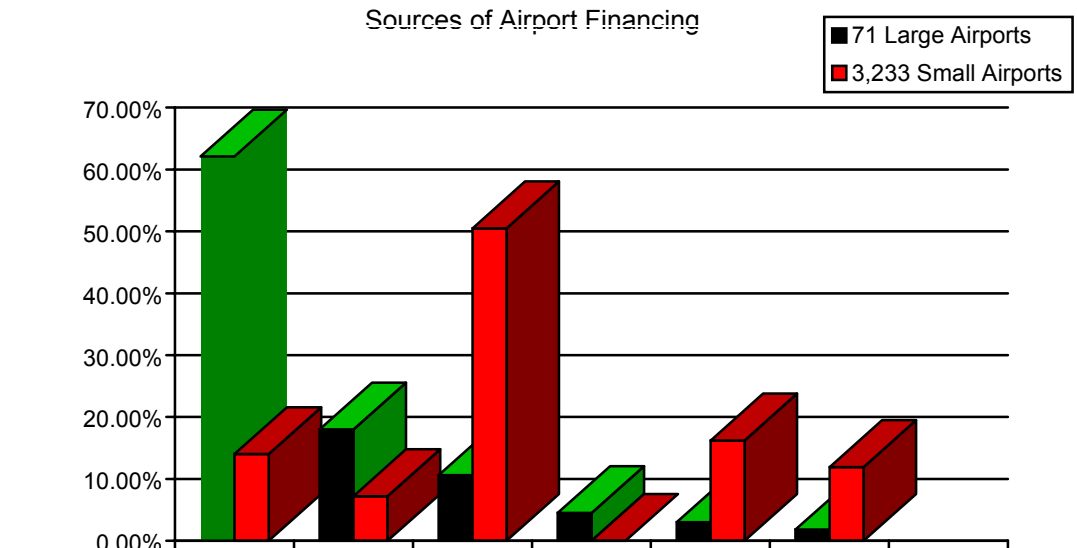
---

[314] For benchmarks used to monitor the FAA's Oceanic System Development and Support Contract to support air traffic operation of all trans-oceanic flights, see http://www.itpolicy.gsa.gov/mkm/pathways/faa-osds.htm.

[315] FAA, *National Aviation Research Plan: Overview* (1999), at http://nasdocs.faa.gov/nasiHTML/RED/01overview.html. For the industry's model of the benefits derived via aviation, see The Air Transport Action Group, *The Economic Benefits of Air Transport: Methodology*, http://www.atag.org/ECO/eco2.htm.

[316] Zorica Nedovic-Budic, *The Likelihood of Becoming a GIS User* (URISA Journal, Volume 10, #2, 1998), at http://www.urisa.org/abstracts/GISLiklihood.htm.

[317] Derived from figures presented in GAO, Testimony of Gerald Dillingham before the House Committee on Transportation and Infrastructure (February 4, 1999), http://www.house.gov/transportation/aviation/02-04-99/dillingham.htm.



	Authority Bonds	PFCs	Federal AIP	Airport Revenues	Special Bonds	State Grants	
71 Large Airports	62.10%	18%	10.60%	4.50%	3%	1.80%	
3,233 Small Airports	14%	7.20%	50.50%	0%	16.20%	11.90%	

The realities of size and low traffic make the Federal AIP funding critical for the nation's smaller Airports serving fringe or smaller communities. Spatial Data for larger, more densely populated communities may exhibit this same tendency to attract more diverse financing options than Spatial Data describing more rural communities. Clearly, the need for a variety of finance tools seems apparent by analogy.

Finally FAA's 9 year experience with passenger user fees reveals a mixed result: NCARC found that the $3 PFC charge plus AIP Grants are insufficient to pay for the infrastructure required to meet the demands for aircraft and spacecraft access to Airport facilities.[318] The FAA found that user fees alone would not fund the increased demand for services and system capacity. In the balanced budget "PAYGO" world, NCARC recommended trying to more closely match FAA's user fees to recover the cost of providing FAA's services. Increased user fees has not been met with industry or passenger acclaim, and has left the FAA looking for other options to finance Airport and Air Traffic Control infrastructure growth.

318 See NCARC Report, Chapter I(D), http://www.faa.gov/ncarc/consensus/index.htm.

Chapter A 6 Community Development Analogy: SBA's SBIC Program

Background of Need as Opportunity[319]

Through the 1950s, an organized national capital market for loans and investments made to "small businesses" did not exist. An informal network of "angels" (family members and local folks) interested in growing small businesses always existed, but luck rather than design dictated whether an entrepreneur might find his or her angel interested in investing in a business in the given industry and territory. Minorities and women entrepreneurs had an even tougher time finding the capital to start and grow their businesses.

In 1958, Congress enacted the Small Business Investment Company (**SBIC**) Program to foster creation of a pool of long-term, patient capital needs of small U.S. businesses not met by banks or other private capital sources. [320] Small companies often require business loans of the type not generally made by banks or equity financing in the critical $250,000 to $4 million range, a range not generally available from private venture capital firms. SBICs fill this gap. Whereas more private venture dollars are being invested in foreign companies (companies that will compete with U.S. businesses), the SBIC program focuses solely on the small U.S. companies that create almost all net new jobs in the United States.

Functional Role

The Small Business Administration (**SBA**) is in charge of certifying SBICs. As of 1996, the SBIC Program had 281 SBICs operating in 42 states, the District of Columbia, and Puerto Rico. Since 1958, the SBIC program has provided approximately $13 billion of long-term debt and equity capital to approximately 80,000 small U.S. companies, with more than $1.5 billion invested in 1996. A private-sector advisory council estimated that these investments have created more than one million jobs in manufacturing and service businesses. There is now talk of creating small business loan securitization programs outside of SBIC.[321]

In the 3 years (1994-6) following revised SBA regulations that enhanced government repayment terms, 79 new SBICs with approximately $1 billion in private capital were licensed. This is more private capital than had been invested in SBICs in the preceding 25 years. Further, based on pending applications, SBA estimated that an additional 40 to 50 SBICs with more than $500 million in private capital were licensed in 1997. The President's FY2000 Budget would authorize SBA to supply $2.4 billion in equity capital to SBICs to attract venture capital funding for small business.[322]

In 1971, Congress recognized that (i) minority and women-owned businesses were at a disadvantage in competing for commercial debt and equity, and (ii) guidelines for traditional SBIC financing had not made such financing readily available. Congress created the Specialized SBIC (**SSBIC**) Program to address this need. SSBIC loans require even less entrepreneur capital to qualify for loans than SBICs. Through March 1998, SSBICs had provided $2.1 billion in capital to

---

319 The discussion and statistics cited in this Chapter are courtesy of NASBIC: National Association of SBICs. See generally http://www.nasbic.org/.

320 Before investing, venture capital typically looks to an "exit strategy" (i.e., merger, IPO: initial public offering or sale of major product rights) to repay the VC investor within 3 - 7 years. See, *What is Venture Capital?* on the website for National Venture Capital Association, http://www.nvca.com/.

321 Ron Feldman (Federal Reserve Bank of Minneapolis, Banking Supervision Department), *Will the Securitization Revolution Spread?* (1995), at http://www.mpls.frb.org/pubs/region/reg959b.html.

322 SBA, *Fiscal Year 2000 Budget Highlights*, at http://www.sba.gov/aboutsba/2000budget/budgethighlights.doc.

19,626 companies.[323]

Use of Non-Governmental Organizations

Aside from the 35-year expertise of the SBA's administrators and staff, SBICs have benefited substantially from the activities of their non-profit trade association, NASBIC: The National Association of SBICs. NASBIC supports the growth and health of the SBIC industry by:

- Pooling SBIC loans and preferred stock for secondary offerings
- Collecting statistics on SBIC investment and loan activity
- Sponsors workshops and conventions to improve underwriting quality and opportunities
- Offering advice on setting up and growing SBICs
- Interfacing on behalf of SBICs with the SBA, Congress and other governmental officials to improve the capacity and performance of SBICs.

Focused Underwriting & Quality Assurance Standards

SBICs and SSBICs must follow SBA's guidelines for investing in targeted "small businesses."[324]

To check and refine the appropriateness of its underwriting criteria, SBA carefully tracks how far SBIC investments penetrate traditional barriers faced by small businesses, small businesses owned by minorities and women, and small businesses in states where capital is in short supply.[325]

Leveraging Private Funds

The SBIC program is a private-sector led partnership with the Government. SBICs are managed by experienced private-sector managers. All capital required to start an SBIC (from $5 million to $10 million) is private capital. The private capital is at risk in its entirety before any taxpayer money is *at risk* acting as first loss protection of SBA funds. Additional capital (generally as much as two times the amount of private capital) is provided by the sale of SBA-guaranteed securities. SBA examines SBICs regularly to ensure their financial soundness and compliance with all regulations. Changes made since 1994 made the SBIC program safer. In 1993, 25 of 280 SBICs were required to liquidate by SBA with a total projected risk of loss to the Government of $41.3 million. In 1996, only 2 of 282 SBICs required liquidation with a projected loss of only $1.3 million.

The 1994 SBIC Program improvements and increases in interest and fees paid by SBICs have reduced the cost to Government. The 1997 appropriation of $21.7 million (a 46% reduction) supported $665 million in Government-guaranteed investments in SBICs (a 78% increase). Total 1997 SBIC investments in small businesses was an estimated $1.8 billion. In terms of leverage, for every $1.00 of Government cost, approximately $60.00 was invested by the private sector (through SBICs) in small U.S. businesses.

Facilitating Tax, Guarantee & Regulatory Environment

The key feature of SBIC status is the ability to borrow at federally-insured rates. This reduces an SBIC's cost of funds from the current average of 17% annual return to private equity investors[326] to

---

323 SBA Program Statistical Package, http://www.sba.gov/INV/tables/1998/word/table1.doc.

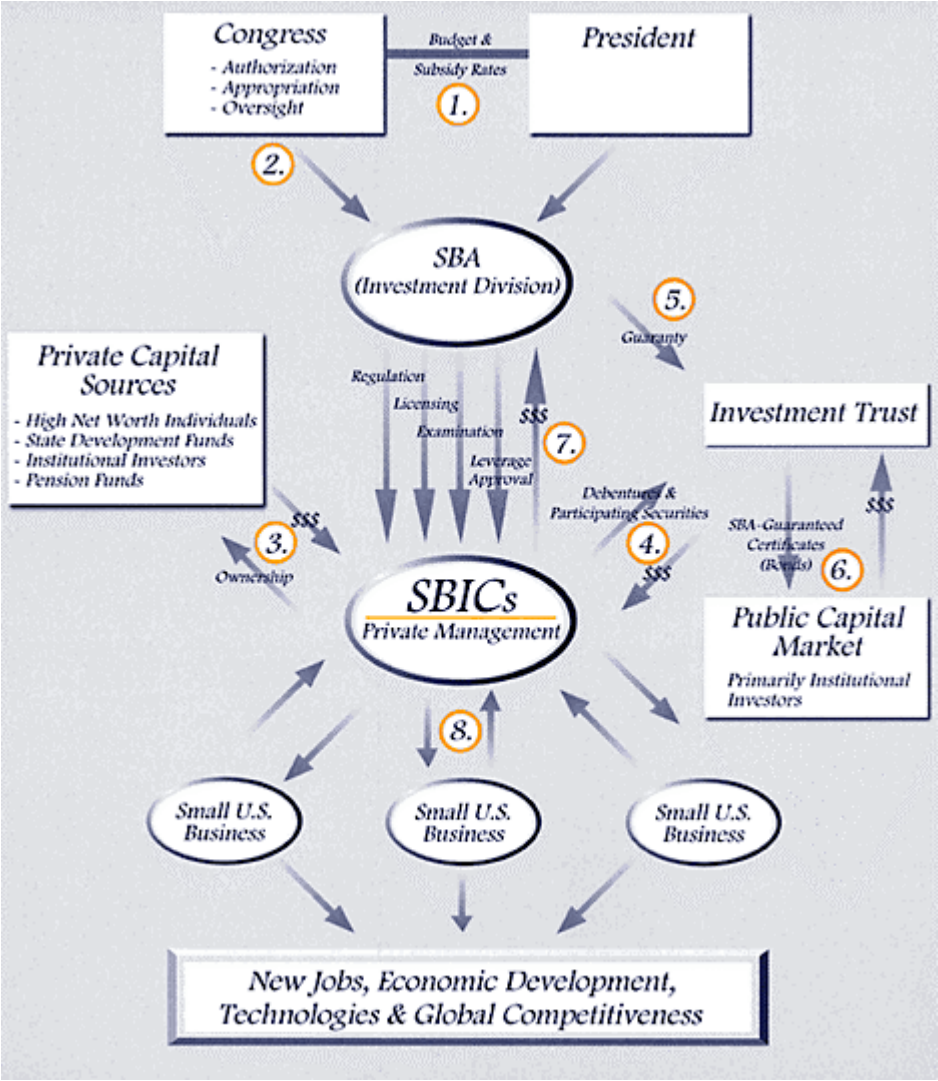
324 Generally, 13 CFR Part 107, at http://www.sba.gov/INV/regs/regs.html.

325 Generally, *SBIC Program Statistical Package - Financing to Small Businesses, For Fiscal Year 1998 Only* (November 26, 1998), at http://www.sba.gov/INV/tables/1998/stats/.

326 Venture Economics, *Private Equity Returns Rebound for Short-Term Long-Term Returns Continue Stellar Performance Distributions Affected by Public Stock Volatility* (May 18, 1999), at http://www.securitiesdata.com/news/news_ve/1999VEpress/VEpress05_18_99.html.

approximately 7.5% per annum (175 basis points over the 10-year Treasury)[327], and permits SBICs to invest and lend to small businesses at rates that are lower (given the risk) than such businesses would otherwise receive commercially. The SBICs earn on average a return of 19% on their investments in the small businesses.[328] Leaving a spread (return on capital minus cost of capital) of more than 10% for fully-invested SBICs.

A flowchart showing these interactions appears below.[329]



Description of SBIC Funding Flowchart:

---

327 Len Fagen, SBA Office of Investment (Telephone Conversation August 9, 999) (202) 205-6510.

328 SBA, *Weighted Realized Rate of Return on Invested Capital for SBIC Program Licensees Fiscal Years 1977 to 1998* – Table 23 (January 1999), at http://www.sba.gov/INV/tables/1998/word/table23.doc.

329 The Flowchart, and except as noted, much of the discussion and statistics cited in this Chapter are taken from NASBIC, http://www.nasbic.org/flowchart.html.

1. The President's Budget proposes total program level, subsidy rates, and appropriations. The subsidy rate is an estimate, stated as a percentage, of the amount to be reserved against possible program losses.
2. Congress sets the final appropriation. The required appropriation is calculated by multiplying the program level by the subsidy rate.
3. A prospective SBIC must raise between $5 million and $10 million in private capital before it can be licensed. After licensing, the private capital is always at risk first.
4. Money (leverage) can only be drawn from the Trust after application to and approval by the SBA. A full credit and regulatory compliance review is performed each time leverage is sought. Money drawn down by SBICs is repaid in accordance with the terms of the securities.
5. SBA guarantees the payment by the Trust of all principal and interest due on the certificates sold to the public capital market.
6. Money for leverage is raised by quarterly sales of 10-year SBA-guaranteed securities bearing interest at a rate equal to that of 10-year Treasury Bonds plus an average of 70 basis points.
7. Participating securities SBICs pay approximately 10% of their profits to the SBA.
8. Investments in small U.S. businesses may be in the form of a loan, a loan with equity features (e.g. warrants to obtain stock in the future), or the purchase of equity (stock).

Under Federal Banking laws dating from the Depression Era 1930s and aimed at strengthening the revitalized banks, nationally-chartered banks are prohibited from becoming major investors in businesses. An exception to that prohibition permits these banks to organize and own the stock of SBICs.[330] From 1988 through 1998, banks invested $7.8 billion into an average of 434 SBICs.[331] This conduit for equity funds helps traditional, deposit-taking banks compete with investment "banks" in finding and sharing in the growth of small businesses that ultimately go public through **IPO**s (Initial Public Offerings) or are acquired in mergers with larger competitors or complementary businesses.

National Approaches to State Legal Structures

By requiring the formation of SBICs under the corporate, partnership or limited liability company (**LLC**) law of the several States, SBA permits these entities to be structured in accordance with investor preferences.[332]

To take advantage of state and local economic development programs and policies and recognizing that some geographic areas attract less interest for venture capitalists than others, SBA permits these governmental units to establish their own SBICs.[333] The success stories of the SBIC program are national and local - ranging from STAPLES office supplies started in Westborough Massachusetts, to CALLAWAY golf clubs in Carlsbad California, to healthcare IMS in St. Louis, to Mothers Work in Philadelphia that makes maternity dresses for career women.[334]

---

330 15 U.S.C. 682(b) at http://www4.law.cornell.edu/uscode/15/682.html, and 12 CFR 7.1015 at http://squid.law.cornell.edu/cgi-bin/get-cfr.cgi?TITLE=12&PART=7&SECTION=1015&TYPE=TEXT.

331 SBA, *Bank-Owned SBIC Financing by Number and Type*, http://www.sba.gov/INV/tables/1998/word/table14.doc.

332 Small Business Investment Company Act of 1958, as amended, Sections 301, http://www.sba.gov/INV/sbaact.html.

333 Small Business Investment Company Act of 1958, as amended, Sections 501, http://www.sba.gov/INV/sbaact.html.

334 See NASBIC, *SBIC Success Stories*, at http://www.nasbic.org/success/index.html.

Lessons for Financing the NSDI

Spatial Information is developed as a by-product of a core set of business functions and software applications inside public and private enterprises.[335] These software applications *start* as Commercial Off The Shelf (**COTS**) standardized relational database management and geo-spatial processing software developed and sold by leading companies like MICROSOFT, ORACLE, ESRI, SMALLWORLD, IBM and others.[336] In actual use, these COTS applications are *then configured and programmed* to fit the specialized demands of public and private users for business demographics, AM/FM (Automated Mapping/Facilities Management), dispatch and other purposes. To support the final applications, Spatial Information must be acquired from multiple sources, inspected, inventoried, analyzed and ultimately printed out as a report or as input to other business processes and IT products. This resembles the work of small manufacturers or craftsmen.

Access to capital to support the business of developing the IRM for fine tuning COTS into a community-focused enterprise can be tough for smaller communities or poorer neighborhoods in large communities. This special "extra" need for liquidity support resembles what small businesses face in such communities and neighborhoods. SBA and Congress addressed this special need through the more generous equity underwriting standards and incentives of the SSBIC Program.

Congress' SBIC Program uses a multi-participant network (SBA, SBICs, NASBIC, banks, investors, small businesses) to develop investment transactions suitable for SBA guarantee and co-investment. This network collectively moderates the safety and growth of a specialized capital market where the average transaction depends on the best type of financing product for the age, repayment goals and prospects of each particular small business: from small loans ($192,275 for straight debt) to larger investments ($2,321,604 pure equity) and averages $937,326 (across all types).[337]

Thousands of individual transactions, nationally pooled for Federal guarantee – all are elements that appear prototypical of the way NSDI-related investing might emerge. The Federal government needs experience with this type of underwriting to build an empirical history of the accounting metrics and secondary market appetite that launch successful NSDI-related investments.

Increasingly, SBICs are moving online, through Portals like the Angel Capital Electronic Network hosted by the University of New Hampshire,[338] to attract small businesses interested in finding investors and to reduce the cost to SBICs of originating their investments.

---

335 Consult the e-commerce/e-business/e-government discussion on page 23.

336 Contrast COTS with the Stovepipe, customized solution approach described at fn. 73.

337 These averages are derived from SBA, *All SBIC Program Licensees Financing to Small Businesses Fiscal Years 1989 to 1998 – Table 2*, at http://www.sba.gov/INV/tables/1998/word/table2.doc.

Financing Format	Investments (#)	Amount ($mil)	Average Investment
All	3,456	$3,239.40	$937,326
Straight Debt	1,890	$363.40	$192,275
Debt w/Equity	631	$705.30	$1,117,750
Pure Equity	935	$2,170.70	$2,321,604

338 ACE-NET, at https://ace-net.sr.unh.edu/.

Chapter A 7 Community Development Analogy: SBA's Certified Development Company Fixed Assets Loan Program

America's 22 million small businesses employ more than 50 percent of the private workforce, generate more than half of the nation's gross domestic product, and are the principal source of new jobs in the U.S. economy.

Small Business Administration Home Page[339]

Background of Need as Opportunity

Small businesses need more than operating capital. Land, buildings, machinery, equipment and other fixed assets purchases stretch a small business' equity, and the interest on loans to acquire such assets becomes a permanent use of its funds from operations for many years.

Functional Role

SBA's Section 504 Certified Development Company (**CDC**) Program made $1.77 billion available in FY 1998.[340] The President's FY2000 Budget Proposal would make $3.5 billion in CDC funds available.[341]

The typical formula for CDC Loans is illustrated as follows:[342]

% of Funding	Source	Priority Lien	Maximum Amount	Interest Rate	Term for Real Estate Loan	Term for Equipment Loan
50%	Private	1st	No Limit	Market	10 Years +	7 Years +
40%	SBA's CDC 504	2nd	$50 - $750,000[343]	Fixed	20 Years +	10 Years +
10%	Equity					

Use of Non-Governmental Organizations

CDCs are non-profit organizations organized under State law and certified by SBA for a given region to operate under the jurisdiction of a board that includes local government officials, private-sector lending institutions, and business and community organizations.

The SBA operates the program through 300 CDCs nationwide.[344] 95% of the lending activity of CDCs was provided by and transacted through members of NADCO: National Association of

---

339 SBA, at http://www.sba.gov/aboutsba/.

340 SBA, *Summary of Statistics: Business Loans*, at http://www.sba.gov/cgi-bin/loan-approvals4.pl.

341 SBA, *Fiscal Year 2000 Budget Highlights*, at http://www.sba.gov/aboutsba/2000budget/budgethighlights.doc.

342 Kathleen Strawhacker (Virginia Asset Financing Corp.), *The 504 Loan - Intelligent Financing for the 90's*, at http://www.kcilink.com/rbff/504-loan.html, and Section 504 Fact Sheet, http://www.sba.gov/opc/pubs/fs70.html (FS-0070, February 1998).

343 The 504 Loan amount can increase to $1 million if the project or business qualifies in one of the following ways: minority-owned business; located in a rural area as defined by SBA; manufacturing facility or advancement of technology; company must make changes due to regulatory environmental compliance; financing will assist in expansion of exports; business district revitalization; changes necessitated by Federal cutbacks.

344 See, http://www.sba.gov/opc/pubs/fs70.html. For NADCO's membership in each state, click on their map at http://nadco.org/nadco/members/.

Development Companies.[345]

Focused Underwriting & Quality Assurance Standards

SBA requires that participating CDCs apply economic development and related criteria to loan and project candidates.[346] Specifically, the CDC's portfolio must create or retain one job for every $35,000 provided by the SBA.

Leveraging Private Funds

Due to limits on the portion (normally 40%) and amount ($750,000, but up to $1 million under certain conditions) of total project costs that can be SBA-guaranteed, private equity investments of 10% and commercial lender funding of 50% are normally required.

For commercial lenders, the CDC Program offers multiple advantages:[347]

1. *Improved Collateral* - reduces risk by financing a smaller portion of the project while maintaining a first- lien collateral position on 100% of the assets being financed.
2. *Grows Small Business Customer Base* - retains commercial-account relationships while participating in the long-term financing.
3. *Increases Transaction Size* - permits bigger loans; total financing can be $2.5 million or more.
4. *Builds Origination Business* by developing a secondary market in their first-mortgage portion.
5. *Aids Compliance with the Community Reinvestment Act* and extends legal lending limits that core capital can support.
6. *Efficiency of Standardized SBA 504 Program Transactions* saves time and reduces paperwork for the lender.

Facilitating Tax, Guarantee & Regulatory Environment

Debentures issued by CDCs are guaranteed by SBA, virtually eliminating the risk of the underlying corporate or community borrower's credit.

In addition, the loans made alongside the CDC by private bank lenders carry Community Reinvestment Act (**CRA**) credits (a key measure of community presence in bank merger approvals).[348] For purposes of monitoring lending limits imposed on banks, the impact of these loans

---

345 See, http://nadco.org/nadco/about.html.

346 13 CFR 120.860 et seq., at http://www.sba.gov/regulations/120g.html.

347 Taken from http://www.sba.gov/opc/pubs/fs70.html.

348 Generally, http://www.ncrc.org/cra/regulations_current.html. National Community Reinvestment Coalition, http://www.ncrc.org/cra/index.html, is quite active in the tactical use of CRA. NCRC explains:

> **How Community Groups Use The CRA To Increase Access To Capital And Credit For Underserved Neighborhoods**
>
> The Community Reinvestment Act's regulatory framework empowers neighborhood organizations to increase the flow of credit and capital to minority and low- and moderate-income communities. When a federal regulatory agency is considering a lending institution's application for merging or service expansion, neighborhood organizations and citizens can offer comments for the official public record stating their opinions as to whether the regulator should approve the lending institution's application. A regulator can be convinced to deny or delay the lender's application due to poor community reinvestment performance, concerns over reduced competition after the merger, or because of safety and soundness considerations. In the last several years, denials and delays of merger applications have been rare. Alternatively, regulatory agencies can approve the application but require that the lender undertake specific steps to improve its community reinvestment performance.

is minimized in the calculation of risk-weighted bank capital – meaning that less of a bank's core capital is needed to support a larger volume of CDC lending than regular commercial loans secured by similar collateral.

National Approaches to State Legal Structures

CDCs are organized under their home state's non-profit laws, and certified by SBA as meeting national requirements for adequate capitalization, diversity of board representation, fiscal management and strategic planning.

Lessons for Financing the NSDI

The CDC structure provides long-term loans at reduced rates to small businesses so those businesses can serve as primary engines of job growth in their local community. The mortgage-based financing is secured by property in those communities - property that will be productive as long as these same businesses are cultivated and thrive there.

In order to maintain or improve their community reinvestment performance, lending institutions have an incentive to make formal agreements with community organizations that commit to specified levels of lending, investments, and services in underserved communities. Often lending institutions will enter into agreements with neighborhood groups when their applications are being considered by federal regulators. In these cases, lending institutions want to convince regulators that they will work with community groups to increase access to credit and capital for underserved populations. These vignettes describe CRA agreements won by NCRC members in situations in which lending institutions were in the process of merging.

It must also be noted that community groups can also offer comments during the CRA exam process that suggest areas where a bank needs to improve its CRA performance. NCRC member group comments have convinced a bank to increase small business and home lending in the wake of a CRA exam. This is particularly the case when the community group comments resulted in a bank receiving a lower rating than Outstanding. This is even the case if the bank received a Satisfactory instead of Outstanding. The bank, especially if it has a merger and acquisition strategy, will take steps to improve its CRA performance.

Bank mergers typically reduce the number of branches and lenders available to serve a region. A bank's failure to have sufficient CRA credits and policies can result in major capital commitments when bank merger reviews occur. NCRC's website features examples of how this approach to community development advocacy can be used to increase regional lending accountability and activity:

- $4.1 billion, six-year agreement with First Chicago Bank. The agreement sets specific numeric goals for small business and home lending. For instance, the agreement would result in 5,200 more small business loans and 36,000 home loans over the next six years. The agreement results in First Chicago's market shares of home and small business loans being higher in lower than upper income neighborhoods.
- $13-billion, 5-year CRA agreement with Charlotte-based First Union Corporation. The agreement signed in the spring of 1998 concluded six months of negotiations between the bank and local community groups from Pennsylvania, Delaware, and New Jersey. First Union agreed to make $875 million in mortgages and $1.25 billion in small business loans over a five-year period. First Union created a $40 million job relocation program for displaced employees, and earmarked $45 million for CRA related investments. The advocates showed that 40% of the deposits from the City of Philadelphia would be controlled by First Union after its proposed merger, triggering the concern of Senator Arlen Specter and other national, state and local leaders.

CDC requires

- a federal government guarantee (from SBA)
- a non-profit CDC representative of the community and certified by SBA
- a private lender or lenders

This structure adapts to each state and regional banking and business climate and yet fulfills a consistent national policy of providing long-term capital to support community revitalization through business development.

National priorities for community information infrastructure support can be served through financing structures that use federal guarantees of community data consortia obligations, where the CDCs are replaced by such consortia and the taxes paid by the businesses receiving CDC loans are replaced by the likely intergovernmental savings transfers from using standardized spatial data to administer federal programs and policies. [349]

[349] Refer to the discussion on Data Mandates in Chapter 4.

Chapter A 8 Community Development Analogy: Commerce's EDA Revolving Loan Funds

Background of Need as Opportunity

Businesses targeted by SBA's Specialized Small Business Investment Company (SSBIC) Program[350] are located in economically disadvantaged areas.

The basic capital sources used to finance their growth may be unavailable or too expensive. They face 2 types of capital issues:

- *Capital Availability* - Notwithstanding aggressive banking efforts to recruit them as borrowers, these businesses typically fail to qualify for traditional private sector financing due to their small size, location or lack of operating history.
- *Capital Affordability* - The interest rates on capital can be quite high. Capital from credit card (currently 15%) or unsecured debt (currently 14%)[351] while available, saddles the entrepreneur with large annual interest costs.

Functional Role[352]

In order to encourage and foster the development of new and expanded businesses and their attendant increased employment in economically-disadvantaged localities, the federal government created a number of Revolving Loan Fund (**RLF**) programs through various agencies such as HUD: Housing and Urban Development, EDA and U.S. Department of Agriculture, among others.

A major goal of governmentally-funded RLF programs is to encourage private economic development lending activity in economically-distressed areas, preferably through and by local lending institutions that have ties to the community and would have the incentive to encourage additional economic activity apart from the particular RLF Program. The RLFs' "developmental catalyst" function involves the identification and remediation (to the extent within the RLFs' limited capability) of shortfalls in capital availability and/or affordability in the local small business lending market, especially as these shortfalls relate to the needs of start-up or expansion situations which have the potential to create or retain jobs.

In most cases the economic development Capital Availability obstacle manifests itself in the shortfall between (A) the total cost of a development project and (B) the aggregate amount of (1) the first-lien fixed-asset financing (often an SBA-guaranteed loan) offered by a local bank plus (2) the borrower's equity contribution, hence the term *gap financing*. This funding shortfall, by its position in the hierarchy of collateral, is required to be subordinate to the bank loan as a condition of that loan, but has priority over the borrower's equity, and thus is analogous to a preferred investment -- paying a steady interest rate, and yet in an un- or under-secured position with regard to liquidatable collateral.

The Capital Affordability shortfall is much more difficult to identify, given that, with the private sector's reticence to lend this gap financing, no directly-comparable cost for this money can be determined. Many small business borrowers utilize credit cards (at 15%) or home equity loans (at 13%) to provide

---

350 Regular SBICs are discussed in Chapter A 6.

351 Rates posted on August 30, 1999, at http://www.banxquote.com/bloomberg/rates.asp.

352 This discussion is taken substantially from Laurence B. Richardson, II of Alex. Brown & Sons, Inc., *A Strategy to Increase Economic Development by Providing a Source of RLF Recapitalization from the Capital Markets through the Utilization of Private Securitizations* (EDA Project Number 99-06-07405, June 1996), at http://netsite.esa.doc.gov/newclr.nsf/85255a0a0010ae82852555340060479d/da1f9fd8b082dc668525639b0062a4c6?OpenDocument.

the funds to close this gap. A vast difference of opinion exists among the RLFs as to whether the true needs of the borrowers are mainly for access to RLF funds willingly subordinated to bank loans, or whether the RLF financing should additionally address affordability and be offered at subsidized interest rates (below customary bank Prime-based rates) in order to assist the borrowers.

In 1996, Richardson found that EDA RLFs adopted two strategies to rectify the gap in available, affordable capital for small business lending. Some charge effectively market rates for this gap financing, while others believe that offering a subsidized interest rate is part of the RLF's role. Many RLFs began offering subsidized rates in the early 1980s when the absolute level of interest rates was very high (Prime averaged 15.27% in 1980, 18.87% in 1981 and 14.86% in 1982, for example). But now, in our low-rate environment (Prime of 7.75%), this subsidy is not viewed as being as necessary.[353]

Use of Non-Governmental Organizations

A "Community Development Corporation" must be or be controlled by a non-profit organization.[354] Regardless of whether the RLF is a for-profit, non-profit or government instrumentality, in order to be self-sustaining there must be a balance between inflows and outflows of funds. Revenues from interest earned and fees charged must exceed the total of administrative expenses and loan losses, plus a factor for inflation, if the RLF is to maintain and preserve the capital resources to continue its present level of economic development activity without government subsidy.

Focused Underwriting & Quality Assurance Standards

EDA's Administrative Manual guides how RLF Grantees lend and re-lend RLF funds.[355]

Leveraging Private Funds

These RLFs are capitalized with federal grants and are charged with the mission of stimulating economic development through lending capital to small businesses that are unable to qualify for private-sector financing. State and local governments have augmented these federal efforts through additional funding for these RLFs and/or the creation of their own similar entities. The RLF loan must leverage at least $2 of private investment for every $1 of RLF grant funds invested in a business or

---

353 Richardson argues that subsidized rates might, in fact, be viewed as being counter to an RLF's mission of growing its overall capital base provide loans to more small businesses. Unless necessary to grow businesses that for reasons of operating losses in their early years, subsidized rates could be expected to lead to financial substitution: creating a counterproductive incentive for borrowers that otherwise qualify for, and thus afford, private-sector financing to instead seek RLF funding due to the lower interest cost. In a limited-capital environment, financial substitution causes eligible projects to go unfunded while borrowers qualified for private sector financing (and thus technically ineligible for RLF loans) use up the funds.

His argument addresses the economics of pricing interest rates to achieve full capital utilization as between RLF-eligible and RLF-ineligible business borrowers. For purposes of NSDI analogy, the point to keep in mind is that alternative sources of NSDI funding should bear different interest rates depending on the market demand for Spatial Data content being developed by a community. An "interest rate subsidy" may be required to foster the growth of Spatial Data on a nationally consistent basis in less populated areas such as agricultural, rural and tribal communities. In more densely populated and developing areas, the market value of Spatial Data content and the creativity of private sector uses for that Data will permit modest access fees for local governments to make their data more uniform, accurate and up-to-date, subject to the public policy considerations on Pricing governmental data described in Chapter 6 above.

354 42 USC 9802, at http://www4.law.cornell.edu/uscode/42/9802.html.

355 See, EDA, *Section 209 Economic Adjustment Program - Revolving Loan Funds Grants/Administrative Manual* (December 1998), at http://www.doc.gov/eda/pdf/RLFADMAN.PDF.

project.[356] With EDA's consent, the loan held by an RLF may be pledged as part of a securitization to leverage even more private capital.[357]

Facilitating Tax, Guarantee & Regulatory Environment

As with other approaches to community credit, whenever they seek to merge, banks risk severe regulatory criticism for failing to lend to small businesses.[358]

National Approaches to State Legal Structures

As with SBIC Loans and investments generally, EDA RLF loans are made pursuant to state contract and mortgage laws.

Lessons for Financing the NSDI

The Economic Development Administration's RLF Program has identified Regional Planning Organizations that could be partners in a community-based NSDI development initiative.[359] Instead of having to set up a new set of Federal, State, Local administrative relationships, an NSDI Finance Program that seeks to organize Community Information Resource Management Districts[360] would find an organizational architecture already exists and has experience in managing Federal Revolving Loan Fund Programs.

---

356 See, EDA, *Section 209 Economic Adjustment Program - Revolving Loan Funds Grants/Administrative Manual (December 1998)*, p. 7, at http://www.doc.gov/eda/pdf/RLFADMAN.PDF.

357 EDA, I*nterim-Final Rule to implement a comprehensive amendment to the Public Works and Economic Development Act of 1965, as amended, by the Economic Development Administration Reform Act of 1998* (Pub. L.105-393) (Docket No. 990106003-9003-01, February 11, 1999), proposed13 CFR 314.10(a), at http://www.doc.gov/eda/pdf/13CFRIII.PDF. This implements certain recommendations described by Laurence B. Richardson, II of Alex. Brown & Sons, Inc., in *A Strategy to Increase Economic Development by Providing a Source of RLF Recapitalization from the Capital Markets through the Utilization of Private Securitizations* (EDA Project Number 99-06-07405, June 1996), at http://netsite.esa.doc.gov/newclr.nsf/85255a0a0010ae82852555340060479d/da1f9fd8b082dc668525639b0062a4c6?OpenDocument.

358 Federal Reserve Board, *Transcript of Public Meeting on NationsBank/BankAmerica Merger held in San Francisco* (July 9, 1998), at http://www.federalreserve.gov/events/publicmeeting/19980709/19980709.htm.

359 EDA, *Economic Development Directory: Section 4 - Contact List for RLF Programs* (January 1999), p. 12, http://www.doc.gov/eda/pdf/phone.pdf.

360 I co-authored a proposal for Community IRM Districts as a member of the New York State Temporary Geographic Information Systems Council. See, the Council's Report entitled *Geographic Information Systems: The Key to Competitiveness* (March 1996), Appendix VI (NYS Division of the Budget), http://www.nysl.nysed.gov/gis/gtcreport/1n6ddist.htm.

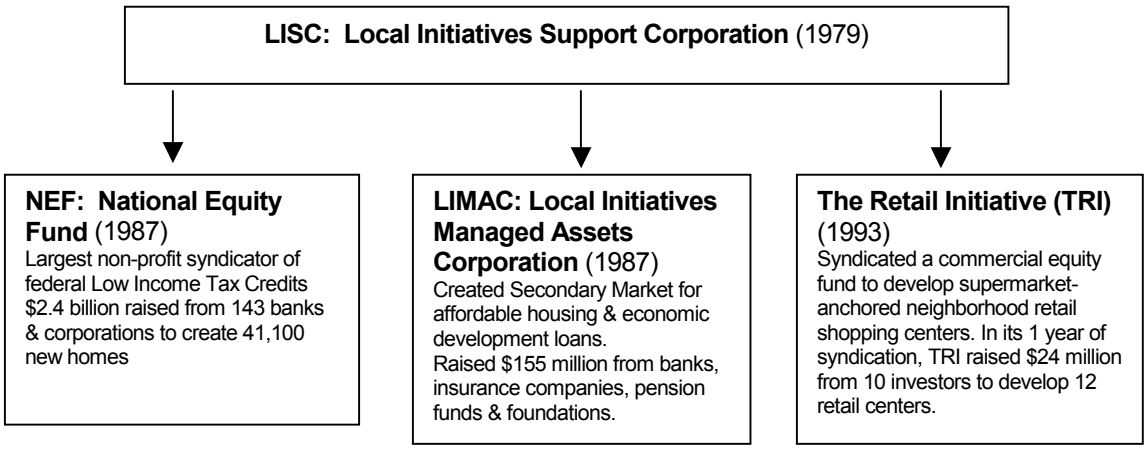
Chapter A 9 Community Development Analogy: LISC - Local Initiatives Support Corporation

Background of Need as Opportunity

Community Development Corporations (**CDC**s) had started in the [19__s]. As the federal support for inner cities began to erode in the [1960s], CDCs felt greater pressures to shore up rapid declines in the fabric of inner-city neighborhoods. Racial and social unrest in such neighborhoods accelerated as the gaps in income increased through the 1980s.

Functional Role

LISC was formed as a non-profit financial intermediary with $10 million[361] by The Ford Foundation and 6 corporations in 1979 to assist in transforming distressed neighborhoods into healthy communities by supporting the development of and financial resources available to charitable, tax-exempt CDCs, bringing technical and financial know-how. Three affiliates have been formed since.



In an *U.S. Banker* interview[362] with LISC's immediate past President Paul S. Grogan "likes to view LISC as a 'distribution system' for public and private entities to direct money into redevelopment. With dozens of offices around the country, LISC is also a conduit to thousands of nonprofit neighborhood groups, providing them with financing and technical support. For banks, LISC's most visible arm has been the National Equity Fund, a limited partnership vehicle providing low-income housing tax credits that corporations can buy in exchange for tax savings. Some 80,000 affordable homes and apartments have been financed through such programs, but Grogan has also steered the organization toward economic development."

The process of redevelopment follows a path familiar to LISC:[363]

1. LISC staff meets with a CDC to identify a community's most pressing housing needs and determine a viable, affordable housing plan.
2. LISC and the CDC work with local officials to ensure that the housing developments coordinated with city and state plans.

---

361 LISC, *Who We Serve*, at http://www.liscnet.org/html/whoserve.htm.

362 U.S. Banker, *A Redevelopment Pioneer Reflects* (February 1999), at http://www.liscnet.org/html/whatsnew_news01.htm.

363 LISC, at http://www.liscnet.org/html/nef_frame.htm.

3. NEF, Inc./LISC experts and the CDC develop a projected budget and schedule, and obtain all financing sources.
4. Throughout construction, NEF, Inc. carefully charts the development's progress each month.
5. Once the project is completed, NEF, Inc. monitors the project to make sure it is meeting its financial goals and complying with all regulations.
6. In the months and years ahead, LISC continues to work hand in hand with the CDC to ensure that the development serves as a catalyst for broader community revitalization.
7. NEF arranges for property and other insurances coverages at reduced rates.
8. LISC provides property management services to assure that the development continues to maintain its attractiveness and value for low-income renters beyond the 15 year tax credit period.

Use of Non-Governmental Organizations

LISC works as an incubator of projects that developers, community non-profits and religious groups undertake to improve their neighborhoods.

Low-income tax credits are of value to corporate and individual investors as credits against their tax liabilities. Thus private sector investors are able to pool their community reinvestment portfolio strategies, locating viable projects.

Banks purchase interests in the loans originated by LISC. Banks, with encouragement from Federal bank regulators at the Office of the Currency, Federal Home Loan Bank Board, Federal Reserve System and other offices, have learned to take advantage of interest rate subsidy, tax credit, administrative credit (the Community Reinvestment Act review discussed later in this Chapter), Treasury CDFI grants (also discussed later in this Chapter) and other incentives.[364]

Focused Underwriting & Quality Assurance Standards

LISC projects that are intended to create low-income tax benefits must meet the income and neighborhood eligibility requirements of Internal Revenue Code (the **Tax Code**) Section 42, first enacted in 1987.[365] Beyond the Tax Code's qualifications, LISC underwriting criteria reflect a national approach to housing, economic development and retail/shopping center design and occupant/owner characteristics.

Leveraging Private Funds

LISC has helped 1,500 CDCs build or rehabilitate 80,000 homes and create 10.3 million square feet of commercial and industrial space. LISC has raised $3.1 billion in grants, loans and investments, and used that capital to leverage an additional $3.8 billion.[366] LISC has pooled support from 1,900 corporate, government and foundation donors.

LISC is the leading community development intermediary in the nation, making significant loans to at least 22% of all CDCs, well ahead of the 9% of CDCs who received loans through local

---

[364] A working compilation of these incentives and how the banking industry uses them is suggested by the Ninth Annual American Bankers Association (ABA) Community Development Lending Conference, co-sponsored by the Office of the Comptroller of the Currency (OCC) (November 4-6, 1997), http://www.occ.treas.gov/community/confsum.htm.

[365] For text of the Tax Code's Low Income Housing Tax Credit see http://www4.law.cornell.edu/uscode/26/42.html.

[366] Statistics taken from *Facts About National LISC (May 1998)* Factsheet distributed by LISC.

partnerships.[367] In 1998, LISC and its affiliates channeled $605 million into neighborhood development last year, a $65 million boost over year-earlier totals, LISC said. Besides housing, the projects included economic development, child care, education, health care and community security. Most of the funds were distributed to the CDCs in the form of equity investments by banks and other entities, below-market-rate loans, lines of credit and loan guarantees.

LIMAC has harnessed and created a secondary market for low income tax-sheltered investments by pooling them into $50 million+ bundles with more than enough cash-on-cash return to satisfy conservative underwriting such investments. This ability to "lay off" primary portfolio investments and loans into partnerships (for the investments) and securitized mortgage pools, replenishes the supply of funds available for LISC and other CDCs to invest and lend to improve low income and rural communities.[368] Notwithstanding Federal pension and state insurance regulatory encouragement, the vitality of such secondary market makes community development investment more realistic for pension funds and insurance companies, who need to know their "exit" strategy when underwriting large, socially-responsible investment initiatives.

Facilitating Tax, Guarantee & Regulatory Environment

NEF organizes partnerships of Fortune 500 corporations interested in investing in affordable housing. In return, NEF investors receive low income housing tax credits, which can be applied against their federal income taxes. In 9 years, NEF has raised $2 billion to create more than 33,000 affordable homes for American families.[369]

The Community Reinvestment Act (**CRA**)[370]

> is a federal law requiring banks to help meet the credit needs of their entire community, including low- and moderate-income neighborhoods. Banks that fail to do so can be denied permission by federal regulators to buy other banks, engage in interstate banking, and open or close branches. CRA does not direct banks to make specific loans. Instead, it gives them a broad, affirmative obligation to serve the needs of the community in which they are located. It is up to the bank to figure out how it can best serve the needs of its community. CRA has encouraged lenders to invest in Low Income Housing Tax Credit developments, make loans on affordable multifamily housing development, offer small business lending, and support community development corporations.

The CRA incentives on banks makes loans to low income housing tax credit partnership deals more attractive. Because CRA performance is monitored by bank regulators over the long term, LISC provides a flexible conduit for regional banks to facilitate meeting their CRA objectives, since LISC can serve as lender, borrower, grantee and equity investment vehicle. For instance, in August 1999, Fleet Community Development Corporation made a $5 million loan to LISC to support LISC program activities in Fleet's lending area, bringing Fleet's support for LISC since 1981 to $120 million in equity,

---

367 Descriptions in this paragraph taken from Electronic Banker, *LISC Leads List of Intermediaries* (September 1, 1999), http://www.electronicbanker.com/html/news/090199_4.htm.

368 Factors growing the secondary market for community development loans are described in Kathleen Kenny (Community Investment Consultant) and Frank Altman (President and CEO, Community Reinvestment Fund), *The Emerging Secondary Market for Community Development Loans* (Community Investments Vol. 9 No. 2 – Spring 1997), http://www.frbsf.org/candca/conspubs/cra97-2/emerge.html#resources.

369 Discussion taken from *Facts About National LISC (May 1998)* Factsheet distributed by LISC.

370 Discussion taken from The Enterprise Foundation, *Federal Policies Illustrated: What is the Community Reinvestment Act?*, http://www.enterprisefoundation.org/policy/monographs/pubpol4.asp, which gives many examples of the CRA's impacts on low income neighborhoods. The Financial Services Act of 1999, H.R. 10 PCS (106th Congress - July 12, 1999) maintains the CRA's requirements.

bridge financing, and grants.[371]

LISC considers tax advantages[372] vital to its market-making function:

> The Low Income Housing Tax Credit is America's most important tool for developing affordable rental housing. It has generated more than 900,000 safe, decent and affordable homes -- 90 percent of all affordable rental housing nationwide -- since it was enacted in 1986. Congress created the Housing Credit because apartment construction and rehabilitation cost too much for low-income families to afford. The credit replaced and dramatically improved upon previous tax code incentives for development of low-income apartments.
>
> The Housing Credit is limited to good quality apartments dedicated for 30 years at restricted rents to families who earn 60 percent or less of an area's median income. It is a credit to investors for 10 years at up to 9 percent of their cost of constructing or rehabilitating such apartments. Every state receives credits each year equal to $1.25 times its population.
>
> Housing Credit apartments help stabilize neighborhoods by improving housing quality and supply. They rent quickly, because the need for them is so much greater than can be met under the $1.25 credit volume limit. The limit has not been adjusted for inflation since the program was created, so Housing Credits have lost nearly 50 percent of their purchasing power. Every year, 100,000 low-cost apartments -- more than the Housing Credit replaces -- are demolished, abandoned, or converted to market rate use.

CDCs also have access to the proceeds of tax-exempt bonds issued by state and local housing authorities, through LISC/LIMAC or other issuers. Such tax-exempt interest reduces the construction period and permanent financing costs associated with buying a site, rebuilding it and renting it out to residents and retail establishments, thereby giving non-profit NGO developers more liquidity (and less financial risk) to build in low-income neighborhoods.

National Approaches to State Legal Structures

The interplay of federal low income housing tax credits, CRA scoring of banks and state regulation of community development and housing come together in the following story of Chase Bank's New York Low-Income Housing Fund:[373]

> **The Community**
>
> In February 1994, the Chemical Banking Corporation announced the formation of its Low-Income Housing Fund to provide $100 million over four years for the development of affordable multifamily housing in New York, New Jersey, Texas, and Florida. In connection with Chemical's March 1996 merger with the Chase Manhattan Corporation, the new Chase expanded the Low-Income Housing Fund to $375 million. Over the next five years, the expanded Fund will continue to support the development of affordable housing in low- and moderate-income communities, particularly those where Chase has a banking presence. Chase has pledged one-third of the total--$125 million—to the New York Equity Fund for

---

371 Business Wire, *Fleet Provides $ 5 Million to Local Initiatives Support Corporation; Rural and Urban Communities Throughout Fleet Footprint to Benefit* (August 18, 1999).

372 Tax discussion taken from LISC, at http://www.liscnet.org/html/policy_lihtc.htm. Also see, National Low Income Housing Coalition, *1999 Advocate's Resource Guide: Low Income Housing Tax Credit*, http://www.nlihc.org/advocates/29.html.

373 Taken from The Enterprise Foundation, *Federal Policies Illustrated: What is the Community Reinvestment Act?*, http://www.enterprisefoundation.org/policy/monographs/pubpol4.asp,

investment in New York City, where the scarcity and high cost of housing present a special challenge to those developing or seeking affordable homes.

The Bank

Following the merger, the Chase Manhattan Corporation has $300 billion in assets and is the largest banking company in the United States. In November 1995, the corporation announced an $18.1 billion community investment commitment for affordable mortgages, development of affordable housing, loans to small businesses, and loans and contributions to community-based nonprofits.

Launching a Partnership

The Chase Low-Income Housing Fund purchases Low Income Housing Tax Credits that help finance nonprofit affordable housing development, particularly in New York City. The New York Equity Fund, a joint venture of The Enterprise Social Investment Corporation (ESIC) and the Local Initiatives Support Corporation (LISC), is managing the investment of $125 million in Chase tax credit equity for developments there. The New York Equity Fund works closely with the city of New York through its Department of Housing Preservation and Development. Since its inception, the New York Equity Fund has committed more than $440 million to develop approximately 8,600 apartments in formerly vacant, city-owned buildings.

The Project

The El Barrio Renaissance Apartments are one of the many projects in New York City made possible through the participation of Chase and other institutions in the New York Equity Fund. Four previously abandoned structures were transformed into two buildings with 77 apartments for families who had been homeless or living in substandard conditions. Before El Barrio's Operation Fightback developed the complex, fires and drug traffic had plagued the site. Now, after a complete renovation, dozens of families are safe and comfortable, and four commercial spaces occupy the ground floor. Residents include a grocery-deli, travel agency, pharmacy, and Army/Navy store. Financing and technical assistance were provided through New York City's Department of Housing Preservation and Development, The Enterprise Foundation, and ESIC.

The Results

In its two years of operation, the Chase Low-Income Housing Fund has invested $97.5 million in ESIC and LISC-sponsored funds, outpacing its initial four-year timeline and nearly completing its original $100 million commitment. Of the total investments to date, $57.5 million has been with the New York Equity Fund for affordable housing projects located in New York City. Chase's recently increased equity commitment in New York means that hundreds of additional units of housing are being developed for low-income families, many of whom are homeless.

Lessons for Financing the NSDI

As a nonprofit organization, LISC demonstrates how to incubate multi-participant projects that use tax and regulatory benefits. Absent LISC, a community's learning curve to participate in the national vision or framework is ad hoc, trying to find leadership and perhaps failing due to lack of continuity of knowledge and trust in the worthiness of the community's goal.

LISC

- pools community loans eligible for tax credits
- permits banks to meet their annual Community Reinvestment Act (CRA) requirements, minimizing the cost and risk to banks of failing to meet such regulatory provisions

- brings expertise in community partnering, and managing multi-participant projects over several years
- has an "all-in" cost of funds that is below the cost that a local developer or community group would otherwise pay, due to LISC's track record of project completion
- reduces the cost to developers and homeowners in its low-income project areas, thus permitting more projects to become viable at reduced interest cost

One commentator sees CRA (and LISC's use of CRA) as a part of a trend in legislative use of the organizational response principles of *chaos theory*, where individual corporate action is not so much mandated as it is incented in the free market towards a common set of policy goals.[374] From this point of view, Congress and the White House have empirical experience (through CRA and other incentive programs) in using various rewards (i.e., matching grants, reduced costs of doing business, lower interest rates, greater liquidity, tax credits and reduction in administrative delay) to subtly push free market participants in the public and private world to embrace socially desirable outcomes like community redevelopment and NSDI.

Aside from its significance as an analogy, LISC exemplifies a national organization whose programs directly benefit from an NSDI that simplifies the technical assistance needed to rebuild communities. For example, LISC's Community Security Initiative[375] in New York, Kansas City and Seattle represents a collaboration between LISC, the Police Executive Research Forum **(PERF)** and the John F. Kennedy School of Government's Program in Criminal Justice Policy and Management **(PCJ)**. It is designed to promote and develop creative partnerships between CDCs and community policing departments in selected cities across the country. With a results-oriented mission, a CSI police-CDC partnership addresses the issues of crime and fear in low-income neighborhoods.

---

374 Vincent M. Di Lorenzo, *Article: Equal Economic Opportunity: Corporate Social Responsibility in the New Millennium* (Colorado Law Review Winter, 2000), 71 U. Colo. L. Rev. 51, Part III.

375 Taken from LISC, *Community Security Initiative*, http://www.liscnet.org/howwework/programs/csi/. Harvard's Kennedy School of Government found that Seattle's Chinatown enjoyed a 39% drop in violent crime since 1995, safer streets, better housing, more jobs, improved economic vitality, and a long lasting partnership between the community and police through LISC's CSI program. Business Wire, *Seattle Chinatown/International District a National Model Where Community Action and Policing Meet* (November 22, 1999).

Chapter A 10 Employee Stock Ownership (ESOP) Analogy: US Investigations Service

Background of Need as Opportunity[376]

The Office of Personnel Management (**OPM**) took seriously the mandates of the National Performance Review. One goal that OPM strove to meet was that of forming a federal workforce that is both reinvented and substantially reduced in size. To meet downsizing requirements, OPM instituted privatization efforts.

The first question asked by OPM in their restructuring effort was, "Is OPM doing work that is not basic to our core mission of protecting the merit system?" The determination was that the work of their training and investigations units, although important, could be performed in the private sector. The next step was to determine how best to privatize these investigation units while still serving the interests of the American taxpayers, OPM employees, and their agency customers.

Many of the more than 200 education specialists in the OPM training unit were interested in private sector training programs. OPM helped negotiate a contract whereby 140 of these individuals were hired by the non-governmental US Department of Agriculture Graduate School at the same salary and benefits that they had been receiving. Others went to the Brookings Institution or other training programs.

Members of the OPM investigations unit, which conducted government background investigations, were presented with the option of starting an Employee Stock Ownership Plan. An ESOP lets each eligible employee share in the ownership of the company. As a new employee-owned company, it would perform many of the same services but in the private sector. The employees who were game took part in negotiations that led to the creation of an ESOP called U.S. Investigations Services (USIS), Inc. (**USIS**). By July of 1996, 681 of the 706 employees who were offered jobs with the new company had accepted them. USIS had an exclusive contract to conduct investigations for OPM.

The creation of USIS was the first government privatization of its kind. A private consulting firm estimated that its creation should save the taxpayers $25 million over five years.

Functional Role

USIS conducts background employment and security checks for the public and private sectors.

Use of Non-Governmental Organizations[377]

700 former employees of the federal Office of Personnel Management became shareholders in USIS.

The 3-year ESOP process involved the private sector expertise and leadership of multiple parties as follows:

---

[376] Taken from the synopsis posted by Government Executive, *Proceedings of 1997 Reinvention Revolution: Report from the Federal Frontlines - ESOP Learning Lab* (April 1997), at http://www.govexec.com/reinvent/rrc/esop.htm. See also Mark A. Abramson, *Improving the Business of Government: The U.S. Investigations Service*, (The Business of Government, July-August 1998), at http://www.leadership.com/pubs.htm. Also http://www.npr.gov/library/nprrpt/annrpt/vp-rpt96/appendix/opm.html, and http://www.american-capital.com/datacenter/articleaspArticleID145.html

[377] Background details as to USIS' formation taken from Mark A. Abramson and Paul R. Lawrence, *Improving the Business of Government: US Investigations Services, Inc.* (The Business of Government, July/August 1998), pp. 3-4, and USIS' Website, http://www.usis.com/.

1994 -- President decides to privatize OFI: Office of Federal Investigations within the OPM: Office of Personnel Management in satisfaction of a Reduction in Force process.

1995 -- OPM contracts with ESOP Advisors, Inc. to determine the potential revenues, expenses and cash flows for a newly formed company in OFI's line of business. The study concluded that OFI's operations could be successfully privatized using an ESOP form of ownership by granting the new company a sole source contract to provide essentially the same investigative services to the Federal Government.

1995 – OPM hired American Capital Strategies (**ACS**) to develop a business plan for USIS. ACS brought in Marine Midland Bank as its financial trustee and the law firm of Arnold & Porter. Marine Midland and Arnold & Porter put together USIS' management team, including Phil Harper (CEO and President of USIS), formerly President of Wells Fargo Alarm Systems).

1996 – USIS and

- OPM enter into a 3-year Sole-Source contract of $54 million
- GAO negotiate for USIS to take over OFI's Annandale Pennsylvania facility and equipment
- 700 former employees of OFI open for business using private sector payroll and financial accounting systems instead of the federal systems used by OPM.

Focused Underwriting & Quality Assurance Standards

After privatization of the background check function, private sector clients now had access to USIS' advanced information gathering and analytic techniques. This uniformity of background check functionality may help corporations in the future defend against lawsuits for negligent hiring and will help companies involved in domestic transactions with foreign investors and contractors apply a uniform level of clearance in deciding whether to do business with the foreign groups. For corporations whose stock is traded on the major Stock Exchange this standardization of background check diligence – the same that the government applies to its own hiring decisions – provides an additional layer of protection against shareholder lawsuits and regulatory actions.

Leveraging Private Funds

The leverage provided to the federal government and USIS by issuing ESOP stock to federal employees in lieu of severance is substantial.

Facilitating Tax, Guarantee & Regulatory Environment

The ESOP format offered significant tax advantages for USIS. Pension fund contributions are normally deductible against federal and state income tax.

In essence, the pension fund obligations of USIS toward its employees were partially funded by purchasing stock in USIS.[378] In general, while 25% of a qualified employee's pension fund must be invested in non-USIS obligations (stock + bonds/loans), the remaining 75% can be invested in USIS obligations.[379]

Thus, the 700 employees' pension plans provided a significant proportion of the start-up capital for USIS, and their individual stock ownership of USIS meant increased employee loyalty and performance.

---

[378] For a detailed explanation of an ESOP's tax structure, see *BNA's Tax Management Portfolio Series: ESOPs* (Volume 354-6th Ed. 1999).

[379] See, Internal Revenue Code §401(a)(28(B), and *BNA's Tax Management Portfolio Series: ESOPs*, Section II A(1)(h) Diversification Requirements, p. A-7.

National Approaches to State Legal Structures

As a creature of federal tax law, the ESOP can be replicated in every state.

Lessons for Financing the NSDI

NAPA and others have studied a variety of forms for appropriate Federal participation in NSDI development. A consistent structural goal has been to build an ongoing Federal capacity to partner with intergovernmental and private Spatial Data development efforts. In essence, taking the model of the FGDC as a spokesperson for Federal Agency Data collection and outreach, and giving it the institutional mandate to broker and partner Spatial Data standardization, development, supply and applications with the other sectors of our economy. This transformation from standards to transactional roles requires additional capabilities and staff.

The use of an ESOP or a PBO: Performance Based Organization Model (studied in Chapter A 11) represent new options for organizing these additional capabilities consistent with FGDC's mandate, while reducing the taxpayer cost of maintaining such capabilities. For instance, in any PPP: *Public* Private Partnership organized to co-develop the NSDI, the ESOP and PBO permit greater flexibility in employee recruitment, staffing and compensation of the Federal public "partner."

USIS also demonstrates the value of a "seed" contract for the supply of services of the newly formed ESOP to stabilize the new company's initial revenues, retain and recruit qualified staff from the public and private sectors, and to attract increased customers. In the NSDI context, the equivalent would be a "supply" or "take or pay" contract with the ESOP (or with the PPP in which the ESOP is tasked to manage the Federal oversight of the public's interest in the PPP). Such a contract could have performance minimums and incentives for increasing the deployment of NSDI resources, and reducing the Federal outlay for Spatial Data in Federally funded programs (see Chapter 4 on Data Mandates).

Chapter A 11 Performance-Based Organization (PBO) Analogies

Background of Need as Opportunity

Performance-Based Organizations[380] are discrete units of government that commit to clear objectives, specific measurable goals, customer service standards, and targets for improved performance. Once designated, they have customized managerial flexibility and a competitively-hired CEO (chief executive officer), who signs an annual performance agreement with the Secretary of the sponsoring Agency and receive a share of his or her pay depend on the organization's performance. The British, who have extensive experience with this concept, find that such agencies improve performance and cut administrative costs.[381]

The Clinton Administration has identified several traditional Governmental Processes as ripe for PBO consideration:

I. Commerce
- Technical Information Dissemination (National Technical Information Service)
- Intellectual Property Rights (Patent and Trademark Office)
- Seafood Inspection (NOAA, NOS)

II. Defense
- Defense Commissary Services (Defense Commissary Agency)

III. HUD
- Mortgage Insurance Services (Government National Mortgage Association)
- Mortgage Insurance Services (Federal Housing Administration)

IV. OPM
- Retirement Benefit Management Services (Federal Retirement and Insurance Service)

V. Transportation
- Air Traffic Control Services (FAA)[382]
- St. Lawrence Seaway Corporation (St. Lawrence Seaway Development Corporation)[383]

VI. Treasury
- U.S. Mint

---

380 Taken from the discussion of PBOs in the National Performance Review's Library, http://www.npr.gov/library/papers/bkgrd/pbo.html.

NAPA has commented that PBO may be a modern term for the successful strategy over the past 50 years of establishing government corporations manage and operate previously governmental functions. See Statement by Herbert N. Jasper (Fellow of National Academy of Public Administration & Former Professional Management Staff Member of Bureau of the Budget) before the Subcommittee on Government Management, Information and Technology of the House Committee on Government Reform and Oversight (February 4, 1999), at http://www.house.gov/reform/gmit/hearings/testimony/990204hj.htm.

381 For the far-reaching application of PBOs in redesigning the Labor Government's use of Information and Communications Technologies, see http://www.parliament.uk/post/egov4.pdf

382 S. 545 The Federal Aviation Administration Authorization Act of 1999 as introduced in the Senate (http://thomas.loc.gov/cgi-bin/query/C?c106:./temp/~c106AkBOYj) includes as Title V the Transportation Secretary's proposal to create a PBO for Air Traffic Services.

383 This PBO is proposed in Section 3(c)(2) of the Harbor Services Fund Act of 1999 proposed as H.R. 1947, at http://thomas.loc.gov/cgi-bin/query/C?c106:./temp/~c106qF26ii.

Functional Role

In a PBO, *regulatory functions* are split from their *program operations*. The PBO focuses on programmatic operations. Not all government agencies are suited to become a Performance-Based Organization. Operations that do not have clear, measurable results should be excluded. For example, the foreign policy and planning offices in the State Department or basic scientific research offices at the National Institutes for Health may be inappropriate candidates.

Use of Non-Governmental Organizations

PBOs have greater flexibility to initiate and manage contractual and employee performance incentives with the private sectors and inter-governmentally. This means that traditional Agency barriers and delays to hiring/retention, outsourcing and partnering are minimized.

Focused Underwriting & Quality Assurance Standards

Given the annual Business Plan and the results-dependent compensation of PBO executives, the Plan becomes a driver for consistent quality standards and financial stewardship across the enterprise and in its dealings with third-party contractors and customers.

Leveraging Private Funds

To be effective in servicing its PBO "corporate" charter, the PBO must adapt its business strategy and reengineer its business processes to create intergovernmental and private sector revenues. Opportunities for leveraging private partners and their capital include:

- using technology to automate redundant processes, to store the PBO's "Business Knowledge" and to serve up Internet-ready access to the PBO's products;
- taking advantage of private capital assets to originate and prequalify PBO-eligible customer loan or other requests or to outsource credit card billing of the PBO's fees for i.e. expedited service; and
- taking advantage of private capital assets to enhance, refresh, mine and market PBO data in a way that preserves and tracks the security required to make such data publicly available.

Facilitating Tax, Guarantee & Regulatory Environment

The National Performance Review staff has drafted enabling general legislation to support wider PBO formation within the federal government.[384] Although this general legislation did not pass in 1998, the Administration did create the first PBO out of the Student Financial Aid program.[385] And in the current year, the President and Vice President are proposing to expand the PBOs within the Federal Government.[386] The benefits of the PBO include flexibility in procurement, personnel and other processes.

National Approaches to State Legal Structures

Using the Federal student loan program as an example,[387] student loans from private and state

---

384 See http://www.npr.gov/initiati/21cent/billlegi.html.

385 See http://www.npr.gov/library/news/pbofact.html.

386 See GovExec Magazine, *Performance-Based Organizations Back In Style* (February 3, 1999), http://www.govexec.com/dailyfed/0299/020399b1.htm, and *Thinking Ahead: Performance Pioneer Greg Woods* (March 1999), at http://www.govexec.com/features/0399/0399think.htm.

387 For an overview of Federal direct and bank-originated student loan programs, see Texas Guaranteed Student Loan Corporation, *Mapping Your Future: Federal Direct Student Loan Program*, http://mapping-your-

universities are originated in each state and pooled (pledged and resold) to collateral trustees for institutional investors and the loans serviced so that student borrowers are billed and the loan collections processed in bulk.

States have a long history of forming PBOs/governmental corporations for general economic development and project finance functions. A network of federal/state/city PBOs for functionally-similar management functions would represent a next stage of evolution in intergovernmental management for organizations like MPOs (Metropolitan Planning Organizations) established by ISTEA and TEA-21.

Lessons for Financing the NSDI

Given the requirements of the private and intergovernmental sectors as consumers of Spatial Data and Services, certain of the processes for producing, marketing, organizing and analyzing Spatial Data should be housed within Performance Based Organizations inside all levels of Government. Under appropriate government policy guidelines, these PBOs would be free of certain statutory administrative restrictions and could contract, hire and invest more freely as technology partners with private sector and inter-governmental parties.

For instance, a PBO could represent the Federal interest in an appropriate Public-Private Partnership (**PPP**) to oversee the NSDI and foster NSDI joint venture agreements with state governments and the private sector. As a PBO, the Federal government would have a faster and more flexible process to follow and respond to technology-driven changes in business strategy that fosters NSDI building and partnering activities. The revenues derived from the Federal PBO's share of PPP revenues would stay in the PBO, as a revolving fund to be reinvested in the PPP's NSDI-building activities.

Naturally, performance standards to gauge the effectiveness and accountability of the PBO would need to be put in place and be reviewed. Such measurable and qualitative standards should be flexible enough to unleash the ingenuity of government employees attracted to operating in an organizational environment adapted to the type of cross-sector, market-enhancing challenge that NSDI represents.

---

future.org/paying/fdslp.htm.

Chapter A 12 Non-Profit Bond Fund Analogy: Nonprofit Facilities Fund

Background of Need as Opportunity[388]

The Nonprofit Facilities Fund (NFF) was established in 1980 to assist New York City nonprofits with energy conservation. It expanded in 1985 to serve the more diverse capital needs of New York nonprofit organizations. In 1993 NFF expanded beyond New York, initially focusing on arts and culture organizations through the Cultural Facilities Fund Program. NFF now serves nonprofits nationwide through offices serving Philadelphia, New Jersey statewide, Massachusetts statewide, the San Francisco Bay Area, Chicago, and through the National Alliances Program, which serves a broader geographic area through national and regional partnerships.

Functional Role

NFF strengthens communities nationwide by supporting the efforts of nonprofit organizations and other enterprises with a social mission. As a leading community development financial institution, NFF invests its money and expertise, primarily for facility projects, to help these organizations fulfill their missions while maintaining financial health. NFF's investments bolster the long-term sustainability of these organizations, helping them to make key contributions to the economic, social, and cultural development of their communities.

As part of its outreach function to cultivate non-profit borrowers, NFF offers various advisory services through educational workshops, consultations and publications.

Use of Non-Governmental Organizations

Through the Nonprofit Facilities Fund, banks and other financial institutions active in New York pool their dedicated credit availability to smaller non-profit organizations to provide loans of up to $650,000. The program is coordinated through the New York State Banking Department.[389] This functions primarily as inter-grant working capital and is repayable at lower interest rates than commercially available (currently 8.5%[390] slightly below commercial loans). The lower rates, the longer repayment maturity and underwriting criteria designed for non-profit organization balance sheet, make these targeted loans attractive to smaller non-profits.

Focused Underwriting & Quality Assurance Standards

NFF's financial services go beyond below-rate lending, and include pre-development and capital grants, matching grants to build assets, and grant/loan packages for organizations that lack access to conventional sources of capital. The major financial services programs tailored especially to the attainable underwriting criteria of its non-profit clients are:

1. *Cultural Facilities Fund Program* addresses the facilities-intensive needs of arts and culture organizations by providing financing, pre-development planning grants, workshops, and advice.
2. *Asset-building* is a new program featuring an innovative product that is designed to encourage organizations to plan for long term facility maintenance needs. The Asset-building program provides technical assistance and matching grants to organizations that make

---

388 Discussion taken from Nonprofit Facilities Fund's website, http://www.nffny.org/, and their promotional materials.

389 See http://www.banking.state.ny.us/nonpff.htm.

390 Telephone conversation with Olivia Maristella of NFF (212) 868-6710 (September 1, 1999).

regular contributions into a bank account reserved for scheduled replacement of building systems. It is initially targeted to youth-serving organizations in New York City and Boston.

3. *Expanding Child Care Opportunities* is a collaboration between NFF and Child Care, Inc. It provides workshops, technical assistance, and financing to New York area childcare providers to help them expand their facilities and meet demand for their services.

Leveraging Private Funds

NFF has raised more than $37 million from over 70 funders nationwide, representing many of the nation's leading businesses and private independent foundations.

A diverse mix of funders has supported NFF's work:

Banks	Bankers Trust Company of New York
	Canadian Imperial Bank of Commerce
	Fuji Bank & Trust Company
	J.P. Morgan & Co., Incorporated
	LTCB Trust Company
	Manufacturers and Traders Trust Bank
	Merchants Bank of New York
	Mitsui Trust Bank
	NCB Development Corporation
	Republic National Bank of New York
	United States Trust Company of New York
Church Investment Funds	Investment Fund of the Diocese of Long Island
Community Association	National Community Capital Association
Corporations	Con Edison
	Fidelity Investments
	Pfizer, Inc.
Foundations	Booth Ferris Foundation
	Boston Globe Foundation, Inc.
	Calvert Social Investment Foundation
	Charles Hayden Foundation
	Chase Manhattan Foundation
	Citicorp Foundation
	Connelly Foundation
	David and Lucile Packard Foundation
	DeWitt Wallace - Reader's Digest Fund
	Edna McConnell Clark Foundation
	F.B. Heron Foundation
	Fleishhaker Foundation
	Geraldine R. Dodge Foundation
	Grants for the Arts
	IBJ Foundation
	J.M. Kaplan Fund
	John D. & Catherine T. MacArthur Foundation
	John S. and James L. Knight Foundation
	Joyce Mertz-Gilmore Foundation
	Lila Wallace - Reader's Digest Fund
	LuEster T. Mertz Charitable Trust
	Marin Community Foundation

Foundations (continued)	Robert Sterling Clark Foundation
	Surdna Foundation
	The Ford Foundation
	The James Irvine Foundation
	The New York Community Trust
	The Pew Charitable Trusts
	The Pinkerton Foundation
	The San Francisco Foundation
	Walter & Elise Haas Fund
	William and Flora Hewlett Foundation
	William Penn Foundation
Government	Commonwealth Fund
	Commonwealth of Massachusetts
	Empire State Development Corporation
	Illinois Arts Council
	Massachusetts Cultural Council
	National Endowment for the Arts
	New York City Economic Development Corporation
	New York State Council on the Arts
	United States Department of the Treasury – Community Development Financial Institutions Fund[391]

NFF has invested $22 million in facility projects, which has leveraged a total of more than $100 million. These investments have built and transformed over 1.3 million square feet of facilities nationwide, including childcare and community centers, social service clinics and shelters, and spaces for the performing and visual arts. NFF has also provided advice to more than 7,000 organizations nationally.

The diversity (geographic and mission) of the Fund's clients and the relatively small funding amounts seeded through the Fund as leverage is impressive:

- Agassiz Neighborhood Council, a community group serving North Cambridge, MA, purchased its home of nearly 20 years with a $250,000 loan. The Council also received a $10,000 planning grant to do a fundraising feasibility study.
- Arden Theatre Company in Philadelphia used a $200,000 loan for renovations to an old post office building to create theatre and rehearsal space.
- Bay Area Video Coalition, the nation's largest media arts center serving the nonprofit sector, received a $300,000 loan to renovate its leased space in the San Francisco Bay Area.
- Boston Center for the Arts, which cultivates and presents the work of emerging artists, used a loan of $38,500 to complete a renovation, enabling it to expand programs, including a job-training component for teenagers.
- Brooklyn Heights Montessori School, an independent school in New York, borrowed $100,000 for renovations to its school building. As enrollment increased, it borrowed an additional $515,000 to construct a new, adjoining facility.

---

391 U.S. Department of Treasury, *Community Development Financial Institutions Fund Notice of Funds Availability* (November 1, 1999), Federal Register Vol. 64. No. 210 p. 59094, http://www.ustreas.gov/cdfi/core_nofa00.pdf.

- Callen-Lorde Community Health Center used a $500,000 loan towards the creation of a primary care health clinic to serve New York City's gay and lesbian community.
- Kingsbridge Heights Community Center, a multi-service center in the Bronx, New York, used its $150,000 loan to construct a new facility to support its Early Head Start program.
- The Point CDC, a community development corporation devoted to the cultural and economic development of the Hunts Point section of the Bronx, New York purchased its building with a $290,000 loan.
- Greenpoint Manufacturing & Design Center Local Development Corporation, an economic development and job retention center for craftsmen, artisans, and artists in Brooklyn, New York, borrowed $250,000 to renovate its home, an old fiber mill. Greenpoint also received a $25,000 loan to purchase new equipment for its machine shop.
- MERIT Music School, a music school for Chicago's youth, used a $262,000 loan to expand its facility and upgrade its heating, ventilation, and air conditioning system.

Facilitating Tax, Guarantee & Regulatory Environment

The New York State Banking Department encourages banks to participate in the Fund to diversify their risk of Non-Profit lending and reduce the cost of originating such loans. Banks earn CRA: Community Reinvestment Act credit for making such loans.

The breadth of NFF's reach was recognized by being certified as a Community Development Financial Institution (**CDFI**) making it eligible for Treasury's special CDFI Incentive Grant Program.[392] From the federal view, Treasury's CDFI Program is leveraging the special outreach, lending and finance expertise available only through a grass-roots organization like NFF. CDFI also serves as a Treasury program for building technology capacities for community development (like information infrastructure and how to use it).[393] NFF's eligibility as a CDFI means, among other things, that Treasury makes CDFI grants to banks as federal matching funds for bank participation in NFF projects.[394]

National Approaches to State Legal Structures

From its base of operations in New York City, NFF now sponsors programs nationwide through field offices in Boston, Chicago, Philadelphia and San Francisco, and its National Alliance Program office at the New York headquarters.

Lessons for Financing the NSDI

Nonprofit Facilities Fund has identified a niche lending customer – the smaller non-profit organization - who is underserved by traditional banks. In its 20 years of existence, the Fund has attracted a group of influential funders inside and outside the traditional foundation circle.

Various studies suggest that financing is a barrier to GIS.[395] If the funding required by a given

---

[392] See, US Department of the Treasury, *List of Certified CDFIs*, at http://www.treas.gov/cdfi/jul999.pdf. For general information regarding the CDFI Program see, http://www.treas.gov/cdfi/cdfiprog.html, and the Coalition of Community Development Financial Institutions, at http://www.cdfi.org/.

[393] U.S. Department of Treasury, *Notice of Technical Assistance Available to Community Development Organizations (January 4, 2000)*, http://www.ustreas.gov/cdfi/2000_ta_release.pdf.

[394] Chase Bank, LISC and others are featured in this regard in U.S. Department of Treasury, *CDFI Profiles by State: New York*, p. 5, http://www.treas.gov/cdfi/newyork.pdf.

[395] See discussion at p. 61

community is so small as an absolute dollar amount, some might believe that originating, pooling and securitizing loans of such small size would be unprofitable. NFF's experience demonstrates that small-sized grants and loans to community groups to build permanent facilities (including information infrastructure) can be a viable.

Chapter A 13 Internet Stock Analogy: America Online

I now have a job that clearly has to take in mind the public interest.

It's a new world for all of us in many ways.

America Online's President Steve Case
on announcing the acquisition of Time Warner for $156 billion[396]

Background of Need as Opportunity

Two companies. America Online (**AOL**), the largest Internet Service Provider (**ISP**) on Earth (8.6 million subscribers worldwide), connecting more people to the Net than any other company.[397] Netscape, the company that modified the U.S. Government's MOSAIC software, and made it a consumer browser, encoding URL (Uniform Resource Locator) and domain names into a transparent tool of search and navigation.

AOL learned that content, proprietary channels of information developed for AOL's audience and reinforced customer loyalty as "unlimited monthly hours" of all you can enjoy of the Web made subscriptions just a front door to move into customer's houses and lives. Growing online banner ad revenues, co-branding and other non-subscriptions revenues are decreasing AOL's reliance on subscription fees.[398] Some pertinent statistics as of January 2000:[399]

- AOL has 22 million paid subscribers (including CompuServe)
- In 7 years, its annual revenues have gone from $40 million to $5.2 billion
- Advertising revenues were $500 million in 1999
- Merchants marketing their products and services have paid $400 million as "rent" to have access to AOL's subscribers and their browsing habits – Intuit paid $30 million to be AOL's primary financial information provider for 3 years
- AOL has $200 million of strategic equity investments in 25 companies

In explaining the justifications for buying Netscape for $4.2 billion in AOL stock, Steve Case, AOL's President said that:[400]

---

396 *AOL, Time Warner Leap Borders to Plan a Mammoth Merger* (Wall Street Journal - January 11, 2000), p. A6.

397 See, ABCNews.Com, *Corporate Profile: America Online, Inc.*, at http://webapp.abcnews.com/financialreports/main.asp?quote=stocksymbol&ticker=aol.

398 AOL, through its European brand *Netscape Online*, is now free in Britain, funded by AOL's share of the user's per minute telephone charges. Andrew R. Sorkin, *America Online Offers Free Internet Use in* Britain (New York Times, August 25, 1999).

399 From multiple source: *America Online to Buy Time Warner for $165 billion* (NY Times January 11, 2000), pp. A1, C1, C10-11; Randy Whitestone, *AOL Hits It Big With Earnings Model* (Inter@active Week, February 25, 1998), at http://www3.zdnet.com/zdnn/content/inwk/0507/288466.html.

400 Rachel Chalmers (Computerwire), *AOL Chief: We Bought Netscape in Spite of Browser Business* (Computergram International June 7, 1999), Issue: 3676, http://www2.computerwire.com/msoft/mt2-990607.html.

> Netscape's value to AOL… was principally contained in its portal, NetCenter.
>
> "We were largely missing in action in the portal space," Case observed. The company's options were to build or acquire. Case said NetCenter turned out to be the best option: "Especially given the price." He said the other attractive properties the company brought to the table were its enterprise software, which is now being sold in alliance with Sun Microsystems Inc, its brand name and its people.
>
> Contrary to everything Microsoft has sought to imply [in the government's antitrust case], the browser was, Case says, a disincentive. "The Netscape browser business was in a state of significant decline," he said. "There was a lot of concern that it declining on our watch might reflect poorly on AOL. But we decided that if we focused on the businesses we cared about - the portal and e-commerce - and the assets we cared about - the brand name and the team - that would make up for the risk of the browser." Government expert witness Franklin Fisher, whose redirect testimony offered the government the opportunity to play the Case videotape, said at its conclusion: "This confirms my proposition that the purchase of Netscape was not because of the browser."

The judicial relief (or mediated settlement) to be crafted in the federal antitrust trial of Microsoft for predatory use of its market position[401] as the dominant provider of PC and Network Operating Systems and Office Suite software (word processing, spreadsheet and database) hinges in no small way on the fact that despite such market position, AOL+Netscape control around 40%[402] of all Internet subscriptions and 33% of all Internet traffic,[403] and have the potential through an alliance with Sun Microsystems to use JAVA to replace Windows as the world's primary (running on 90% of all PCs)[404] operating system.[405]

Functional Role

AOL functions as a virtual community to hear other's tastes and friendly (marketing-inspired) advice, where users go to get feedback on which movies to see, stocks to buy, areas to live in and other lifestyle choices to make.[406]

401

402 Matt Richtel, in *Small Internet Providers Survive Among the Giants* (New York Times, August 16, 1999), points out that the number of independent service providers (ISPs) in America is growing and that the market shares controlled by AOL, and its nearest competitors AT&T's Worldnet Microsoft's MSN are staying relatively flat or shrinking. According to *Boardwatch* Magazine, 5,895 ISPs offer local access numbers in fewer than 25 area codes, but only 616 are available in more than 25 area codes, meaning only 616 ISPs are accessible on a regional or national basis.

403 Carol Powers, *Internet Giant AOL Digs Deeper Into Virtual Financial World* (American Banker, August 11, 1999), Vol. 164, Issue: 153.

404 John R. Wilke, Trial documents hint AOL prepar*ed to go head-to-head with Microsoft* (Wall Street Journal June 3, 1999), at http://www.msnbc.com/news/276225.asp#BODY.

405 Brock N. Meeks & Elliot Zaret, *How eight months of innovation and acquisition impact the Microsoft trial* (MSNBC June 29, 1999), at http://www.msnbc.com/news/285076.asp#BODY.

406 According to the advertising industry research company A.C. Nielsen, the success of the summer blockbuster *Austin Powers: The Spy Who Shagged Me* was substantially boosted by the 65% of AOL users who clicked on the banner ads and went to see the movie (many of whom placed ticket orders on AOL's ticketing site Moviefone). See, Bloomberg, *ACNielsen ReelResearch Indicates Almost Half of AOL Members Now Go Online to Get Information Before Deciding Which Movies to See* (September 2, 1999), at http://quote.bloomberg.com/analytics/bquote.cgi?story_num=391c8d70ce9cc13ecae82bd02f103628&view=stor

For the consumer and online retailer, AOL bundles 6 functions

1. Dial-Up ISP Access via Modem and local telephone line - an onramp to the "Information Highway"[407]
2. Email Management
3. Site Hosting
4. Proprietary Content - a builder of rest stops and scenic overlooks for the passengers traveling that highway.
5. Banner Advertising & Marketing Platform for Retailers & Service Providers - a virtual shopping mall that places "Cookies" on your hard drive to track browsing and purchasing habits in order to tailor product offerings to targeted consumers
6. Parental Controls/Security Options

Use of Non-Governmental Organizations

A wholly-private entity, AOL has a market capitalization of $97 billion, 44% of whose shares are owned by institutional investors who have enjoyed total 5-year return of 192%.[408]

Focused Underwriting & Quality Assurance Standards

The synergy (or "art") of the AOL/Netscape deal turned on Netscape's need to deploy its benchmark browser software as quickly and ubiquitously as possible at a time when AOL's Internet browser was – being charitable – clunky, AOL no longer could keep its customers satisfied browsing magazine and other "exclusive" content available within AOL's servers and needed more robust business portals like NetCenter and its underlying technology to more completely bring the Web into AOL.

As one industry commentator observed:[409]

> Although the "Browser Wars" originally began as a race for market share they appear over. Microsoft saw Netscape's Navigator browser as a threat to their operating system dominance of Windows and acted to end that opportunity. "As far as I'm concerned they were a complete competitor to the operating system," Microsoft senior vice president Jim Allchin said in testimony taken in March. If computer programs could be made to run with Netscape's Web browser, no one would notice the operating system, precisely the intention of Marc Andreesen, former CTO of Netscape, as he declared in 1997. That threat is now [1998] greater than ever for Microsoft.
>
> …
>
> The secret weapon in AOL's brand-centered strategy for a[n operating] platform fight with Microsoft is that it doesn't have to win this battle to win the war. Microsoft wants new platforms into which it can sell operating systems and applications and so does Sun. ***AOL has always cared less about how its service is delivered as long as it is delivered to the greatest audience***. The test case will be 3Com's new Version VII of the hugely successful Palm Pilot -- with wireless connectivity that links the device to branded content,

---

y&version=marketslong99.cfg.

[407] AOL sold its access infrastructure to MCI/Worldcom (and shed that infrastructure's capital demands).

[408] Fundamentals for AOL on September 1, 1999 at 3:00 PM EST, at http://www.quicken.aol.com/investments/stats/?symbol=AOL.

[409] Arik R. Johnson is Managing Director of the Competitive Intelligence (CI) support bureau and consultancy Aurora WDC, *Clash of Titans Makes Strange Bedfellows -- What does the AOL-Netscape Merger mean for Microsoft?*, http://www.aurorawdc.com/aol_msft_nscp_analysis.htm.

users might sacrifice freedom for convenience. If it catches on, AOL will also speed up its efforts in the area.

Leveraging Private Funds

The growth of a flexible, international market for venture capital[410] is the key diversification technique fueling equity investments in companies like AOL/Netscape. Often the purchase price in merger deals is paid by exchanging stock of the acquirer (AOL here) and warrants for such stock for shares of the acquired company (Netscape here) in a proportion equating to the market value of the acquired company plus a premium for the purchase of voting control.

Historical Performance of America Online, Inc.					
Year Ended	Net Sales (Bil)	Annual Income	Price per share	Earnings share (EPS)	Dividend per share
Jun-98	$2.60	$92.00	$27.69	$0.15	$1.00
Jun-97	$1.69	-$499.35	$8.44	-$1.30	$0.00
Jun-96	$1.09	$29.82	$54.64	$0.07	$0.00
Jun-95	$0.39	-$33.65		-$0.13	$0.00

On March 18, 1999, as the Dow Jones Industrial Average exceeded 10,000 for the second time in a row, AOL's stock closed at 116 1/8.

Facilitating Tax, Guarantee & Regulatory Environment

Federal antitrust investigation of Microsoft made the climate for review of the AOL/Netscape merger opportune.

National Approaches to State Legal Structures

Using appropriate licensing terms and conditions, subscribers and Web surfers can view but not redistribute AOL's proprietary content.

Lessons for Financing the NSDI

In a world of convergent technologies, where private industry has taken government technology and grown it exponentially using free market demand and venture capital investments, a privatized model must be considered. Indeed, to not do so would be to repeat the scenario that led some to criticize federal housing initiatives as better served from the private sector.[411]

AOL's acquisition of Netscape illustrates the leap-frog nature of corporate acquisitions rushing to assemble functional tools for navigating all sides of cyberspace: the individual/residential consumer browser, the business seeking new customers, the advertiser using advertising dollars and online browsing habit research to assure more sales, the stock broker and bank ready to exchange market research for new clients, and the data editor/repackager building specialized content so AOL's subscribers keep coming back for more online programming in a business model pioneered by broadcast television. AOL/Netscape has capitalized on making technology simple to use and navigate, and then marshalling and marketing the purchasing power of its users.

Subscription fees for monthly access to the Internet and AOL's proprietary online content form the foundation of the company's revenues. The chart below summarizes the growth of Internet

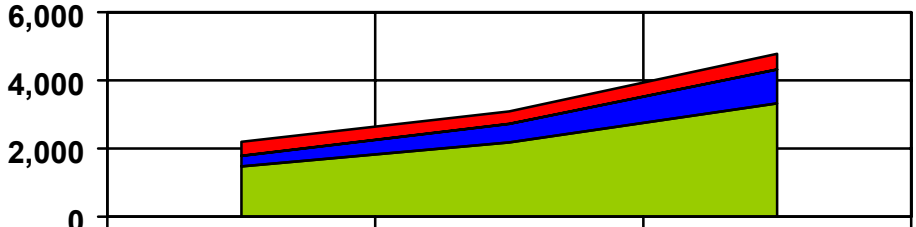
---

410 For a list of investment banks, see http://www.corpfinet.com/Invest_Banks.html.

411 See The CATO Institute's call for privatization of FHA: Federal Housing Administration. http://www.cato.org/testimony/ct4-4-5.html

subscription revenues,[412] and the over 55% of paid domestic subscribers who access the Web through America Online:

AOL Revenues ($Millions; June Fiscal Year)



	1997	1998	1999
Enterprise Solutions	411	365	456
Advertising & Marketing	308	543	1,000
Subscription	1,478	2,183	3,321

Such subscription revenues could form the base of a private or quasi-public consortia, portal or other mechanism to assemble and disseminate spatial data and functional, easy of use tools.

AOL's netizens (regular users of the Internet community) buy products and thus Websites (like broadcast and cable television) derive substantial revenues from advertising. Advertisers find that the cost to reach 1,000 netizens through a Website is as little as 10% of the cost of reaching the same audience through other media.[413] Furthermore, sophisticated "cookies" permit tracking the Web visits of netizens that fit the advertiser's customer profile, to improve the likelihood that the visitor actually buys the desired product. [414] The acceptance in digital commerce of "cookies" as the price for free information services often infringes on personal privacy, but the rush to build warehouses of browsing habits to foster retail and commercial focused marketing is equivalent to the Direct Marketing Association's use of mass mailings and Zip code + 4 filters on physical demographics, dating back to the Sears Roebuck catalogue mailing list.

AOL's acquisition of MapQuest[415] will lead the company (as a bell-weather for other Internet portals) to become more involved in the potential commercial value of spatial data as premium content, as a tool to further advertising's effectiveness and as a graphic way (using a mouse pointer on a map) of exploring non-spatial content.

---

412 Revenues from AOL's SEC Form 10K, *Consolidated Results of Operations*, (June 30, 1999), http://www.corp.aol.com/annual/10k/10k2.html. See T.G. Lewis, *The Friction-Free Economy: Marketing Strategies for the Wired World* (Harper Collins 1997), p. 119.

413 *Friction-Free Economy* at p. 120.

414 See Web advertising revenues at http://www.forrester.com.

415 AOL's MapQuest Acquisition is discussed on p. 74.

However, perhaps the most important financial lesson for the NSDI of America Online's string of acquisitions[416] and its announced Time Warner merger is the ease with which multi-billion dollar alignments of technology occur using corporate stock (AOL's) in lieu of cash or debt to finance the commercial infrastructure for the Digital Economy, as long as that stock is highly valued (its stock price being more than 175 times its earnings per share).

A corollary lesson for financing the NSDI is the value (objective stock price value) of enterprises that maximize ***brand*** identification and loyalty due to customer ease of use and reliability of service delivery for everyday needs in cyberspace (email, Internet access, home shopping, etc.) Spatial information services provided through such a branded functional model should display significant valuation in the equity markets, and thereby attract capital to build supporting bandwidth, data warehouses, infrastructure and alliances.

[416] NY Times, *Everything New is Quickly Newer* (January 11, 2000) p. C10:

Date	Acquisition	Value (in $Millions)
November 24, 1998	Netscape	$4,096
December 22, 1999	MapQuest	$871
June 22, 1999	Hughes Electronics	$1,500
May 21, 1998	Mirabilis	$407
February 1, 1999	MovieFone	$380

Chapter A 14 Service Bureau Analogy: Bloomberg L.P.

Background of Need as Opportunity[417]

Just as Federal Express created a new paradigm in the 1980's, revolutionizing the shipping of documents and small items, Bloomberg L.P. in the 1990's created one for the dissemination and use of business and financial information. In the process, the company changed the landscape of the approximately $7 billion financial data industry,[418] challenging once dominant brands like Dow Jones' Telerate system and its chief rivals Reuters and Bridge Information Systems.

Founder Michael R. Bloomberg shaped his company in his own image. A pioneer in the frontier of new technology, he "has capitalized better than anyone else on the growth industry of financial information."[419] In 1981, when baby boomers were toiling in entry-level jobs and the stock market was in the tank, Salomon Brothers merged with Philbro Corp., and did not offer bond trader Michael Bloomberg a job with the new company. As a Salomon Brothers partner, he received $20 million from the buyout/settlement,[420] found a new financial partner in Merrill Lynch and launched Innovative Market Systems. The company installed 20 financial data terminals at Merrill Lynch in 1983, and 3 years later changed its name to Bloomberg Business News. His trading software "SABRE-ized"[421] improved the process by showing contributed prices from multiple firms and the analytics to maximize trading positions.[422]

From the original business that provided arcane financial data to bond traders (his job on Wall Street), Bloomberg has grown a unique information powerhouse whose news reports are published in newspapers worldwide, whose television programming in 102 countries and whose data flow to about 111,000 trading desks, executive suites and newsrooms -- anywhere that instantaneous financial information is in demand.

As Bloomberg explains:[423]

> At great expense, each of the largest securities companies collected data independently…I could provide a far more sophisticated system at a fraction of the price…and if most firms used my data and analysis, I would be creating an industry-wide standard.
>
> I conceived a business built around a collection of securities data, giving people the ability to select what each individually thought the most useful parts, and then providing computer software that would let non-mathematicians do analysis on that data.
>
> People say to me, 'The Internet's going to put you out of business!' but we couldn't be happier about it – it gets us out of the communications business. The availability of data in machine-readable form over the Internet doesn't really hurt us because people aren't paying

---

417 Taken from New York Times, Sunday March 21, 1999, Section 3.

418 Carol Power, *Internet Start-Up Offering Market Data at a Discount* (American Banker, January 19, 1999), Vol. 164, Issue 11, p. 17.

419 George Stanley (Managing Editor - Milwaukee Sentinel Journal), *Remarks at Milwaukee Press Club Awards Ceremony for 1997 Sacred Cat Winner Michael Bloomberg*, http://www.tefnet.org/oay97/bloom.html.

420 Nancy Hass, The House that Bloomberg Built (FastCompany - November 1995), http://www.fastcompany.com/online/01/bberg.html.

421 See the discussion of SABRE Reservations System in Chapter A 20

422 Bloomberg, *Company History: 1988*, http://www.bloomberg.com/products/history.html.

423 Michael Bloomberg, *Bloomberg by Bloomberg*, as cited in *Impact of the Internet on the Financial Information Services Industry: A Case Study of Bloomberg L.P.*, http://www.stanford.edu/~tmiranow/:

us to be a transmission medium; they're paying us for value added. And the value added is there whether it gets to you over a satellite or over a cable, Ethernet, or a dial-up line.

Functional Role

Bloomberg's computers compile financial data and other information, spitting them out for those who need them. Any news headline about an Asian insurrection, any stock transaction on an obscure Latin American market, any change in a local water authority's bond price -- information from 800 separate sources -- are sent through the company's servers at the rate of 12,000 discreet items of information a second.[424] Bloomberg Financial News Service monitors sit on 111,000 trading desks, executive suites and newsrooms. As a brand, "Bloomberg" stands for functional, reliable and instant financial data access, analysis and customer service.

Just as fast cars and luxury homes became functional icons of wealth in the Industrial Age, the sociology of technology adoption has dubbed the "Bloomberg" both information appliance and power toy in the Digital Age:[425]

> The Bloomberg is a control freak's dream machine. It displays an instant sense of the measurable world held in momentary stasis—particularly that part of the world connected to money. The machine generates a mechanical and electronic reduction of dozens of societies in motion, with all the related data edited, considered from hundreds of different angles, refitted to any number of customized matrices and analytical methods, digitized, and then mainlined through telephone wires. The Bloomberg is a miniaturized CIA for money workers who crave the illusion of control, and Bloomberg users will tell you that jockeying the screens quickly becomes an addiction. In certain Wall Street houses the Bloomberg junkies around the office are called "infomaniacs."

Use of Non-Governmental Organizations

The content that drives Bloomberg's services is both proprietary and public. The content streams in to Bloomberg's New York offices in real time from 800 sources[426] in countries around the world in various formats (text, numerical, video and audio).

Local business reporters use Bloomberg to put the corporate and financing stories affecting their communities in broader perspective and to ferret out the true motivations behind them. In turn, these local news gatherers share news content with Bloomberg in exchange for the free right to have the Bloomberg Terminals (normally, $1,700 per month) in their newsrooms and to use Bloomberg's content in their local newspapers and television news programming.[427]

Focused Underwriting & Quality Assurance Standards

Bloomberg's reliability is legendary. In the rush to get "exclusive stories," news services sometimes find that they jumped on a story in real-time that later proves to be rumor, misunderstood or just plain wrong. As a long-time user of Bloomberg.com for business news, I find it is normal for Bloomberg to correct the story throughout the business day, and to show in the story's caption the paragraph

---

424 See NYT, March 21, 1999, Section 3.

425 Donald Katz, *Information-Age Billionaires Need Love, Too* (Worth Online – October 1995), http://www.worth.com/articles/Z9510F02.html.

426 See NYT, March 21, 1999, at Section 3, p.12.

427 This migration of business information to and from Bloomberg is traced by George Stanley (Managing Editor - Milwaukee Sentinel Journal), *Remarks at Milwaukee Press Club Awards Ceremony for 1997 Sacred Cat Winner Michael Bloomberg*, http://www.tefnet.org/oay97/bloom.html.

where information has been corrected.

The "Bloomberg" on Wall Street trader's desks represents the "high end" data + decision support product. Financial trading and underwriting decisions, in part made based on the trends identified on the "Bloomberg" move billions of debt and equity dollars around the world daily. The portal's exacting 24/7 requirements[428] for highly accurate and focused financial data and news that impacts financial investment strategies yields a huge supply of content available for Bloomberg's other media outlets: radio, cable and satellite television channels and Bloomberg.com, as well as for resale to newspapers and other media and Internet sites desiring to redistribute Bloomberg's archives of content to supplement their own original reporting and content assembly capabilities.

Leveraging Private Funds

Michael Bloomberg's personally invested $20 million. Merrill Lynch's invested $30 million for a 30% stake[429] in a company that would supply data and the analytic tools to maximize the value of that data. The $50 million provided significant private capital to build Bloomberg's media empire around content assembly, delivery and analytical tools. Bloomberg's annual revenues exceed $2 billion,[430] and Michael Bloomberg's personal net worth exceeds $1 billion according to *Forbes* Magazine. Because the Company is privately held, details as to its current financing for expansion are not readily available.

Facilitating Tax, Guarantee & Regulatory Environment

The free access to the airwaves and the Internet, and the desire of cable television programmers to add business-focused channels at low cost to cable franchise channel offerings facilitated Bloomberg's growth as a media presence.

National Approaches to State Legal Structures

Bloomberg loosely knits together multiple networks of print and electronic news organizations seeking to find serious outlets for their archived local business news stories. Research has not uncovered any uniquely opportune national approach to legal structures beyond computer licensing of Bloomberg's content under state laws and intellectual property protection for Bloomberg's software and other service elements under federal copyright and patent laws.

Lessons for Financing the NSDI

Bloomberg illustrates the commercial value of a robust kit of high-end and general consumer screens and Internet portals to distribute Spatial Data developed and enhanced by multiple sources and displayed in a coherent, systematic, natural interface with decision support tools. The standards for delivering reliable Spatial Information adapt to the user's needs, and data is "prequalfied" as appropriate to a broad range of direct and indirect users (from the average user for investment, the expert trading currencies, stocks or bonds on Wall Street to radio, TV and Web broadcasters trawling for a story). Multiple views of the Data are simultaneously displayed as online examples for the user to emulate in understanding standardized data in historical trend analysis and estimating future

---

428 To assure unbroken, confirmed delivery of this content, Bloomberg has invested in (and in some cases pioneered) information infrastructure. Frame Relay Forum, *Bloomberg Financial Goes Global with Frame Relay*, http://www.frforum.com/4000/4002/4002.2.1.html.

429 Leah Nathans Spiro, *In Search of Michael Bloomberg* (Business Week May 5, 1997), http://www.businessweek.com/1997/18/b352532.htm.

430 Andrew Rafalaf (Associate Editor), *A Conversation with Michael Bloomberg* (Wall Street & Technology, September 1999), p. 76.

market performance.

The "Bloomberg" professional terminal represents a higher-end, premium service that updates continuously, accesses a broader range of content and has more decision support tools and built-in analytics to maximize the user's productivity in understanding and acting on the value of data as knowledge.[431] Debates about public access to spatial data vs. value-added services that exploit spatial decision support might benefit from examining Bloomberg's multi-level offerings.

---

[431] *Impact of the Internet on the Financial Information Services Industry: A Case Study of Bloomberg L.P.*, http://www.stanford.edu/~tmiranow/:

> Bloomberg currently [probably 1998] counts more than 100,000 installed terminals serving more than 150,000 financial professionals in brokerage houses, commercial banks and investment banks, corporations and government institutions. At a cost of $1,200 plus per terminal per month, these terminals generate approximately $1.5 billion in annual revenue to Bloomberg.
>
> …
>
> However, Bloomberg.com is not designed to replace the Bloomberg Professional. With an installed base of over 100,000 terminals, the Company appears to be reluctant to cannibalize its existing Professional revenue stream by placing too much proprietary content on its website. For example, the web site offers extremely limited analytical tools and devotes over ten pages to describing and offering its various software and data analysis packages that are associated with the Professional.
>
> Bloomberg.com appears to have been successful in its two-fold strategy of protecting its Professional business while at the same time embracing a new and complementary media channel, the Internet. Revenues have increased organically at roughly 15% year-over-year in the past, while Bloomberg.com was the 47th most visited site last year [probably 1998]. Recognizing that technology will eventually enable web-based delivery of all financial information, Bloomberg.com offers the added benefit of providing the platform through which the Company may offer value-added services to its analytical customer base in the future.

More insights about pricing data, value-added online services and moving from proprietary to Internet-based delivery mechanisms learned through this Stanford case study of Bloomberg appear at fn. 143.

Chapter A 15 Service Bureau Analogy: LEXIS-NEXIS Legal Reference Data

Background of Need as Opportunity

The law and the art of persuasive argument involves a battle of precedents: In litigation, the side with the strongest facts must prove that those facts, even though true, prove elements that permit recovery under other established legal theories of negligence contract, etc. These elements are like lighthouses, mapped for specific negligence theories by lines of cases that extend back into English Common Law.

Up until 1973, lawyers relied on casebooks that were indexed by The West Publishing Company using West's proprietary Topical Key Number System. The index system was rooted in 19th Century concepts of legal rights and remedies.

With the explosion of cases in the 1970s, more subtle theories of recovery, defense and damages defied easy Topical description. Lawyers no longer thought of the elements of a case or transaction serially as an A + B + C list of elements = a legally-recognized right of recovery. Also the fact patterns giving rise to cases became increasingly complex. And finally the art of arguing cases and drafting contractual protections against this complexity became increasingly more refined as clients expected precedents to more closely reflect their fact patterns, and judges required that precedents reflect the sentiment of their judicial circuit.

Meanwhile, law firms were computerizing. The managing partners' view of computers as a device for automated word processing used by secretaries was changing as computing power and ease of use increased and became more cost-effective, and computer applications incorporated more expertise directly relevant to automating subtasks of lawyers, paralegals and secretaries.

Before LEXIS-NEXIS, lawyers would have to take the benefits of WEST'S fixed and historically consistent Key Number System with its drawbacks. The subject heading for topical analysis of a WEST digester of a new judicial decision or statute might not be the most intuitive. Terms like "intellectual property" were catalogued under "Patent" or "Copyright", and indexer's skill would be well tested to foresee the subtle play of fact pattern precedents on legal outcomes in current legal settings some 100-200 years later.

In 1967, the Ohio Bar Association formed the Ohio Bar Automated Research Corp. (**OBAR**), that used the "free text" retrieval system developed by Data Corp. of Dayton Ohio as an alternative to WEST's more static indexing. Originally designed to keep track of procurement contracts and airplane equipment inventory at Wright Patterson Air Force Base[432], the software answered the need

---

[432] Some statistics on Wright Patterson Airbase:

- is the home of the headquarters of a vast worldwide logistics system supporting procurement and operations of the entire Air Force.
- is the foremost aeronautical research and development center in the Air Force.
- has a work force numbering approximately 24,000 people, making it the fifth largest employer in the state of Ohio and the largest employer at a single location. Approximately 15,000 of these people are civilians.
- is home for more than 70 units representing 7 different Air Force commands and a host of DOD organizations.

See, *Wright Patterson Air Force Base: Facts & History*, at http://www.wpafb.af.mil/facts.html. Thus, the contribution of Data Corp.'s full text search and retrieval of aircraft parts and order information must have been

of the legal profession for more flexible legal research tools.[433]

Functional Role

LEXIS-NEXIS provides a uniform "Full Text" search engine on top of proprietary and shared databases known to be useful to bankers, lawyers, researchers, journalists and other professionals.

Use of Non-Governmental Organizations

LEXIS-NEXIS is now a unit of Reed Elsevier plc, one of the largest electronic and print publishers in the world.

In developing its software product, Mead Data Central (the service's original owner/developer) entered into many cooperative research arrangements with private software companies, government, law firms, law schools and other academic institutions.[434] From 1973 through 1980, the Company signed up bar associations in all 50 states, offering members access to a rich variety of general federal, state and local statutes, regulations and case law in digital form.

Due to slow connection speeds in the early 1970s, Mead Data created one of the largest private data networks (MEADNET) serving 75 cities and tripling the access speeds then available.

Focused Underwriting & Quality Assurance Standards

The content available through LEXIS-NEXIS is reviewed for appropriateness as part of a decision-support tool aimed at the lawyer, banker, doctor, scientist, educator, journalist or other specialized customer. This means that both general news and case law, medical abstracts or other research are packaged to enhance customer loyalty to LEXIS-NEXIS as an "all in one" research Portal.

Leveraging Private Funds

Started 25 years ago, LEXIS has grown to be the largest online compiler and distributor of legal case law, statutory materials and other professional content.[435] LEXIS-NEXIS is the world's leading

---

profound.

433 A general history of LEXIS-NEXIS appears in The 25th Anniversary of LEXIS-NEXIS, *LEXIS started with a handful of clients*…, pp. 12-17.

434 See, University of British Columbia, *A Brief History of FLAIR: Faculty of Law Artificial Intelligence Research Project*, at http://www.flair.law.ubc.ca/project/index.html:

> "In 1985, IBM invited the University of British Columbia [UBC] to submit proposals for a cooperative project between IBM and UBC. With [UBC Law School] Dean Peter Burns' endorsement, Professors Robert T. Franson, JC Smith and John Hogarth of the Faculty of Law assembled and present a proposal. A three-year agreement was established whereby IBM furnished the Faculty of Law with $2m worth of equipment, software, and expertise. The Government of BC matched the contribution with a $1.2m grant. In 1989, the program concluded and IBM declared it was one of the most successful cooperative projects ever entered with a university.
>
> A proposal was then submitted to the Social Sciences and Humanities Research Council. The proposal resulted in a grant for a three year project called Faculty of Law Artificial Intelligence Research (FLAIR). Contributions were also made by the Law Foundation of BC, Insurance Corporation of British Columbia, Mead Data Central, Economic Consultants.
>
> The FLAIR Project created one of the first rule-based expert systems in case law, and one of the first case-based legal reasoners. The project is recognized internationally for its work in the fields of automatic text analysis and non-Boolean conceptual search technology. This technology has garnered attention not only academically, but is widely recognized for its potential to transform the way research is done in full text legal databases."

435 Discussion taken from http://www.lexis-nexis.com/lncc/about/company.html.

provider of enhanced information services and management tools in online, Internet, CD-ROM and hardcopy formats for a variety of professionals. Serving customers in more than 60 countries, sales representatives are located in 50 U.S. cities and around the world, including London, Frankfurt, Hong Kong and Toronto. The company is a division of Reed Elsevier Inc., part of the Reed Elsevier plc group of London, one of the world's leading publishing and information businesses. LEXIS-NEXIS is based in Dayton, Ohio, USA, and employs 6,200 individuals worldwide.

According to the Company, LEXIS-NEXIS leads the information industry with the largest one-stop, dial-up information service, the LEXIS®-NEXIS® service for legal, business, and government professionals. The LEXIS-NEXIS service contains more than one trillion characters and 1.4 billion documents in more than 8,692 databases. It adds 4.6 million documents each week. Today, 1.5 million professionals worldwide - lawyers, accountants, financial analysts, journalists, law enforcement officials and information specialists -subscribe to the LEXIS-NEXIS services. They perform more than 300,000 searches per day.

As part of a publishing conglomerate providing comprehensive authoritative legal, medical and professional content, Reed Elsevier has acquired many of the text publishers popular in such fields dating as far back as the 1800s, and now owns many well-respected brands (The Mitchie Company, Shepards' Citation Service, US Code Service, US Supreme Court Reports (Lawyers Edition), Matthew Bender, Martindale-Hubbell Law Directory, Congressional Information Service, Butterworths, and even Official Airline Guides (OAG), among others).[436]

Facilitating Tax, Guarantee & Regulatory Environment

As an information retrieval service licensed by a private company, LEXIS-NEXIS uses a series of licenses to protect its copyright, trademarks and service marks, as well as the interests of content providers whose newspaper or other articles are provided to LEXIS' customers[437]. This license contains disclaimers of liability and provides a means of enforcing charges for occasional, monthly and unlimited use. Licenses, content pricing plans and download features for academic institutions are limited as compared to full-fare commercial users.

National Approaches to State Legal Structures

Because law is practiced differently in the 50 states and major metropolitan centers, in solo, corporate and government practice settings and by different ethnic, cultural, international and other communities, LEXIS has marketing alliances that cut across bar associations, state, country and other institutional borders.[438]

Lessons for Financing the NSDI

LEXIS-NEXIS was an early digital adopter of *If you build it, they will come*[439] thinking. The business

---

[436] See, Reed International plc Form 20-F Filing (March 25, 1999), http://quote.fool.com/sec/sectext.asp?CIK=929869&Directory=950164&Year=99&SECIndex=22&nStartLoc=17244&nEndLoc=114891&symbols=RUK.

[437] See, http://www.lexis-nexis.com/lncc/about/terms.html.

[438] See, http://www.lexis.com/xchange/barassociations/default.asp.

[439] Many of the private sector analogies in this Report embraced the same philosophy of making technology easier and more worthwhile using (America Online Chapter A 13, Bloomberg Chapter A 14, SABRE Chapter A 20, and VISA Chapter A 17).

The line is paraphrases one in the baseball epic *Field of Dreams*. For those who forget the movie, Roger Ebert's summary:

> The movie *Field of Dreams* is about an Iowa farmer is standing in the middle of a cornfield when he

hears the voice for the first time: "If you build it, he will come." He looks around and doesn't see anybody. The voice speaks again, soft and confidential: "If you build it, *he* will come." Sometimes you can get too much sun, out there in a hot Iowa cornfield in the middle of the season. But this isn't a case of sunstroke.

Up until the farmer starts hearing voices, *Field of Dreams* is a completely sensible film about a young couple who want to run a family farm in Iowa. Ray and Annie Kinsella (Kevin Costner and Amy Madigan) have tested the fast track and had enough of it, and they enjoy sitting on the porch and listening to the grass grow. When the voice speaks for the first time, the farmer is baffled, Could this be one of those religious pictures where a voice tells the humble farmer where to build the cathedral?

It's a religious picture, all right, but the religion is baseball. And when he doesn't understand the spoken message, Ray is granted a vision of a baseball diamond, right there in his cornfield. If he builds it, the voice seems to promise, Joe Jackson will come and play on it - Shoeless Joe, who was a member of the infamous 1919 Black Sox team but protested until the day he died that he played the best he could.

As *Field of Dreams* developed this fantasy, I found myself being willingly drawn into it. *Movies are often so timid these days, so afraid to take flights of the imagination, that there is something grand and brave about a movie where a voice tells a farmer to build a baseball diamond so that Shoeless Joe Jackson can materialize out of the cornfield and hit a few fly balls. This is the kind of movie Frank Capra might have directed, and James Stewart might have starred in - a movie about dreams.* [emphasis supplied]

It is important not to tell too much about the plot. (I'm grateful I knew nothing about the movie when I went to see it, but the ads give away the Shoeless Joe angle.) Let it be said that Annie supports her husband's vision, and that he finds it necessary to travel east to New Jersey so that he can enlist the support of a famous writer (James Earl Jones) who has disappeared from sight, and north to Minnesota to talk to what remains of a doctor (Burt Lancaster) who never got the chance to play with the pros.

The movie sensibly never tries to make the slightest explanation for the strange events that happen after the diamond is constructed. There is, of course, the usual business about how the bank thinks the farmer has gone haywire and wants to foreclose on his mortgage (the Capra and Stewart movies always had evil bankers in them). But there is not a corny, stupid payoff at the end. Instead, the movie depends on a poetic vision to make its point.

The director, Phil Alden Robinson, and the writer, W.P. Kinsella, are dealing with stuff that's close to the heart (it can't be a coincidence that the author and the hero have the same last name). They love baseball, and they think it stands for an earlier, simpler time when professional sports were still games and not industries. There is a speech in this movie about baseball that is so simple and true that it is heartbreaking. And the whole attitude toward the players reflects that attitude. Why do they come back from the great beyond and play in this cornfield? Not to make any kind of vast, earth shattering statement, but simply to hit a few and field a few, and remind us of a good and innocent time.

It is very tricky to act in a movie like this; there is always the danger of seeming ridiculous. Costner and Madigan create such a grounded, believable married couple that one of the themes of the movie is the way love means sharing your loved one's dreams. Jones and Lancaster create small, sharp character portraits - two older men who have taken the paths life offered them, but never forgotten what baseball represented to them in their youth.

"Field of Dreams" will not appeal to grinches and grouches and realists. It is a delicate movie, a fragile construction of one goofy fantasy after another. But it has the courage to be about exactly what it promises. "If you build it, he will come." And he does. In a baseball movie named *The Natural*, the hero seemed almost messianic. *Field of Dreams* has a more modest aim. The ghost of Shoeless Joe does not come back to save the world. He simply wants to answer that wounded cry that has become a baseball legend: "Say it ain't so, Joe!" And the answer is, it ain't.

Roger Ebert (Chicago Sun Times, April 21, 1989), at http://www.suntimes.com/ebert/ebert_reviews/1989/04/349987.html. In real life, the baseball field (the infrastructure star of the movie), was constructed in just three days. See, http://www.fieldofdreamsmoviesite.com/shoot.html.

successfully leveraged:

- A modern lawyers' basic need to find, search, display and assemble reports using the most current and most historically deep data in digital form;
- The Defense Sector's software (Wright Patterson Airbase) for improved inventory and search of diverse databases;
- A multi-state network of alliances with state government, private expert users (bar associations, judges and lawyers) and universities (law schools) to design and market better content portals of general applicability; and
- A proprietary and shared network of higher bandwidth than otherwise then available at reasonable cost.

In the process, they created a brand for authoritative content and search tools.

NSDI leverages shared standards for arranging layers of spatial data in logical sequence and in a manner most easily catalogued, accessed and updated. LEXIS-NEXIS' "free text" search methodology discarded West's Topic Numbering system, requiring less editor discretion in coding what a future searcher of information would want to find and how that future searcher would phrase the question. This shift in search-facilitating specifications for data entry and storage mirrors the commercial value of *Catalogue Services* self-identified through the OpenGIS' specifications and proved in OpenGIS Web Mapping Testbed activities.[440]

To the extent that LEXIS-NEXIS laid the foundation for case law to be put online going forward, it also provided the commercial justifications and portal[441] for reaching back to "legacy" case law,

---

[440] OpenGIS Consortium, *Breakthrough in Web-Based Geographic Information*: *OpenGIS Web Mapping Testbed Demonstration Declared Successful* (September 10, 1999), http://www.opengis.org/wmt/press_release.htm.

[441] Beyond legacy materials in textual form discussed in the LEXIS-NEXIS analogy, the multimedia legacy of the Industrial Age requires technology for preservation, as much as its conversion to digital format for other purposes.

Movies and their renewed commercial value in the Digital Age represent a prime example of the commercial role in safeguarding the history of our social history. As AMC (American Movie Classics) explains (http://www.amctv.com/ontheair/blocks/preservation/preservation1.html):

> According to the experts, more than half of the twenty-one thousand shorts and full-length features made on nitrate stock before 1950 have been lost. Much to the dismay of ardent film fans everywhere, only about ten percent of the movies produced in the United States before 1929 still exist.
>
> The need for preservation and restoration is not limited to films from Hollywood's Silent and Golden Eras, however. Every color film made on Eastmancolor stock between 1950 and 1975 is in danger of fading away.
>
> The original negatives of a number of acknowledged classics are no longer in existence, requiring preservationists to make completely new prints of such films as "How Green Was My Valley" (1941), "The Ox-Bow Incident" (1943), and all of the features of Shirley Temple, Will Rogers and Betty Grable. The original negative of John Ford's "Stagecoach" (1939) is gone, as is the negative for Stanley Kubrick's "Dr. Strangelove" (1960). The vast majority of pre-1910 one-reelers are gone, as are the original versions of Orson Welles' "The Magnificent Ambersons" (1942) and "Little Red Riding Hood," a cartoon made in Kansas City in 1922 by Walt Disney, before he moved on to fame in Hollywood.
>
> Filmmakers are also particularly concerned about orphan films, not in warehouses like studio titles, which are generally not exploited on video and in non-theatrical situations: including newsreels, films in public domain, independent productions, and documentaries.
>
> But archives are beginning to help. The Museum of Modern Art has about thirteen thousand titles in its

because of the doctrine of precedent *stare decisis* (literally, let the decision stand). As commercial delivery of spatial information accelerates, legacy data that explains the 4th spatially-related dimension of *time* (e.g., why to populations, rivers, businesses move) can be converted and "cleaned up"

---

archives and preserves about one hundred films a year, ninety-five percent of which are orphan films.

Film preservation is a recent idea. As early as twenty years ago, the only people preserving films were underfunded archives. The big studios simply saw film libraries as an unnecessary storage expense that they were unwilling to indulge in. Often, films would be copied onto video tape and the negative destroyed. This haphazard "preservation," however, didn't take into account the low quality of videotape compared to the high-definition digital technology available today. And who knows what technology awaits in the future? In addition, some of the video transfers that were made were of edited cuts of the films. Often the films were not letterboxed before the transfer to video, which caused them to lose the wide aspect ratio of big-screen cinemascope movies, thereby sullying the integrity of the film picture.

Film preservation is now recognized as an important cultural endeavor, and some of the studios have built preservation facilities and improved the preservation policies of their libraries. But funds have been shrinking. Adjusted for inflation, government funding of the effort is less than half of what it was in 1980. A black and white film costs from $10,000 to $50,000 to preserve; a color film from $30,000 to $300,000. AMC's efforts to raise money through our annual Film Preservation Festival are now more important than ever in helping archives preserve not only Silent and Golden Era films, but irreplaceable historical documents like newsreels as well.

In the past, AMC has raised over $1.5 million to support the Foundation's six member archives. [AMC] helped raise the money to restore and preserve films like "Stagecoach" (1939), "My Darling Clementine" (1946), and "All Quiet on the Western Front" (1930).

The cable television network AMC (American Movie Classics) runs regular benefits for The Film Foundation, and then airs the restored classics. Symbolic of a foundation/museum/media partnership preserving and disseminating the fruits of preserving American cultural history.

Chapter A 16 Service Bureau Analogy: MEDLINE Medical Data

Background of Need as Opportunity[442]

In 1879, the predecessor of today's National Library of Medicine (**NLM**) started collecting citations of medical journal articles and publications useful to physicians and other health professionals into a paper-bound volume called *Index Medicus*.

By the early 1960s, in order to keep up with the ever-increasing volume of biomedical literature that had to be included in the Index Medicus bibliography, NLM turned to computers. An extensive computerized literature retrieval system, known as MEDLARS: Medical Literature Analysis and Retrieval System, became totally operational in 1964. NLM staff performed thousands of searches for libraries and researchers before interactive, on-line searching capabilities and databases, such as MEDLINE®, became available in 1971. The NLM took advantage of early terminal technologies (like TWX terminals used by librarians to request inter-library book loans) and networks (like TYMNET in urban areas) to become the first remotely searchable database. Through MEDLINE, health professionals and other interested individuals have immediate access to more than 3 million journal article references accumulated since 1966 and growing at a rate of over 400,000 a year.

Functional Role[443]

MEDLINE is primarily a clearinghouse for medical journal articles and research papers. MEDLINE is the NLM's online database that contains almost 10 million references to journal articles in the health sciences. Some facts about MEDLINE:

Time covered:	10 million references from 1966 to the present
Source:	4,000 journals in 40 languages, of which 52% published in the U.S. 88% of the current references are to articles in English, and 76% of the references have English abstracts
Weekly update:	7,300 references are added weekly (almost 400,000 yearly)
Broad coverage:	Basic research and the clinical sciences (including nursing, dentistry, pharmacy, and allied health)

MEDLINE may be searched directly by anyone who has access to the Internet and a Web browser. It is also available in medical libraries, an increasing number of public libraries, and at the NLM in Bethesda, Maryland. MEDLINE is available free over the World Wide Web through the Library's Home Page at www.nlm.nih.gov. No registration is required. MEDLINE services are also provided by several companies and educational institutions that lease the database from the NLM. MEDLINE may be searched by subject, author, title words, or a combination of these.

Use of Non-Governmental Organizations

Maintaining the MEDLINE database requires 2 steps: *Data Entry* and *Descriptive Indexing*. NLM uses contractors to provide Data Entry manually and OCR (Optical Character Recognition) services in digesting the journal articles, author names, publication date/volume and other data that form part

---

442 National Library of Medicine, *Images From the History of the National Health Service*, (MEDLARS, circa 1964) page 102, http://130.14.74.3/exhibition/phs_history/102.html.

443 NLM, http://www.nlm.nih.gov/pubs/factsheets/medline.html.

of the citation building to keep MEDLINE current.[444] NLM also relies on contractors to hire scientists holding PhD or Masters Degrees in topical medical practice and research disciplines to perform the essential work of describing a journal article's content, using a controlled vocabulary that a MEDLINE user would typically include in a search query.[445]

Focused Underwriting & Quality Assurance Standards

For database continuity and quality assurance, the work of contractors in support of Data Entry and Descriptive Indexing functions of adding journal articles to MEDLINE are overseen by NLM staff using approved procedures. NLM staff train indexers in their methodology and even perform some Indexing functions internally.[446]

Leveraging Private Funds[447]

The public (free) search engines have a built-in feature known as "Loansome Doc™", that lets the user order a copy of an article through the National Network of Libraries of Medicine® (**N/NLM**). Also, for more than 400 journals, users can click from a MEDLINE reference to the publisher's home page to request (or view) the full article, whereupon most publishers charge for providing the article.

The MEDLINE Data is also licensed[448] to commercial "value-added" resellers, such as DIALOG®. Consistent with the Public Health Service Act (Section 383), the NLM Board of Regents has established a domestic pricing policy permitting NLM to recover costs associated with accessing the online system. Such costs include telecommunications, postage, and other related costs. The Board of Regents has delegated to NLM's Director the authority to set prices at the level required to ensure effective and efficient management of the system. To the extent practicable, such costs recovered from member users or institutions are independent of their geographic location. Before free Web access, NLM used experimental flat rate programs whereby institutions paid a single annual fee for unlimited access.[449] These programs were available to members of health professional associations

---

444 Interview, Sheldon Kotzin, Chief – Bibliographic Services Division of NLM (April 15, 1999) (**Kotzin Interview**).

445 Kotzin Interview, fn. 444.

446 Kotzin Interview, fn. 444.

447 NLM, *Online Services Policy*, http://www.nlm.nih.gov/pubs/factsheets/online_serv_policy.html.

448 NLM, *License Agreement to License NLM Data in Machine-Readable Form*, http://www.nlm.nih.gov/databases/license/license_agr.html.

449 In that pre-Web free access era, those flat rate prices for MEDLINE were substantial:

Current Year data (input during 1999 indexing year):

$9,000 weekly updates -OR-

$5,000 monthly updates

Older data: licensees requesting older data selected one of the 7 groupings of years as shown below.

Fees	Years of Publication
$1,750	1996 - 1998
$1,750	1993 - 1998
$1,750	1990 - 1998
$3,500	1985 - 1998
$5,250	1980 - 1998
$5,250	1975 - 1998
$7,000	1966 - 1998

and to academic institutions.

Facilitating Tax, Guarantee & Regulatory Environment

The National Library of Medicine is part of National Institutes of Health (**NIH**) Campus in Bethesda Maryland. Most of the budget for MEDLINE is part of Library Operations funded by NLM. In order to more efficiently collect and disseminate medical research funded through the Federal Agencies and research programs, Congressional and Senate frugality requires that the results of such research be indexed and disseminated by NLM, presumably via MEDLINE.[450]

National Approaches to State Legal Structures

NLM licenses its data in digital form pursuant to a standard data license.[451] Federal copyright law governs the redistribution of author-generated abstracts, and most likely the indexes compiled by NLM from private or other copyrighted sources.[452]

Lessons for Financing the NSDI

MEDLARS and MEDLINE represent a governmental clearinghouse for information developed by public, private and academic researchers. While a limited search facility is free to the public, reprints of articles may be available for free or at the publisher's standard charge from online publisher Websites.

In NSDI terminology, the metadata to describe the journal articles is becoming virtually free to NLM. To help market their copyrighted articles for resale, publishers increasingly provide NLM with metadata in standardized format convenient for indexing by NLM's staff and contractors. In a quid pro quo return, MEDLINE's citation of the journal article includes hyperlinks to the publisher's website (increasing the publisher's site traffic) where MEDLINE users can browse other articles, purchase copies of requested articles and be enticed through banner ads to purchase other goods and services.[453]

Congress has adopted NLM and MEDLINE as means to collect and disseminate the results of Federally-funded medical research, thereby preserving the value and reducing the waste in such research. In FY 1998, NLM's total budget for MEDLARS and many other programs in health information communications was $161 million, of which $4 million was earmarked for improvement of information systems.[454]

MEDLARS also functions as a digital Ambassador of American Foreign Relations for Health Policy, and provides the rest of the world with access to the same medical research as US hospitals,

---

NLM, *MEDLARS Pricing Schedule* (effective October 1, 1998), http://www.nlm.nih.gov/databases/license/price_sched.html.

[450] For instance, U.S. Senate S. 580, *Healthcare Research and Quality Act of 1999*, Section 924 (introduced by Senator Bill Frist MD, March 10, 1999), at http://thomas.loc.gov/cgi-bin/query/D?c106:1:./temp/~c1063pTWNU:e38754:.

[451] See, http://www.nlm.nih.gov/databases/license/license_agr.html.

[452] See, *Copyright of Abstracts & Downloading Small Amounts of MEDLARS® Data for Redistribution*, http://www.nlm.nih.gov/databases/download.html.

[453] Kotzin Interview, fn. 444. This quid pro quo arrangement saves NLM approximately $6-7 per digitally supplied citation, or roughly $900,000 annually. As publishers supply more citations to NLM digitally, the savings will increase to roughly $3 million per year.

[454] P.L. 105-78 / H.R. 2264, *National Library of Medicine*, Title II, at http://thomas.loc.gov/cgi-bin/query/D?c105:1:./temp/~c105EwRsqK:e46480:.

clinicians and citizens receive.[455] This foreign access promotes international adoption of US medical technology standards, healthcare procedures and management practices, thereby fueling exports of American medical and pharmaceutical products and consulting services. Spatial technology and data are now regular components of US technical assistance to foreign countries.[456] However, the international relations opportunities for American foreign policy to capitalize on spatial technology as a tool for conflict resolution, environmental cooperation and political democratization has yet to be significantly featured by the popular news media as part of a comprehensive White House foreign policy initiative. Especially in the international setting, working US models for financing of data acquisition and maintenance, negotiation of standards and other issues would be extremely valuable.[457]

---

[455] MEDLARS Centers are available (usually online, or on CD-ROM) in Argentina, Brazil, Canada, China, Egypt, France, Germany, Hong Kong, India, Israel, Italy, Japan, Korea, Kuwait, Mexico, Russia, South Africa, Sweden, Switzerland, and Taiwan and through the Pan American Health Organization, http://www.nlm.nih.gov/pubs/factsheets/intlmedlars.html. Nonprofits also make MEDLINE available abroad. See, *Frontiers in Bioscience: A Virtual Journal and Library*, at http://www.bioscience.org/.

[456] U.S. Department of Commerce Technology Administration Office of Technology Policy, *International Policy U.S. Bilateral SciTech Agreements Part II*, outlines, among other things, Eastern European participation in NOAA's GLOBE Project, EPA's environmental monitoring assistance and USGS' GIS assistance to Djibouti, http://www.ta.doc.gov/bilat/NATION2.HTM.

[457] The lack of financing, role of commercialization and the need for better intergovernmental consortia models are some of the lessons suggested in Sindre Langaas (UNEP/GRID-Arendal c/o Dept. of Systems Ecology Stockholm University), *Transboundary European GIS databases: A review of the Baltic Sea region experiences,* A Paper presented at GISDATA Specialist Meeting on "Geographic Information: the European Dimension", Buoux, France, May 8-12 1996, http://www.grida.no/prog/norbal/docs/gisdata/.

Chapter A 17 Service Bureau Analogy: VISA Credit Cards

Background of Need as Opportunity[458]

VISA™ traces its history back to 1958 when the Bank of America started its BankAmericard program. In the mid-1960's, the Bank of America began to license banks in the U.S. to issue its Blue, White and Gold BankAmericard. Membership associations were created both in and outside the U.S., and in 1977, the brand "VISA" was adopted internationally. It was the world's first common identity for multi-bank recognition, acceptance, and interchange of value.

The payment card industry is just 30 years old. Before credit cards, shoppers bought their purchases solely with cash or checks, and merchants operated “house accounts” to provide monthly credit to regular customers. This meant that merchants were forced to raise capital and took the credit risk of default of their customers directly, which in turn limited the capacity of merchants to direct capital to grow their businesses.

Today, cards have become an integral part of our lives. Whether we use them for credit or debit, for travel or at home, for purchases or at the ATM (Automated Teller Machine), owning a payment card opens up “a whole new world of possibilities” and is an essential tool of modern business and governmental processes (whether at tax time or for tracking reimbursable expenses).

For more than 20 years, VISA International's Member financial institutions have helped it become the world's leading full-service payment network. In a highly competitive industry, VISA’s products and services (including VISA Classic card, VISA Gold card, VISA debit cards, VISA commercial cards and the VISA Global ATM Network) are used by consumers in more than 240 countries and territories. Today, VISA is pioneering yet another cash-substitute --- chip cards. More than 20 million smart cards have been issued by its Member banks around the world. In the world of electronic commerce, VISA is playing a major role by developing standards such as the Secure Electronic Transaction (**SET**) protocol, which will make it as easy and safe for merchants and consumers to conduct business in the virtual world as it is in the physical world. By utilizing a combination of encryption, digital certificates and digital signatures, SET will become an integral part of the way millions of consumers transact business over the Internet.

Other milestones for VISA include:

> January 1978 - VISA Travelers Cheque approved. Expanding the payment services business beyond credit cards, development begins on the worldwide VISA Travelers Cheque program.
>
> May 1981 - VISA premium card approved. The first VISA premium card product, eventually known as VISA Gold (also called "Premier" in some regions) begins development.
>
> September 1981 - Worldwide ATM service approved. The development of an international ATM disbursement service begins.
>
> May 1986 - Olympic sponsorship approved. VISA’s worldwide sponsorship of the Olympic Games begins.
>
> November 1987 - PLUS Mark acquisition approved. The Plus System mark is adopted as VISA’s ATM-only mark worldwide.
>
> June 1992 - Chip technology standards for storing cash value endorsed by VISA’s membership. Chip cards are endorsed as a payment service option, setting the stage for the

458 Discussion taken from History of VISA International, http://www.visa.com/av/who/main.html#history.

most significant change to the payment card industry since the introduction of the magnetic stripe.

March 1994 - Interlink acquired. The acquisition of Interlink establishes VISA's worldwide on-line, Personal Identification Number (PIN)-based service.

June 1996 - VISA Cash introduced. The chip-based stored value card is rolled out at the 1996 Olympic Summer Games in Atlanta.

July 1996 - First Chinese international payment card. For the first time, consumers in China can use their VISA credit cards to make purchases and withdraw local currency from ATMs when they travel outside of China.

January 1997 - First Secure Electronic Transaction (**SET**) Certificates issued. Visa, IBM, and VeriSign issue First Visa-branded SET Digital Certificates over the Internet

March 1997 - Partner Program announced. VISA announces global strategy for multiple function, smart card applications to allow Member banks to migrate easily from magnetic stripe cards to chip cards.

April 1997 - First VISA SET transaction. The first SET transaction takes place in Singapore and is followed later in the day by a similar transaction in Taiwan. A Citibank VISA card in Taiwan was used to purchase items from the same Singapore retailer, the world's first cross-border VISA transaction using SET technology from different manufacturers.

August 1997 - Largest SET pilot underway. The Pan-European secure electronic commerce pilot gets underway. It is the world's largest pilot for secure electronic commerce using the SET standard and involving 38 VISA Members in 16 European countries.

Functional Role

VISA provides its 21,000 bank members and their merchant and consumer customers with the following:

- Recognizable brand/logo for marketing trustworthy payment processing services,
- Standards and operating procedures for exchange and clearance of payment instructions, overdrafts and incomplete transactions,
- Use of VisaNet System, a proprietary network for payment clearing services and marketing use through data-mining; and
- Ongoing test-bed for research, development and testing of enhanced services, security and brand optimization.

Use of Non-Governmental Organizations

VISA plays a pivotal role in advancing new payment products and technologies to benefit its 21,000 member financial institutions and their cardholders.

VISA International is an association that was created by banks to serve banks. It is a multi-regional corporation that provides an operating structure to support consumer payment services globally - yet allows its Members to design products and services to meet local needs anywhere in the world. VISA cards are issued by its Member financial institutions, so that while the cards are accepted at millions of locations worldwide, they remain very much a local product. In Italy, consumers consider the card Italian, in Japan Japanese, and in Brazil Brazilian.

As an association, VISA is controlled by no single interest. It is owned jointly by its Member financial institutions around the world. Through this worldwide membership, VISA International provides a

global system for value and information exchange. VISA itself does not offer cards or financial services directly to consumers and merchants. That role is fulfilled by its individual Members. Each VISA Member determines the terms, such as fees and annual percentage rates that it will offer its customers. This structure encourages competition among Members and with other payment programs. The VISA brand - the familiar Blue, White and Gold flag - is one of the most recognized and preferred brands worldwide. Nearly 600 million cards carry the VISA brand or one of its acceptance marks such as VISA Interlink or VISA Electron.

More than 14 million locations accept VISA cards. Consumers using VISA products purchased more than $1 trillion in goods and services in the 12 months ending March 1997. With headquarters near San Francisco, California, VISA International is divided into six regions worldwide (Asia-Pacific; Canada; Central and Eastern Europe, Middle East and Africa; the European Union, Latin America and the Caribbean, and the U.S. Regional headquarters) and offices are located in a number of cities including London, Paris, Tokyo, Singapore, Sydney, Toronto, Frankfurt and Miami.

Focused Underwriting & Quality Assurance Standards

As an association of banks and financial institutions serving merchants and cardholder/consumers, VISA continues to evolve its own standards for payment processing by credit card, smart card and electronic commerce. It has pioneered fraud detection.

According to VISA, VISA is the leading payment brand and the largest consumer payment system worldwide with more volume than all other major payment cards combined. VISA has more than 70 smart card programs in 33 countries and on the Internet, with 23 million VISA chip cards, including over 8 million VISA Cash cards. VISA is pioneering SET Secure Electronic Transaction™ programs to enable and advance Internet commerce. There are more than 620 million Visa-branded cards, which generate over US$1.2 trillion in annual volume. VISA is accepted at more than 15 million worldwide locations, including at over 450,000 ATMs in the VISA Global ATM Network.

According to VISA, the VisaNet system is the largest and most sophisticated consumer financial transaction processing system in the world. It provides worldwide telecommunications and payment data processing; authorizes and settles payments; and offers a range of value-added services such as risk management and fraud control services.

These commercial standards appear to have been effective at (1) handling a growth in transaction volume (15-20% annually), while (2) reducing fraud and customer dispute rates (70% decline since the 1970s).[459]

Leveraging Private Funds[460]

On December 16, 1998, VISA claimed a world record in financial services by processing more than 110 million payment transactions in a single day on VisaNet, the VISA global payment processing network. VISA processed 110,086,395 transactions worldwide on December 14, 1998, an increase of nearly 25% over the previous year's 88 million transactions and marking the start of what was the busiest "peak season" ever for VISA worldwide.

On average, VISA processes about 50 million payment transactions daily, which is about 15 times more than the estimated 3 million transactions processed by the New York Stock Exchange each day. VISA's peak season is the period when consumer purchasing worldwide reaches its highest

---

459 See, http://www.visa.com/av/doj/competition/main.html.

460 Generally, *VISA Sets World Record for Global Payment Processing Volume: 110 million transactions processed by VisaNet system in one-day* (December 16, 1998), http://www.visa.com/av/news/PRaamisc121698.vhtml.

volume. Peak season for VISA is usually between November 19 and January 4, with the highest transaction volumes occurring between the U.S. Thanksgiving holiday and Christmas.

"We knew that we were advancing to a new record as our volume steadily grew in the days prior to the record-setting date on December 14, 1998. In reaching 110 million transactions, the VisaNet system sustained more than 3,000 transactions per second for nearly 14 continuous hours," said Bill Chenevich, executive vice president, VISA International, "which is, in itself, another industry and world record." About 25 percent of VISA's annual transaction volume occurs during the 45-day peak season, a time when consumer expectations are also at their highest.

Facilitating Tax, Guarantee & Regulatory Environment

Credit card interest rates have declined due to the competition for credit card loyalty among VISA's rivals (MasterCard, American Express and Discover Card, and in the corporate segment, Diner's Club). While VISA is a payment processing and marketing service, its member banks actually issue the credit card and provide the electronic payment services to merchants and consumers. These banks are subject to state and national banking regulations. Under the Truth in Lending Act of 1968, the Federal Reserve Bank regulates consumer credit activities offered in the marketplace by national and state-chartered banks.[461]

As dollar amount of taxes rose with inflation and the tax code reduced the number and value of certain deductions, dependence on credit cards grew to track those more valuable deductions. Likewise, the rise of small businesses depended on automated billing and accounting for income and expenses that let budding entrepreneurs focus on building their companies.

National Approaches to State Legal Structures

VISA illustrates an association that operates globally, but thinks and acts locally. VISA International provides worldwide telecommunications; handles data payment processing; authorizes and settles payments; and sets operating standards on a national, regional and global basis to ensure consistency and quality of service. It also develops new products and services - such as the new chip card programs. These functions allow its Member financial institutions to provide their customers with a convenient, low-cost means of completing a tremendously high volume of transactions throughout the world.

VISA claims to offer the widest range of financial services in the bankcard industry. VISA's diverse product line includes credit and debit cards, travelers cheques, VISA stored value cards, corporate and business cards, as well as new, state of the art products such as its online products and services, and the VISA Global ATM Network with over 457,000 ATMs in 120 countries. In the future, VISA plans to lead the payments industry as its products and services evolve to meet the ever-changing dynamics of the marketplace. In the future, VISA will continue to advance the use of chip cards in electronic commerce, on the Internet, and in other emerging media to ensure that we remain "The World's Best Way to Pay" for its Members and their cardholders.

VISA's members adapt the credit card application to meet Federal and State[462] bank, financial institution and credit reporting requirements applicable to dealings with their customers. This allocation of retail vs. wholesale roles leaves VISA International free to focus on providing its member

---

461 See, http://www.ny.frb.org/pihome/fedpoint/fed17.html.

462 For example, State banking departments monitor interest rates, credit card solicitation and collection practices, equal credit opportunity, financial exploitation of the elderly and the terms and conditions for cards offered in their State. See State of New York – Banking Department, *Interest Rate Information – Credit Card Survey* (July 1999), at http://www.banking.state.ny.us/nyschome.htm, and http://www.banking.state.ny.us/ltreld.htm.

financial institutions with the logistical transaction clearing and payment processing services in accordance with standardized member services agreements.

Lessons for Financing the NSDI

Today, 21,000 member financial institutions market their credit cards and other inter-bank electronic fund transfer services through the VISA Brand.[463] This Brand represents assurance of secure and reliable billing, currency conversion and vendor dispute resolution to consumers. The Brand also represents reliable payment, electronic funds transfer, fraud protection and marketing list services to vendors and their financial institutions. Finally, the members have an individual and collective stake in the continuing credibility and performance of other members issuing, merchants accepting and customers using the card branded VISA – thus weeding out "bad apples" whose actions impair the card's acceptance as a cash equivalent (banks, merchants and cardholders).

The NSDI and its required components (metadata standards, data transfer standards, interoperable software specifications, etc.) have yet to be subsumed under a brand that, like UL (Underwriters Laboratory) or ISO (International Standards Organization) or even Microsoft, would represent to institutional and non-institutional users of Spatial Data a reliable method of creating, transacting, acquiring and enhancing their Data.

VISA also symbolizes a member-owned company that exists to provide standardized back-office support for a membership of large institutions that process transactions (payments) in the service of other commerce (stores, travel and other industries accepting VISA as a means of payment). A similar back-office operation to clean metadata for government- and industry-wide sources of Spatial Data would spur development of the NSDI by processing accelerating exchanges of Spatial Data. As with the metadata used to identify and trade securities under CUSIP (Chapter A 19), the metadata used to process Spatial Data exchanges in common Framework layers might turn out to be a small subset of more comprehensive metadata ideally available.

VISA also provides ongoing test-bed development of advanced standards and capabilities of demonstrable benefit as shared data, standards and procedures in the common business strategies of its Members by accelerating the rate and diversity of reliable transactions at minimized processing cost and risk to Members and cardholders.

[463] This discussion taken from http://www.visa.com/cgi-bin/vee/av/who/main.html?2+0#history.

Chapter A 18 Service Bureau Analogy: New York Clearing House Association

Background of Need as Opportunity[464]

In 1831, Albert Gallatin, the President of the National Bank in New York had an idea. He wanted a place where he could safely deposit gold in a way that saved the labor, time, warehousing, insurance and related costs. It seemed that every Friday, porters would make the rounds of other banks in the City calling on paying teller windows to settle accounts in cash or gold bullion (then legal tender), collect checks payable on the National Bank and to repay loans owed to National Bank. Sometimes banks with less capital would use this float to the detriment of their more capitalized competitors, leading to bank panics and default.

Gallatin's idea was for a Clearing House where banks could cooperatively exchange and settle the net accounts of their customers' checks, store and borrow gold bullion, municipal securities and other instruments of value, and effect other inter-bank efficiencies. Unlike the Bank of England, at that time, U.S. law forbid the Treasury Department to lend money. So banks and bank depositors were entirely left to their own devices to deal with liquidity strains of war, rumor, borrower default and other conditions.

The Clearing House Association was organized on August 23, 1853 (22 years after Gallatin first suggested it) by 38 major city banks. By October 11th, when the Association opened for business in the basement of 14 Wall Street, 52 banks (all but 5 of those doing business in the City) had joined as members, and made exchanges of $22,648,109 and deposited balances on the books of the Association of $1,290,572. The Association functioned for 9 months without a charter, which was adopted on June 6, 1854.

Functional Role

In the early days the Clearing House concentrated on optimizing the manual clearance of checks by its member banks,[465] and provided vault services for gold bullion and other valuables that rivaled the

---

[464] Historical discussion taken from George Simonson, *The Clearing House of New York City* (1898) (**Simonson**).

[465] For a look back in time to the Industrial Age's knack for organizing manual processes, see the Simonson's description (at pp.9-11) of how the clerks from member banks were assigned numbered desks (one for each bank) and would at a exact time perform specific tasks:

9:30 AM Bank of New York clerk arrives at Clearinghouse with bags of checks in packets corresponding to each member bank

9:59 AM The Great Gong of the Association sounds bringing order to the roomful of clerks, bags and bank desks. Each bank has 2 clerks poised and waiting: a settling clerk who sits behind the bank's numbered desk, and a delivery clerk with the bag of checks slung over his shoulder like a mailman ready to deliver the mail.

10:00 AM A dance of deliveries begins: The delivery clerk for Bank 1 (The Bank of New York) deposits the checks drawn on The Bank of New Amsterdam (Bank 93) to desk 93, where The Bank of New Amsterdam's settling clerk signs a talky sheet showing the total of checks drawn in favor of Bank of New York's customers by Bank of New Amsterdam's depositors. This dance continues until all of the check bundles for all member banks are deposited and receipted at the desks of all member banks.

10:15 AM In roughly 15 minutes this dance is completed. The delivery clerk returns to the desk for Bank 1 and checks the check bundles from all member banks now stacked on Desk 1 against the tally of

Bank of England's.[466] It offered a system for using member bank reserves and extending credit to member banks in times of liquidity disruptions. And it offered arbitration of member disputes before its own Arbitration Committee consisting solely of presidents of member banks.[467]

The Clearing House[468]

- is the oldest clearinghouse in the United States. Formed 146 years ago (1853) its purpose was to simplify the exchange of checks and improve the efficiency of the payments system. Before the formation of the Federal Reserve System, the NYCH served to stabilize currency fluctuations and carry the monetary system through recurring times of panic.
- has operated under the same basic objectives since its formation. As stated in the original charter, the 52 banks that joined in the first historic exchange agreed to:

  (1) effect the daily exchanges between the members and to settle the balances resulting from such exchanges,

  (2) promote the interests of the members, and

  (3) maintain conservative banking through wise and intelligent cooperation.
- is the largest clearinghouse in the United States. It is fully staffed, with 163 employees, to support its core operating services and its advocacy function; it processes more transactions and dollars than any other clearinghouse.
- has the direct involvement of the Chairmen of the NYCH banks. The Chairmen are involved in all key strategic and policy decisions and risk management.
- processes $1.462 trillion on an average day. CHIPS: $1.443 trillion; Automated Clearing House (**ACH**): $9.5 billion; Check: $9.0 billion.
- has over 1,200 users of its various services. CHIPS: 93 users; ACH: 952 users; Check: 170 users.
- has been performing settlement for 145 years. Although the process is now automated, the basic concept of settlement has remained constant.

---

the settling clerk. Satisfied with the tally the delivery clerk returns to The Bank of New York to process the checks against its customers' accounts. The settling clerk stays to add all the checks posted against and owed to The Bank of New York by the other member banks. If more is owed to The Bank of New York than owed by it, the proof clerk of the Manager of the Clearinghouse issues The Bank of New York a credit balance slip. If less, the settling clerk for The Bank of New York gives the Manager's proof clerk a debit balance slip.

12:00 PM If any errors are discovered in the slips given or the debit and credit columns used to calculate member bank balances with the Clearinghouse, a system of fines is imposed for each mistake. Fines are doubled if the mistake is found after 11:15, and quadrupled if the mistake is found after noon.

12:30 PM Member banks must deliver cash to the Manager of the Clearinghouse in amounts sufficient to clear their account balances with the Clearinghouse by 1:30 each day.

1:30 PM Banks arrive to collect the net balances owed them by other member banks.

[466] Simonson, at p. 13, recounts that the Clearinghouse had 3 vaults capable of withstanding corrosion, explosion or drilling, and protected by an early electric alarm system. "Any failure [of the alarm electric current] to signal correctly at the proper hour would result in an armed invasion of the Clearing House by the guards of certain other great financial institutions, reinforced by the police."

[467] Simonson, p.24.

[468] Taken from *The New York Clearing House Facts*, at http://www.theclearinghouse.org/chfacts.html.

- has never failed to settle. Strong operational and risk controls are followed by the NYCH; a stringent credit review process is performed for all participants to allow for continued participation in the services.
- in 1997, received approval from the Federal Reserve to perform settlement on a national basis. Both ACH and check exchanges are authorized to perform national settlement.
- establishes and meets a goal of 99.9% system availability for its core systems. Dual systems are maintained at all times; CHIPS has achieved 100% system availability for sixty-eight of the last seventy-two months. The Automated Clearing House system has met 99.9% for the past six years, with only 5 minutes of downtime over the last two years.
- actively works with member banks to reduce their check fraud losses 24%, from $71 million in 1995 to $54 million in 1996. Through sharing information, education, and technology enhancements.
- has continued to develop value-added services for the financial services community. While its initial purpose was to exchange checks, the more recent application of computer technology to paper payments has changed the face of the national banking system. The mission is to provide banks with services to streamline operations and reduce costs.
- in 1853, began the exchange and settlement of checks at a central location.
- has experienced exponential growth in terms of dollars of check exchanged. On its first day, the Clearing House exchanged checks worth $22.6 million; today, the daily average is $9.5 billion.
- Federal Reserve prices for check clearing, on a per item basis, are 328% higher than the NYCH.
- in 1970, launched its first electronic funds-transfer system, the Clearing House Interbank Payments System (**CHIPS**) – As the world's premier payments system@-- CHIPS is an on-line, real-time payments system that wire transfers funds and settles transactions in U.S. dollars.
- collective annual savings for banks of $32.9 million by using CHIPS. CHIPS fees are over 50% lower than Fedwire fees.
- processes 30% more dollars than the Federal Reserve and transfers more total value than any other private-sector payments system in the world. Over its lifetime, has settled for over $3 quadrillion.
- achieves a 92% straight-through processing rate. Extremely high automation rates are attained by using a central database of account information.
- was the industry leader in developing enhanced risk controls for large-value payments. Implemented enhanced risk controls in 1990, which became the model for the Lamfalussy standards. CHIPS significantly exceeds these standards.
- in 1975, introduced electronic funds transfer for small-dollar payments through the New York Automated Clearing House (**NYACH**), which links financial institutions in a nationwide network that eliminates the need for checks, receipts, and bills. NYACH serves all depository financial institutions in New York, northern New Jersey, Puerto Rico, and the Virgin Islands.
- prices for ACH services, on a per item basis, are 40% to 60% lower than the Federal Reserve.
- was the only privately operated ACH network until 1983 and is the largest private-sector ACH

processor, with 10% market share. Processes more transactions than VISA, or any other private-sector processor.[469]

- made history in 1989 when it became the first ACH operator to provide all electronic delivery. Improved efficiency and reduced costs by eliminating the need for costly tape exchanges.
- in 1992, created the Clearing House Electronic Check Clearing System (**CHECCS**) for electronic check presentment, to reduce risk and improve the efficiency of check clearing, by speeding up the transfer of check information.
- was the first organization to begin a multilateral Electronic Check Presentment (ECP) program. Through ***standardization***, participants can achieve the significant benefits that have been heralded by several important industry organizations.
- actively worked with banks to implement ECP to achieve projected annual benefits of $52.5 million for 8 banks. Benefits derived from fraud reduction and accelerated accounting. [Ed. Note: For more information on ECP as an analogy to NSDI, see, The Payment Solutions Network, a nonprofit owned by banks that converts paper checks to ECP files for batch processing, at http://www.psninc.com/].
- in 1993, created the Private ACH Exchange (**PAX**) for nationwide ACH exchanges, to reduce risk and costs for banks.
- implemented same-day finality of settlement to reduce risk.
- processing handled by the private-sector to reduce costs for banks.
- in 1994, established the Funds Availability Notification System (**FANS**), a shared regional database for fraud reduction.
- provides banks and their customers with a tool to reduce write-offs associated with "bad" checks.
- in 1996, formed the Northeast Regional Check Exchange (**NRCE**), to develop common rules and operating procedures for local clearinghouses.
- was the industry leader in establishing standards for local clearinghouses in the Northeast.
- On March 5, 1998, agreed to establish a new company for 21 of the largest U.S. banks to process small-dollar electronic payments. The new company, The Small Value Payments Company (**SVPCo**) L.L.C., will create efficiencies through standardization of multilateral ECP exchanges and ACH processes.
- On March 12, 1998, the NYCH contributed CHIPS to a new company that will provide a more flexible governing structure for it. The new company, The Clearing House Interbank Payments Company L.L.C. (**CHIPCo**) is governed by a board containing representatives of 10 CHIPS participants who are chosen to represent broad geographic diversity as well as Clearing House member banks.

Use of Non-Governmental Organizations

The Member banks formed, fund and lead the Clearing House.

---

469 NB: VISA Claims to process more *consumer* transactions…See, discussion of VisaNet in Chapter A 17

Focused Underwriting & Quality Assurance Standards

In the early days when the Clearing House provided essential liquidity to the major national banks headquartered in New York City. In the period preceding the Federal Reserve Bank's regulatory and stabilizing role, the Clearing House's 29 pages of Rules, Regulations and Rulings operated to govern interest rates demanded of banks, bank solicitation of customers and credit, and fostered the creation of certificates of deposits, repurchase agreements and other financial instruments in widespread use today that improved on promissory notes and checks.[470]

Leveraging Private Funds

The Member banks provide the funds for the infrastructure (physical, procedural and technological) that define the Clearing House's operations.

Facilitating Tax, Guarantee & Regulatory Environment

The Federal Reserve Banks use and have encouraged use of the Clearing House's facilities to smooth payments and credit in the U.S. banking system.

National Approaches to State Legal Structures

Lessons for Financing the NSDI

The New York Clearing House Association provides essential services to its members and indirectly the general public:

- Automates the processing of payment transactions by banks on behalf of their customers;
- Automates government processing using electronic payment processing
- Standardizes the accounting format, data and systems designs used by members and customers
- Enables large users to safely and securely process transactions by creating a cooperative organization to improve inter-user security and customer privacy
- Operates a shared system for coordinated transfers based on the trust of its member banks
- For almost 150 years, has directly involved the senior executives (Chair/President) of member banks to make sure that the Association's policies, operations and capital base would keep pace with the strategic planning and market shifts in the industry and the country
- In 1998, contributed CHIPS to a new company (CHIPCo) that will provide a more flexible governing structure for it under a board containing representatives of 10 CHIPS participants who are chosen to represent broad geographic diversity as well as Clearing House member banks

In an ironic way, the Spatial Data represented in maps resembles the gold bullion handling that led to formation of the Association in 1853. We are at the beginning of large volume transactions in Spatial Data among institutional, governmental and citizen users. Clearinghouse models for Spatial Data provide a valuable index of available Spatial Data thematically and regionally. However, the origins and evolution of the purposes and capacities of the New York Clearing House Association suggest that Spatial Data Clearinghouses have room to expand their missions, members and capital. It also shows the emergence of more inclusive company structures (CHIPCo) fitting the broad geographic

---

[470] New York Clearing House Association, *Rules, Regulations and Rulings of the New York Clearing House Association* (Revised to October 1, 1928).

diversity in which modern enterprises operate and are accountable.

Chapter A 19 Service Bureau Analogy: CUSIP® Securities Registration

Background of Need as Opportunity[471]

In 1962, after many informal discussions with members of the financial community, the New York Clearing House Association (**NYCH**)[472] established a Securities Procedures Committee to study the question of developing a standard method of identifying securities. This Committee concluded that a uniform securities identification system was feasible and timely and because of the magnitude of the problems to be solved and their far-reaching implications the development of the system should involve the cooperation and support of the entire financial community.

The Clearing House approached The American Bankers Association's Department of Automation to develop the system. In July 1964, the Bankers Association's Committee on Uniform Security Identification Procedures (**CUSIP**) was created under the chairmanship of John L. Gibbons (Chairman of the Trust Committee of Chemical Bank New York Trust Company).

The main goals of the CUSIP Committee were to

1. develop specifications for a uniform security identification system,
2. devise a self-identifying format for imprinting the identification number on the certificate in man/machine readable type font, and
3. establish an agency to administer the identification system according to specifications.

The CUSIP Committee appointed three subcommittees: The Technical Subcommittee to develop specifications, and Legal and Agency Subcommittees to implement the system.

Functional Role

The CUSIP System is the universally accepted industry standard for securities identification and descriptive information for over 4.1 million actively-traded domestic and international securities. Coverage includes: Certificates of Deposit (**CD**s), commercial paper, debt, equity, medium term notes, preferreds, rights offerings, shelf registrations, short term notes, future mortgage securities (**TBA**s), UITs, variable annuities, warrants and 144A securities.

CUSIP is the acknowledged industry standard for proper identification and description of corporate, municipal, government, mortgage-backed, private placement and non-North American numbers. With this system of universally accepted nine-character codes that simplify communicating and recording securities transactions, arbitragers, lenders, traders and portfolio managers:

- expedite transactions,
- automate front- and back-office operations,
- reduce clerical errors,

---

[471] Discussion taken from American Bankers Association, *CUSIP*, at http://www.aba.com/aba/ProductsandServices/PS_CUSIP.asp, and Standard & Poors, *What's CUSIP*, at http://www.cusip.com/cusipdesnew.htm, and

[472] See Chapter A 18.

- speed deliveries and transfers,
- lower their programming and storage costs,
- generate data on trading and blending activities useful for historic, security and institutional other purposes
- print out results of searches,
- enhance the pricing, bidding, sale, creation and securitization of risk-adjusted and optimized portfolios.

Use of Non-Governmental Organizations

CUSIP is a registration service for securities (1) overseen by the American Bankers Association (a trade association), and (2) administered under contract by Standard & Poors (a unit of Dow Jones & Company, which in turn is owned by McGraw-Hill Companies, Inc. (NYSE: MHP)).

Focused Underwriting & Quality Assurance Standards

For consistency, Standard & Poors' CUSIP Service Bureau assigns the CUSIP based on more detailed metadata information filed by securities issuers.[473] Because Standard & Poors often serves as credit rating agency for many of the securities tagged with CUSIP, this coding responsibility relies on Standards & Poors' historic comfort level in the financial industry and regulatory communities for impartiality, consistency and responsiveness.

The CUSIP 9-character numbering scheme is standardized and reflects the ***essential minimum metadata*** required to transact securities: (A) A 6-digit number identifying *the issuer* of the security (governmental unit vs. private corporation), (B) a 2 digit alphanumeric that represents *the type* of security they have issued (grouped by same maturity and rate), and (C) a single digit *checksum* to mathematically confirm correct electronic transmission of the CUSIP code.[474]

---

[473] See, *Request for Assignment of CUSIP Number*, at http://www.cusiprequest.com/.

[474] For the technical reader trying to picture how the CUSIP Numbering System works in practice, CUSIP's explanation (http://www.cusip.com/cusipdesnew.htm) appears below:

> **THE CUSIP NUMBERING SYSTEM**
>
> The CUSIP number consists of nine characters: a base number of six digits known as the issuer number, the 4th, 5th and/or 6th digit of which may be alpha or numeric and a two character suffix (either numeric or alphabetic or both) known as the issue number. The ninth character is a check digit which is described later.
>
> Issuer Number
>
> A single alphabetical file has been developed of corporate, municipal, and governmental issuers, and an issuer number of six digits has been assigned to each in alphabetical sequence. One number will be assigned to an issuer, except in those few cases where the issue numbers are not sufficient to accommodate all outstanding issues with their various rates and maturities, such as U. S. Governments and certain municipalities or states. In such instances, one or more additional issuer numbers will be assigned.
>
> *Gapping Factors:* Gapping factors have been incorporated throughout the numbering system to allow for future file expansion; these are described more fully below.
>
> *Provision for Overflow*: Issuer numbers (900 to 989 in each group of 1,000 numbers) have been reserved for overflow. These overflow numbers will be assigned in ascending sequence to any new issuer that cannot be accommodated at the proper alphabetical position in the preceding group of issuer numbers. Such names are always in a positively identifiable position as the number assigned will contain a 9 in the hundreds position.

Issuer Numbers Reserved for Internal Use: Issuer numbers (990 to 999 and 99A to 99Z in each group of 1,000 numbers) have also been reserved for the user's own purpose. This permits a user to assign an issuer number to any issuer which might be relevant to his holdings but which does not quality for coverage under the CUSIP numbering system. Other issuer numbers (990,000 to 999,999 and 990,00A to 999,99Z) are also reserved for the user so that they may be assigned to non-security assets or for other internal operating purposes. Thus, with the addition to at least two numeric digits in the issue number field, a minimum of three million numbers is available to the user for numbering internal miscellaneous assets.

The alphabetic character Z in the 5th and 6th position has been reserved for use by the Canadian Depository for Securities.

The Issue Number

The issue number uniquely identifies each individual issue of an issuer. (Each individual rate and maturity is considered a separate issue for numbering purposes.) The issue number consists of two numeric characters when assigned to equity securities and two alphabetic characters or one numeric and one alphabetic character when assigned to fixed income securities (this permits the user to differentiate between issues in the two groups).

Issue numbers are assigned in sequence as each issue is originated. However, in the setting up of the CUSIP numbering system and in the assignment of numbers to issues then in existence, numbers were assigned on the basis of rate and maturity and no consideration was given to the original date of issue.

Issue Numbers for Equity Securities: The first issue number for an issuer's equity securities is 10 (blanks in the issue number position indicate this is an issuer; in some cases only an issuer number has been assigned. As additional information is gathered, it will be added to the CUSIP file). The unit position of the equity number is used to identity rights, warrants and so on and is assigned on an as-available basis. When there are insufficient tens positions available for all individual issues, the necessary additional numbers are found through the use of the first open two-position digit in reverse sequence starting with 88 and assigned in descending order. (see illustration below) Issue numbers 00-09 are reserved for future use.

Options: Issue number 01 has been designated to identity options for an issuer.

Overflow Linkage: Issue Number 89 will be reserved for overflow linkage and will not be assigned to a specific issue.

Issue Numbers for Fixed Income Securities: The issue number assigned to an issuer's fixed income securities may consist of two alphabetic characters (AA etc.), one alphabetic character followed by one digit (A2 etc.), or one digit followed by one alphabetic character (2A etc.), assigned in that order. A separate issue number is assigned to each rate and/or maturity for each issue of bonds - thus a serial bond having 40 different maturities is assigned 40 separate issue numbers - but general obligations of a municipality having the same issue date, rate and maturity are normally assigned the same number regardless of purpose. The alphabetic letter "I" and numeric "1" as well as the alphabetic "O" and numeric zero are not used in the assignment of issue numbers to fixed income securities.

Overflow Linkage: Issue Number 9Z will be reserved for overflow linkage and will not be assigned to a specific use.

Issue Numbers Reserved for Internal Use: Issue Numbers 90 through 99 in the equity group, and 9A through 9Y in the fixed income group, are reserved for the user specifically for assignment to those issues of an eligible issuer where no CUSIP issue number has been assigned.

ILLUSTRATION OF THE ASSIGNMENT OF CUSIP ISSUE NUMBERS

Issuer Number Issue Number

ABC RAILROAD CORP 003761

Equity Issues

Com.....10

RT.....11

PFD 5% 20

PFD 3.75%.....30

PFD 1st Ser 6%... 40

PFD 2nd Ser 6%... 50

CL A..... 60

PFD Ser A Conv 5% 70

PFD Ser B Conv 5%..... 80

PFD $3.50.....88

PFD 7.24%.....87

Fixed Income Issues

1st Cons Mtg 4% 10/01/1999..... AA

Sub Income Deb 5.25% 11/15/2000. AB

Sub Deb Conv 4.75% 06/01 /2005.....AC

Equlp Tr Ser 70 7.75% 08/01 /2008 ...AD

Equip Tr Ser 72 7.00% 11/01/2010.....AE

CHECK DIGIT

In data transmission, when accuracy of the number may represent the only means of identification, the use of a check digit becomes mandatory as it provides the means of mathematically determining the accuracy of the whole number transmitted. For this reason it is necessary to use the full nine digits of the CUSIP code.

A check digit based on the Modulus 10 Double Add Double technique will be assigned to each CUSIP security number. Modulus 10 was selected over the other systems because it provides the greatest degree of reliability without the loss of any available numbers.

The illustrations below will clarify the manner of calculation of a Modulus 10 Double Add Double check digit.

Illustration 1

Issuer Number 837649 Issue Number 12

8 3 7 6 4 9 1 2

x 1 x 2 x 1 x 2 x 1 x 2 x 1 x 2

--- --- --- ---- --- --- --- ---

8 6 7 12 4 18 1 4

Thus, 8 + 6 + 7 + 1 + 2 + 4 + 1 + 8 + 1 + 4 = 42

The complement of the last digit of the sum becomes the check digit. The complement of 2 is 8; therefore, the CUSIP number with optional check digit would appear as 837649 12 8

In the calculation of the check digit, alphabetic characters will be assigned a numeric value. The letter A

This "pointer" concept is the important CUSIP philosophy: CUSIP does not directly describe every aspect of a security (i.e., its interest rate, term, collateral, payment priority etc.) CUSIP supplies just enough information to permit issuers, investors, credit rating agencies and regulators to contact the CUSIP Servicing Agent (Standard & Poors) to fully identify, price, index, exchange and transact the security.

Leveraging Private Funds

The operation of the CUSIP numbering system is controlled by the CUSIP Board of Trustees. Through the work of the CUSIP Legal and Agency Subcommittees, the CUSIP service functions were outlined and Standard & Poor's was awarded the contract to function as the CUSIP Service Bureau, the operational arm of the system, which is responsible among other functions for the compilation and publication of the CUSIP Directory.[475] The American Bankers Association owns the

---

will be 10; and the value of each subsequent letter will be the preceding letter's value incremented by 1. Normally, validation of the number would be made internally within a computer, using a relatively simple program.

Illustration 2

Issuer Number 392690 Issue Number QT

3 9 2 6 9 0 26(Q) 29(T)

x 1 x 2 x 1 x 2 x 1 x 2 x 1 x 2

---- --- --- --- --- --- ---- ----

3 18 2 12 9 0 26 58

Thus, 3 + 1 + 8 + 2 + 1 + 2 + 9 + 0 + 2 + 6 + 5 + 8 = 47; the complement of 7 is 3, and the CUSIP number with check digit would appear 392690 QT3

To avoid confusion, the fixed income issue number assignments have omitted the alphabetic "I" and numeric "1 " as well as the alphabetic "O" and numeric zero. However, in the check digit computation described above, the value of "Z" is 35.

A check digit has also been computed for Issuers assigned a six character issuer number.

Alpha characters and their equivalent numerical values

Alphabetic characters are assigned a numeric value. The letter A will be 10; and the value of each subsequent letter will be the preceding letters value incremented by 1:

A = 10 F = 15 K = 20 P = 25 U = 30 * = 36 (PPN System)

B = 11 G = 16 L = 21 Q = 26 V = 31 @ = 37 (PPN System)

C = 12 H = 17 M = 22 R = 27 W = 32 # = 38 (PPN System)

D = 13 I = 18 N = 23 S = 28 X = 33

E = 14 J = 19 O = 24 T = 29 Y = 34

Z = 35

[475] See, *Who Controls the CUSIP Numbering System?*, at http://www.cusip.com/cusipdesnew.htm. CUSIP's Board of Trustees reflects broad representation from users of the system (securities traders, underwriters and service groups):

Name	Position	Organization	City	State
Janet Potter	Vice President and Manager	Union Bank of California N.A.	San Francisco	California.
Richard Betts	Vice President	Bank of New York	New York	New York
Mary Ann Callahan	Senior Vice President	International Depository & Clearing Inc.	New York	New York
Jerome J. Clair	Senior Vice President	Smith Barney Inc.	New York	New York

CUSIP trademark (brand).[476]

The CUSIP Numbering System's data is disseminated by Standard & Poors on a fee for service basis.[477]

Facilitating Tax, Guarantee & Regulatory Environment

The CUSIP System is so reliable and ubiquitous as a tool for tracking securities that the Federal Reserve Bank of New York requires that CUSIP numbers be part of the Reserve Bank's Custody Agreement for Book-Entry Securities deposited by state and local governments as pledgees.[478]

National Approaches to State Legal Structures

As the primary point for the identification of securities issued in the United States and abroad, CUSIP transcends state and even country barriers, facilitating an open market to price and trade securities internationally. CUSIP numbers and standardized descriptions are used by virtually all sectors of the financial industry,[479] and are critical for the accurate and efficient clearance and settlement of

Michael J. Gardienier	Vice President	U.S. Securities Services Operations	New York	New York
John H. Haynie	Senior Managing Director – Operations	Interstate/Johnson Lane Corporation	Charlotte	North Carolina
Ronald Kessler	Corporate Vice President Assistant Director of Operations	A.G. Edwards & Sons Inc.	St. Louis	Missouri
Vincent Mauro	Vice President	Depository Trust Company	New York	New York
Frank McGinnis	Senior Vice President	U.S. Clearing Corporation	New York	New York
Raymond O'Sullivan	Senior Vice President	Roosevelt & Cross Inc.	New York	New York.
Ernest Pittarelli	Managing Director of Operations	UBS Securities Inc.	New York	New York.
Jeffrey Powell	Senior Vice President	Reliance Trust Co.	Crystal Lake	Illinois
Sidney Watt Jr.	Vice President Securities Operations Division	State Street Bank & Trust Company	North Quincy	Massachusetts
William Wingfield	Senior Vice President	SunTrust Bank	Atlanta	Georgia

[476] See, http://www.cusip.com.

[477] See, *Services offered by the CUSIP Service Bureau*, at http://www.cusip.com/prodsvcs.htm.

[478] Federal Reserve Bank of New York, *Custody Agreement for Book-Entry Securities*, Circular 10914, Appendix D to Operating Circular No. 21 (effective February 1, 1997), http://www.ny.frb.org/bankinfo/circular/10914.html.

[479] The CUSIP numbering system has been endorsed by all major segments of the financial community including:

American Bankers Association
American Stock Exchange
Canadian Depository for Securities Ltd.
Depository Trust Company
Midwest Stock Exchange
Government Finance Officers Association of the U.S. & Canada
Municipal Securities Rulemaking Board
National Association of Securities Dealers

securities as well as back-office processing and sophisticated portfolio, arbitrage, hedging and index modeling.

Lessons for Financing the NSDI

CUSIP is an electronic shortcut tool for identifying bonds, stocks and other securities that are traded on the international stock and other exchanges and in private transactions. Without CUSIP, traders and banks would be forced to reference long files of metadata to describe the securities they intend to buy, sell, option or accept as collateral. With CUSIP, there is certainty as to the exact security that is the subject of a given transaction.

FGDC's metadata specifications are slowly becoming integrated into the data development practices of Spatial Data users. Spatial Data is updated regularly. A "shortcut" for referencing Spatial Data available on a specific date from a given source, whose metadata is sufficient to disclose to the user the quality of data on file, would contribute to accelerating transactions in Spatial Data.

In financing development of Spatial Data, investors and lenders might take comfort in a CUSIP-like system to be assured that they have and can prove an ownership or collateral security interest in a uniquely identified set of Spatial Data. The same number would accelerate creating a financial market for swapping ownership or collateral/pledged interests in Spatial Data.

Most users rely on a mixture of Spatial Data developed from multiple sources. In this regard, Spatial Data is like a portfolio of bonds and stocks chosen and optimized for their unique and complementary characteristics in adding to the overall reliability, accuracy and completeness in describing a Region's characteristics. In the wake of Y2K data interdependency issues, for IT professionals trying to balance and diversify the sources and types of Spatial Data underlying their business processes, a CUSIP-like, self-identifying moniker for Framework data would permit development of "data portfolio" analytics that more accurately compare the value of one source of Spatial Data with another, and automate replacement of the initial source where appropriate.[480] Spatial Data descriptors (like those returned through OpenGIS' Get Catalogue Specification)[481] may be exploitable to achieve such optimizing portfolio approach for users focused on thematically similar decision support needs (environmental, healthcare, transportation, real estate).

National Association of Variable Annuities
National Securities Clearing Corp.
New York Stock Exchange
Philadelphia Depository Trust Company
Philadelphia Stock Exchange
Public Securities Association
Securities and Exchange Commission
Securities Industry Association

See, *Who Endorses the CUSIP Numbering System?*, http://www.cusip.com/cusipdesnew.htm.

[480] Compare, bond portfolio analytic packages that use CUSIP, for instance Bridge Fixed Income Services' BondPage Product, at http://www.ejv.com/whatsnew.html.

[481] OpenGIS Consortium, *Breakthrough in Web-Based Geographic Information*: *OpenGIS Web Mapping Testbed Demonstration Declared Successful* (September 10, 1999), http://www.opengis.org/wmt/press_release.htm.

Chapter A 20 Service Bureau Analogy: SABRE Reservations System

Background of Need as Opportunity[482]

American Airlines' first pioneering effort with reservations was the "request and reply" system used in the 1930s. A reservations agent would telephone the central control point where inventory was maintained to inquire about space available on a flight, and a response would be returned via teletype.

Through the mid-1940s reservations were recorded manually with a pencil on different colored index cards, nicknamed "Tiffany" cards after the jeweler's famous 18th century lamps with the colored glass shades. These cards were arranged in a "lazy Susan," and flights were controlled by half a dozen employees sitting around a table spinning the lazy Susan for index cards that would correspond to particular flights. By counting the pencil marks on each card, a clerk at the reservations center could give a "yes" or "no" to a request for a seat.

In some reservations offices, a wall-sized status board was installed to display seat space available on each flight. The board summarized much of the information on the index cards in the lazy Susan. As new reservations came in, workers at the table passed the information to board workers who removed seats from a particular flight until no seats remained.

Using the Tiffany system to complete a booking for a round-trip reservation from New York City to Buffalo required 12 different people performing *more than a dozen separate steps during a three-hour period -- longer than the flight itself!*

American developed the industry's first electrical/mechanical device for controlling seat inventory in 1946. It was called the *Availability Reservisor*, and it applied basic computer file technology to the task of tracking American's seats and flights. Even though it could not sell the seat or cancel a reservation, the system represented a milestone in adapting electronics to airline reservations.

By 1952, the Airline had added basic computer file technology -- a random access memory drum and arithmetic capabilities to the Reservisor. With the *Magnetronic Reservisor* a reservations agent could check seat availability and automatically sell or cancel seats on the electronic drum. As advanced as the Magnetronic Reservisor was for its time, the airline reservations process was still intensely manual.

In 1953, a chance meeting of two Mr. Smiths on an American Airlines Los Angeles-to-New York flight resulted in the development of a data processing system that would create a complete reservation and make all the data available to any location throughout American's system. The outcome of the conversation between C.R. Smith, American Airlines' president, and R. Blair Smith, a senior sales representative for IBM, was the 1959 announcement of a ***S***emi-***A***utomated ***B***usiness ***R***esearch ***E***nvironment -- better known today as the **SABRE** system. American's initial research, development and installation investment in this system was almost $40 million.

By 1964, the telecommunications network of the SABRE system extended from coast to coast and from Canada to Mexico. At the time, it was the largest, private real-time data processing system -- second only to the U.S. government's.

Functional Role

In 1963, the first SABRE system was installed in Briarcliff Manor, New York. The mainframe system

---

[482] Discussion taken from *The History of the SABRE System*, at http://www.sabre.com/corpinfo/history.htm.

was state-of-the-art technology in its time and processed 84,000 telephone calls per day.

The system has evolved, and today's system can handle over 20 million equivalent calls, which are now processed electronically. That reservation system has grown to a network of over 30,000 travel agencies, 3 million online consumers and numerous corporations accessing real-time travel information, 24 hours a day, 7 days a week, 52 weeks a year.

To run this massive reservation system, American Airlines claims to have built the world's largest privately-owned computer system in Tulsa, Oklahoma. Today, The SABRE Group owns and manages this system as well the next generation systems used throughout the AMR organization (AMR is the corporate parent of American Airlines). More recently, The SABRE Group has won outsourcing contracts to supply its business process automation expertise to the airline and other industries, leveraging the financial investment in its technological infrastructure.

The SABRE Group operates one of the world's largest privately owned, real-time computer systems. The vast SABRE network links over 130,000 terminals located in travel agencies, as well as many more privately owned personal computers, and has sent up to 190 million messages per day to the central data center located in Tulsa, Oklahoma. The data center is composed of 17 mainframe computers with over 4,000 MIPS of processing power and 15.3 terabytes of electronic storage

Over the years, American Airlines has also rapidly deployed leading edge technology in its airline operations. Technology is used as a competitive advantage in reducing costs through improved scheduling and efficient flight operations, and increasing revenue through yield management, flight planning and marketing programs. These planning and decision support systems have been sold to other airlines forming the foundation of The SABRE Group's Information Technology Solutions business.

What began as a system for American Airlines to keep track of seats sold on its flights has evolved into "an electronic travel supermarket used by travel professionals, corporations and consumers worldwide to book airline, car and hotel reservations as well as to order theater tickets, bon voyage gifts, flowers and other travel-related goods and services."

The introduction of *easySABRE* in 1985 allowed consumers using personal computers to tap into the SABRE system to access airline, hotel and car rental reservations. Today, the Internet product for online consumers, *Travelocity* is The SABRE Group's leading edge "direct retail" solution for this rapidly growing market.

In 1996, *SABRE Business Travel Solutions* was introduced to the corporate market and is expected to revolutionize the way that large corporations plan and manage their travel expenditures.

Use of Non-Governmental Organizations

In May 1976, American installed its first SABRE unit in a travel agency. By the end of the decade, the system connected to more than 1,000 travel agency customers. Today, nearly 200,000 computers in more than 70 countries on six continents are connected directly to the SABRE system.

Focused Underwriting & Quality Assurance Standards

The SABRE System tracks flights, hotel rooms, cruise ship berths and other offerings. Through The SABRE Group's global distribution system more than 30,000 travel agencies, 3 million registered individual consumers and numerous corporations access information on and book reservations with more than 400 airlines, more than 50 car rental companies, 35,000 hotels, and dozens of railways, tour companies, passenger ferries and cruise lines located throughout the world.

The SABRE Group also provides a comprehensive suite of decision-support systems, software, and consulting services to the travel and transportation industry, and is increasingly leveraging its

expertise to offer solutions to companies in other industries that face similar complex operational issues.

Leveraging Private Funds

The SABRE Group has been managed as an independent division of AMR Corporation (the owner of American Airlines) since 1993, when AMR combined the information technology units of American Airlines under the umbrella "The SABRE Group." In June 1996, The SABRE Group became an independent legal entity. In October 1996, 18% of the equity of The SABRE Group was sold in an initial public offering (IPO) that raised nearly $500 million (valuing the Group at $2.77 billion); the remaining 82% of the company remains under AMR (American Airlines parent corporation's) control. The current market valuation of The SABRE Group's publicly-held shares (not including AMR's 82% and the dilution of outstanding warrants) is $5.8 billion.[483]

An estimated $40 billion in travel products and services is purchased through the SABRE system each year. 60% of The SABRE Group's revenues come from distribution of electronic travel information content, and 40% come from providing information technology solutions,[484] suggesting that a content provider can become an IT solutions provider as it deploys and aggregates its proprietary content.

Facilitating Tax, Guarantee & Regulatory Environment

The underlying technology for SABRE came from the declassified SAGE: Semi-Automatic Ground Environment, an air-defense project made available for commercial use. SAGE (a technological response by the U.S. military to the Cold War) gave birth to the technologies that enabled interactive, real-time computing that were put to use on the SABRE project.[485]

The technology edge and practical experience of The SABRE Group has been tapped by the FAA regularly to improve the safety and function of airports and flights paths.[486]

---

[483] SmartMoney.Com, (September 13, 1999), at http://www.smartmoney.com/si/tools/eqsnaps/index.cfm?story=snapshot&symbol=TSG&fk=6043.

[484] Securities & Exchange Commission, The SABRE Group: Form 10-Q (for quarterly period ended June 30, 1999), at http://www.edgar-online.com/bin/edgardoc/DocFrame.pl?doc=A-1020265-0001020265-99-000007&fmt=text&nad=&nav=&x=50&y=17.

[485] See, *SABRE Takes Off* (COMPUTERWORLD, March 22, 1999), at http://www2.computerworld.com/home/print.nsf/all/99032297CA.

[486] See, *FAA Systems Architecture & Investment Analysis*, http://www.faa.gov/opsresearch/coeact.htm:

> "The [FAA's] Center of Excellence (COE) research activities focus on the development of computer simulation and optimization models that enhance the capacity and safety in the National Airspace System (NAS). COE currently provides the FAA with expertise in the areas of Air Traffic Control (ATC) Systems integration, human factors in aviation, simulation and optimization model development, and aviation safety modeling. ….
>
> SIMMOD Improvements and Maintenance
>
> Under this project, the Center will assume responsibility for providing further development and support for the FAA Airport and airspace Simulation Model (SIMMOD). The research will include the development of new functions useful in the conduct of airport and airspace simulation studies, the provision of technical support to SIMMOD users, the development of standards for conducting and reporting SIMMOD studies, and provision of an archive of SIMMOD data sets. The Center will undertake this activity in conjunction with two of its industry partners, ATAC and SABRE Group. As part of the user support activities, the Center will form and manage a North American SIMMOD Users Group, in close coordination with the European SIMMOD Users Group. Enhancements to the model

National Approaches to State Legal Structures

Airport authorities, railroads, logistical service providers, lodging companies, oil and gas companies and leaders in the financial services industry are all customers of The SABRE Group. SABRE's importance to the competitiveness of domestic flights to Europe is so important that antitrust action to open European computerized reservation systems to SABRE has been taken by the European Commission.[487]

Lessons for Financing the NSDI

SABRE evolved from one airline's own commercial need to better inventory, price and fill its passenger seats, schedule flight crews, dispatch airplane maintenance and meals, and to cross-market additional travel and other services to passengers. In that respect, SABRE represents an early example of business process reengineering with the help of computers.[488]

SABRE standardized the processing of passenger bookings for competing air, rail and other travel services. Competitors focus on improving services, not on the process of making a reservation or disseminating changes in their flight schedules and fares to travel agents and travel Portals like Priceline.Com and SABRE's own Travelocity.Com. Clearly, this evolution has made travel easier for travelers and increased the productivity of the travel industry.

The NSDI could benefit from an equivalent of The SABRE System. Users and suppliers of Spatial Data still lack a focused transactional mechanism or set of mechanisms identified by a single brand name[489] representing an efficient, logistical support system that has the trust of competing data suppliers and consumers. SABRE fills that back-office niche of generating and disseminating metadata on travel schedules and pricing, and bundling it with software applications (demand-load, fleet maintenance and other decision support required industry-wide).

A similar fulfillment operation to compile and disseminate alternative sources of Spatial Data and metadata, cleaning both the data and metadata in the process, would increase the transactional standardization of the NSDI. This mechanism would relieve government and private Spatial Data sources from some of the burdens of generating metadata – costs now seen as public goods, yielding insufficient return on investment. Housing this mechanism in a Spatial Data dissemination or access portal would provide sufficient incentive to the private sector (or a public-private partnership) to incur the cost of cleaning, supplementing and confirming metadata as a "market-driven information commodity."

Finally, SABRE proves a few truths for forming IRM partnerships:

- Seek civilian uses for advanced military and intelligence technologies (SAGE),

---

will be made to the fuel burn post-processor, weather modeling as it affects airspace logic, inclusion of workload metrics, and changes to ground control algorithms."

[487] Testimony Of Andrew B. Steinberg (Senior Vice President, General Counsel And Corporate Secretary The Sabre Group, Inc., Fort Worth, Texas) Before The Antitrust Subcommittee Of The Senate Judiciary Committee (October 2, 1998), http://www.senate.gov/~judiciary/abstein.htm.

[488] Clearly, feedback from the users of the SABRE system was key to its functional design, testing, documentation and ultimate acceptance and success in an era (1960s) when programming in assembler language with limited mass storage and instruction length was the norm. See, *Making SABRE Fly: An Interview with Cliff Taylor* (COMPUTERWORLD, March 22, 1999), at http://www2.computerworld.com/home/news.nsf/all/9903221960a.

[489] LEXIS-NEXIS (Chapter A 15), MEDLINE (Chapter A 16), VISA (Chapter A 17), and CUSIP (Chapter A 19) all established commanding Brand name presence in their industry as trusted sources of data and metadata.

- Confirm that end users need and understand the technology and its functional and ergonomic requirements as early and continuously as possible, and
- Find inspired leaders from the user/customer and technology/vendor/developer to head teams that understand building technology within a financially defensible budget and timeframe.

Chapter A 21 Service Bureau Analogy: Universal Code Council's UPC Bar Coding

Background of Need as Opportunity[490]

Up until the early 1970s, grocery chains and other chain stores individually assigned product code numbers to various goods offered for resale. Back in 1932, Wallace Flint first suggested using codes to create an automated retail checkout system. 40 years later, Flint, as vice-president of the National Association of Food Chains, supported efforts that led to the Uniform Product Code (**UPC**).

Several code formats were developed in the 1940s, 1950s, and 1960s, including a bull's-eye code, numeral codes, and various formats of bar codes. Serious efforts toward automating supermarket point-of-sale started in the late 1960s, and beginning in 1972 a Kroger grocery store in Cincinnati operated using a bull's-eye code.

Meanwhile, the grocery industry formed a committee to select a standard code to be used across the industry. Proposals were solicited from various interested parties, and on April 3, 1973, the committee selected the UPC symbol (based on a proposal from IBM) as the industry standard.

The success of the system since then has spurred the development of other bar coding systems for multiple participants of the information provided via the standardized bar coding platform:[491]

Functional Role

The Universal Code Council, Inc. (the **Code Council**) registers products' UPCs (bar codes), disseminates these UPC codes and works to find new ways to encourage the use of EDI (Electronic Data Interchange). UPCs are registered only for members of the Code Council.

As automated inventory, payment and shipping systems have advanced, bar codes have become even more prevalent in our society. Most retail stores, from supermarkets to hardware stores, use bar codes. The bar code is used in many industrial and military applications as well to improve inventory control, track component manufacturing and confirm quality assurance programs. Given

---

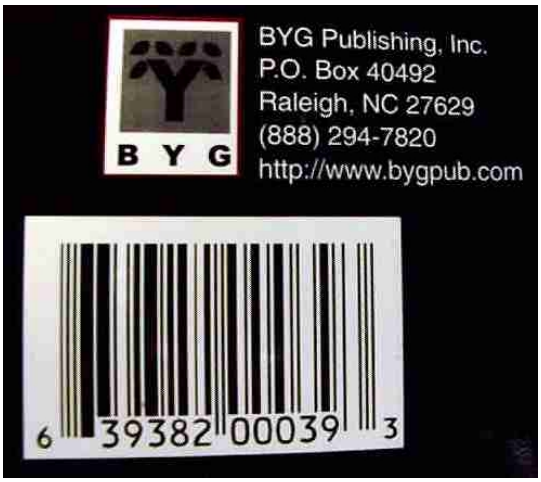
490 Discussion taken from *Universal Code Council, Inc. History Timeline*, at http://www.uc-council.org/about_ucc/uc_history_timeline.html, and Warren Hagey, *The History of Bar Codes*, at http://educ.queensu.ca/~compsci/units/encoding/barcodes/history.html.

491 Graphic from Uniform Code Council, *Business Model*, at http://www.uccnet.org/uccnet_business_model.htm.

this ubiquitous utility,[492] software to generate and manipulate bar codes has come from companies like IBM, TAL Technologies, RiversEdge, and Bar Code Pro.

A detailed explanation of the Bar Code follows:[493]

> UPCs originate with the Uniform Code Council. A manufacturer applies to the Code Council for permission to enter the Universal Product Code (**UPC**) system. The manufacturer pays an annual fee for the privilege. In return, the Code Council issues the manufacturer a 6-digit **manufacturer identification number** and provides guidelines on how to use it. You can see the manufacturer identification number in any standard 12-digit UPC code, like this one that comes off the back of the book *The Teenager's Guide to the Real World* by BYG Publishing:



The UPC symbol has two parts: 1) the machine-readable bar code, and 2) the human readable 12-digit UPC number. BYG Publishing's manufacturer identification number is the first 6 digits of the UPC number - 639382. The next 5 digits - 00039 - are the **item number**. Each manufacturer hires a **UPC Coordinator** who is responsible for assigning item numbers to products, making sure the same code is not used on more than one product, retiring codes as products are removed from the product line, etc. In general, every item the manufacturer sells, as well as every size package and every repackaging of the item, needs a different item code. So a 12-ounce can of Coke needs a different item number than a 16-ounce bottle of Coke, as does a 6-pack of 12-ounce cans, a 12-pack, a 24-can case, and so on. It is the job of the UPC coordinator to keep all of these numbers straight!

The last digit of the UPC code is called a **check digit**. This digit lets the scanner determine if it scanned the number correctly or not. Here is how the check digit is calculated for the other 11 digits, using the code 63938200039 from *The Teenager's Guide to the Real World* shown above as an example:

- Add together the value of all of the digits in odd positions (digits 1, 3, 5, 7, 9 and 11). So 6 + 9 + 8 + 0 + 0 + 9 = 32.
- Multiply that number by 3. So 32 * 3 = 96.
- Add together the value of all of the digits in even positions (digits 2, 4, 6, 8 and 10). So 3 + 3 + 2 + 0 + 3 = 11.
- Add this sum to the value in step 2. So 96 + 11 = 107.

---

[492] Warren Hagey predicts that as newer technologies for EDI are developed, we may eventually see a disappearance of bar codes as we know them today, but for the present time bar codes are alive and well. See, Warren Hagey, *The History of Bar Codes*, at http://educ.queensu.ca/~compsci/units/encoding/barcodes/history.html.

[493] Illustrations and discussion taken and revised from Marshall Brain, *How Stuff Works: How UPC Bar Codes Work* (1998) at http://howstuffworks.com/upc.htm.

- Take the number in Step 4. To create the check digit, determine the number that, when added to the number in Step 4, is a multiple of 10. So 107 + 3 = 110, and the check digit is therefore 3.

Each time the scanner scans an item, it performs this calculation. If the check digit it calculates is different from the check digit it reads, the scanner knows that something went wrong and the item needs rescanning.

There is no price information encoded in a bar code. When the scanner at the check out line scans a product, the cash register sends the UPC number to the store's central POS (Point of Sale) computer to look up the UPC number. The central computer sends back the actual price of the item at that moment. This approach allows the store to change the price whenever it wants, for example to reflect sale prices. If the price were encoded in the bar code, prices could never change. [This means that customers must be vigilant to make sure that stores have updated and correctly marked their scanner prices. Some stores are notorious for deliberately failing to update or correctly assign prices].

Big manufactures have manufacturer IDs with lots of zeros in them. For instance:

Post - 043000

General Mills - 016000

Del Monte - 024000

Quaker Oats - 030000

Here is the bar code from a 3-liter bottle of Diet Coke, showing that Coke's manufacturer ID is 049000. However, if you look at can of Coke or most 2-liter bottles, you will find that the UPC code is much shorter - only 8 digits total.

Here's the bar code from a 2-liter bottle of Sprite.

These short bar codes are called **Zero-Suppressed Numbers**. There's a set of rules around forming zero-suppressed numbers from full numbers, but the basic idea is to leave out a set of four digits, all zeros. In the case of the Sprite UPC code, the 049 at the beginning is the first three digits of Coke's 049000 manufacturer ID. The 551 is the item number for this bottle of Sprite, shortened from 00551. The zero in the second-to-last digit is the fourth digit from Coke's manufacturer ID. The final digit is the normal check digit. The main reason for having zero-suppressed numbers is to create smaller bar codes for small product packages like 12-ounce cans.

The first digit of the manufacturer's identification number is special. It is called the **Number System Character**. The following table shows you what different number system characters mean:

0 - standard UPC number. Must have a 0 to do zero-suppressed numbers.

1 - reserved.

2 - random weight items like fruit and vegetables, meats, etc.

3 - pharmaceuticals

4 - in-store marking for retailers. A store can set up its own codes, but no other store will understand them.

5 - coupons

6 - standard UPC number.

7 - standard UPC number.

8 - reserved.

9 - reserved.

Here is an example of a pharmaceutical bar code (number system character 3), this one from a 4 ounce bottle of Selsun blue dandruff shampoo:

Use of Non-Governmental Organizations[494]

The history of the UPC and the Code Council traces the evolution of business processes and management philosophy aimed at improving the efficiency and reducing the cost of retail transactions, inventory management and warehousing risk and costs:

Stage 1: Single Industry Technology Collaboration

1969 Members of the Grocery Manufacturers of America and the National Association of Food Chains meet to express a need for an "inter-industry product code."

1970 The Ad Hoc Committee on a Uniform Grocery Product Code convenes for the first time and agrees to jointly pursue a uniform grocery product identification code.

1972 The first Board of Governors meeting for the Uniform Grocery Product Code Council (**UGPCC**) is held in Chicago. The UGPCC will administer the new Universal Product Code (**UPC**).

1972 Over 100 manufacturers and 84 retailers have joined the UGPCC.

1973 The design of a linear bar code is chosen as the Universal Product Code symbology.

1974 The Uniform Grocery Product Code Council becomes the Uniform Product Code Council (**UPCC**) recognizing the ubiquitous future for bar code enabled applications.

1975 Over 3,000 companies are members of the UPCC.

1976 The UPCC membership is now at 4,720 members and growing at the rate of 300-400 new members per year. There are 106 stores scanning UPC symbols nationwide.

Stage 2: Early Internalization Efforts

1977 The European Article Numbering Association (**EAN**) is chartered in Belgium. Its EAN-13 code is developed to be fully compatible with the UPC

---

494 Discussion taken from *Universal Code Council, Inc. History Timeline*, at http://www.uc-council.org/about_ucc/uc_history_timeline.html.

1981 Interleaved 2-of-5 (**ITF**) symbology is adopted for shipping containers.

Department of Defense boosts the industrial application of barcode on September 1, 1981 when it adopts the use of Code 39 for marking all products sold to the United States military.[495]

Stage 3: Pre-Digital Economy Enabling Period

1983 UPCC agrees to administer the Uniform Communications Standards (**UCS**). UCS is an electronic data interchange (**EDI**) standard that permits computer to computer ordering and invoicing for the grocery and public warehousing industries.

1984 To reflect the administration of the new UCS standards, the Uniform Product Code Council (UPCC) becomes the Uniform Code Council, Inc. (the **Code Council**) recognizing the growing use of codes for electronic commerce.

1987 The Code Council agrees to administer both the Voluntary Inter-industry Commerce Standard (**VICS**) EDI and the Warehouse Information Network Standard (**WINS**) EDI standards.

1988 The Code Council becomes the management and administrative body of VICS EDI.
1988 The Code Council, in coordination with EAN, endorses Code 128 to encode supplementary information on dispatch units.

1989 The Code Council's Board of Governors formally approves The Code Council/EAN-128 for use with serialized shipping containers.

Stage 4: Formal Standardization

1990 The Code Council and EAN sign a cooperative agreement formalizing their intent to co-manage global standards.

1993 The International Data and Application Standards Committee (**IDASC**) is formed as a joint technical committee between EAN and The Code Council, signaling a major commitment toward the global coordination of standards. The Code Council becomes a member of both the American National Standards Institute (**ANSI**) and the Information Systems Standards Board (**ISSB**).

1994 The Code Council is officially accredited as a Standards Development Organization (**SDO**) by ANSI.

1995 There are now more than 145,000 The Code Council members, representing many industries around the world. The Code Council and the EAN form the Global Policy Committee (GPC) to advise the governing boards on global strategy and cooperation. Global EDI (GEDI) is initiated as a joint effort between UCS and VICS.

1996 Three joint projects are initiated between the EAN and the Code Council: Tec-Core, App-Core, and Trans-Core. ISO/TEC JTCI/SC31 is convened for the first time to focus on global standardization for data carrier symbologies, data content structures, and conformance. The Code Council agrees to serve as Secretariat. The Code Council Board of Governors formally accepts Standard Interchange Language (**SIL**) as a Code Council standard and authorizes its support and maintenance by the SIL Standards Maintenance Committee.

---

[495] National Association of Computerized Tax Processors, *2-D Barcoding Standards Guidance (Final Draft)*, at http://www.taxadmin.org/fta/edi/2-d/2-DStandards.html#Background.

1997 There are now over 200,000 Code Council member companies in 141 countries around the world. James J. Muenz, EDI Technical Director for the Code Council is awarded the prestigious Edward A. Guilbert Professional Award by Data Interchange Standards Association for his leadership in pioneering EDI standards for the grocery industry. The first joint meeting of the EAN Management Board and the Code Council Board of Governors occurs in Chicago. The beginning of a new age of global standardization is noted. The Code Council announces that retailers in North America must be able to scan 13 digits by January 1, 2005. Expansion of the databases to 14 digits is encouraged.

1998 The Code Council announces the initiation of a proof-of-concept project for the development of a universal foundation for electronic commerce, called **UCCnet**. The UCCnet is envisioned to span all industries and geographics regardless of company size and offer its participants an open, standards-based Internet trading community. The Code Council announces its support of RossettaNet, a global initiative to adopt common business processes created to advance IT supply chain interaction world-wide. The Voluntary Interindustry Commerce Standards Association (**VICS**) announces at its VICS Board of Directors meeting that the Uniform Code Council will become its Secretariat effective November 1, 1998. Code Council and EAN International jointly announce specifications for a new class of symbology for space constrained products. Reduced Space Symbology and Composite Symbology capture more information in less space.

Focused Underwriting & Quality Assurance Standards

As an EDI standards organization, the Code Council is responsible for code assignment and dissemination. Thus, the Code Council is responsible for anticipating, debating and promulgating commercially meaningful standards, and for building the operations and systems support required by its members, to take full advantage of such Electronic Commerce.

Leveraging Private Funds

The Code Council is a non-profit membership organization. In addition, the Code Council has the ability to prototype its standards prior to implementation in the Code Council's own operations facility.

Facilitating Tax, Guarantee & Regulatory Environment

In Global Collaboration, the American Code Council has forged cross-border EDI linkages with ANSI, EAN, IDASC, ISO, VICS and other major standards and industry technology organizations.

The bar code has yielded some unanticipated benefits for local government: The accuracy and amount of State and city sales tax collections have improved by reason of UPC Digital file information maintained by major chain stores, and state tax collectors are moving to apply bar coding to tax forms.[496]

---

[496] Federation of Tax Administrators, *Auditing Electronic Data: A Report of the Steering Committee Task Force on EDI Audit and Legal Issues for Tax Administration* (January 1997), at http://www.taxadmin.org/fta/ftapub.html, and National Association of Computerized Tax Processors, *2-D Barcoding Standards Guidance (Final Draft)*, at http://www.taxadmin.org/fta/edi/2-d/2-DStandards.html#Background.

National Approaches to State Legal Structures

State-specific issues relating to resale of Point of Sale (**POS**) information about customer purchasing habits, Bar code scanner pricing mistakes and other initiatives have benefited from the Code Council's oversight of the Technology foundation. Y2K readiness of the Grocery Industry and remediation were accelerated by the Code Council's credibility to broker technology awareness and solutions to national chain stores. The Code Council has also served as expert Technology witness to Congress and State legislative bodies.

Lessons for Financing the NSDI

In its simplest form, the ubiquitous bar code is a cheap way to self-identify and code the manufacturer and item description of thousands of COTS (Commercial Off The Shelf) products that are marketed through the national and international economy's retail and wholesale supply channels. The Code Council now clearly communicates its mission and message to direct and indirect private sector users and beneficiaries.

That the bar code is assigned through a non-profit membership organization, supports EDI and serves to pave the way for export of products with the UPC is noteworthy. In this respect, the bar code serves as its own language – not English, French or Japanese. The UPC represents an internationally exchangeable reference for thousands of products destined for international trade – sparing all in the supply chain (manufacturer, exporter, importer, distributor, wholesaler, retailer, bank, freight forwarder, customs agent, warehouser or factor providing inventory and trade credit and even customer) the uncertainty and delay of translating references to the desired products, improving the efficiency of price comparisons and accelerating trade.

Like the CUSIP Code for Securities (Chapter A 19), the UPC is maintained and assigned centrally. Both the UPC bar code and CUSIP are "light-weight" coding solutions modeled around the generic aspects of (1) Producer, (2) Item Class and (3) Item number. In this regard, the Framework layers and the metadata standards thus far developed to assure quality access to compliant Spatial Data will benefit from ongoing evolution in Producer and User (Stakeholder) thinking about the basic information required to exchange Spatial Data, how that metadata can be summarized and coded and the automation of Clearinghouses to compare the appropriateness of Spatial Data for specific applications (i.e., environmental vs. energy management, economic development vs. real estate development) based on their Framework and metadata similarities.

The Code Council operates a significant technology test-bed and computer facility. Thus far, only OpenGIS Consortium has taken the initiative to organize a Spatial Data Testbed for Interoperability. The OGC Testbed (as it may be reconstituted) is in its embryonic phase, and like the Code Council's, will require time to grow into a resource for building applications out of Interoperable Standards that benefit the entire Spatial Community.

The Code Council leveraged the benefit to chain stores of more efficient commerce in product-based transactions (pricing, ordering, inventorying and sales). The savings and the private parties (initially Grocery store chains) who stood to benefit from such savings were one and the same. As a initiative perceived as primarily Federal, the NSDI conceptually and in practice has so far been a method of efficiency/savings quite far removed from the entities that stand to become more efficient by implementing coordinated Spatial Data development.

This "long road to savings" distance can be shortened and the diverse Public and Private communities to be benefited can be aligned by further research and demonstration investment projects establishing the real savings, efficiencies and enhanced capabilities likely to result from NSDI implementation. The economics of savings that aligned investments trigger inter-governmentally and across public-private interactions needs further refinement through empirical case studies where the joint or consortium activity of all stakeholders can prove that the costs of

coordinating institutional decisions for technology investment pale in comparison to the net gain in institutional function and effectiveness. A more detailed set of recommendations appears in Chapter 9.

Appendix B: Summary of Relevant Federal Legislation

This Report suggests multiple strategies for accelerating the implementation of a National Spatial Data Infrastructure (NSDI) using public and private financing and incentives for the NSDI to "self-organize." In considering what actions need to be taken by the federal government, readers may wonder what new legislative authority is required for the White House to implement such financing and incentives programs. This Appendix B is intended to speed that implementation by highlighting the supporting requirements and flexibility that the White House and federal agencies should use under existing legislation and executive branch directives that apply to government-wide.[497]

The summary arranges legislation and executive branch guidance in three parts. First, information technology generally. Second, spatial information technology. Third, intergovernmental cooperation.

Information Technology Generally

Information Technology Generally: Legislation

Congress has passed several pieces of legislation that lay the groundwork for agencies to establish an investment approach for managing Investment Technology (**IT**). Five key pieces of legislation[498] require that IT procurement and investment management process treat IT as capital assets:

1. The Clinger-Cohen Act of 1996 (**CCA or ITMRA**)
2. The Paperwork Reduction Act of 1995 (**PRA**)
3. The Federal Acquisition Streamlining Act of 1994 (**FASA**)
4. The Government Performance and Results Act of 1993 (**GPRA**)
5. The Chief Financial Officers Act of 1990 (**CFO**)

1. The Clinger-Cohen Act of 1996 (CCA) (formally the Information Technology Management Reform Act, Division E of Public Law 104-106)

The Clinger-Cohen Act requires federal agencies to focus more on the results achieved through IT investments while streamlining the federal IT procurement process. Specifically this act introduces much more rigor and structure into how agencies approach the selection and management of IT projects. Among other things, the head of each agency is required to implement a process for maximizing the value and assessing and managing the risks of the agency's IT acquisitions.

---

497 Given the lack of resources and scope of this Report, numerous legislative and executive initiatives involving the use of technology in federal programs or specific federal agencies (and there are many) are not included here. Such initiatives (and opportunities for such initiatives) would be part of a thorough study into the Data Mandates described in Chapter 4.

498 This summary is based substantially on Section 4 of the GAO IT Investment Guide. To speed review of this material, italics and footnotes have been supplied to point out mandates that Agencies would achieve by adopting a capital budgeting approach to investing programmatic IT funds at the state and local government levels. Note: Brief summaries of the legislative provisions are cited; readers should consult copies of the statutes themselves for actual language contained in the law.

Specific sections of the Clinger-Cohen Act related to IT investments include:

CCA 5112(b) - The OMB Director is to promote and be responsible for *improving the acquisition, use, and disposal of IT to improve the productivity, efficiency, and effectiveness of federal programs*.

CCA 5112(c) - At the same time the President submits the budget to the Congress, the OMB Director is to submit a *report to the Congress on the net program performance benefits achieved as a result of agencies' major capital investments in information systems and how the benefits relate to the achievement of agency goals*.

CCA 5112(c) - The OMB Director is to develop, as part of the budget process, a *process for analyzing, tracking, and evaluating the risks and results of all major capital investments for information systems by the federal agencies*. This process is to cover the life of each system and include explicit criteria for analyzing the projected and actual costs, benefits, and risks associated with the investments.

CCA 5113(b)(1) - The OMB Director shall evaluate the IRM practices of executive agencies with respect to the *performance and results of IT investments*.

CCA 5113 (b)(4) - The Director shall implement periodic reviews of selected information resources management activities of the executive agencies through the budget process.

CCA 5113(b)(5) - Specific actions that may be taken by the *Director of OMB to enforce agency accountability for its information resources management and investments made in information technology include (1) recommending increases or reductions in the agency's IRM budget, (2) using administrative controls to restrict the availability of agency funds, and (3) designating an executive agent to contract with private sources for the agency's management and acquisition of information technology*.

CCA 5122 - Agency heads are to design and implement *a process for maximizing the value and assessing and managing the risks of their IT acquisitions; the process (among other things) is to provide for the selection of investments using minimum criteria on whether to undertake an investment (including quantitatively expressed projected net, risk-adjusted return on investment, and specific quantitative and qualitative criteria for comparing and prioritizing alternative information systems projects) and to provide a means for senior management to obtain timely information regarding progress (at established milestones) in terms of cost, capability of the system to meet requirements, timeliness, and quality*.

CCA 5122(b)(2) - The IT investment process of executive agencies is to be integrated with the processes for making budget, financial, and program management decisions.

CCA 5123(3) - Agency heads shall ensure that performance measurements are prescribed for IT used by or to be acquired for the agency; the performance measurements are to measure how well the IT supports agency programs.

CCA 5123(5) - Agency heads are to analyze the missions of the agency and, based on the analysis, revise the agency's mission-related and administrative processes (as appropriate) before making significant investments in IT used to support those missions.

CCA 5125(b)(1) - The agency CIO is responsible for providing advice and other assistance to agency heads and other senior managers to ensure that IT is acquired and information resources are managed for the agency in a manner that implements the policies and procedures of this act, consistent with the Paperwork Reduction Act, and the priorities of the agency head.

CCA 5125(b)(2) - The agency CIO is responsible for developing, maintaining, and facilitating the implementation of a sound and integrated IT architecture for the agency; the architecture is an integrated framework for evolving or maintaining existing IT and acquiring new IT to achieve the agency's strategic and IRM goals.

CCA 5125(c)(2) - The agency CIO is to monitor the performance of IT programs of the agency, evaluate the performance of those programs on the basis of applicable performance measures, and advise the agency head regarding whether to continue, modify, or terminate the program or project.

CCA 5126 - The agency head, in consultation with the CIO and Chief Financial Officer (or comparable official) is to establish policies and procedures that (1) ensure that accounting, financial, and asset management systems and other information systems are designed, developed, maintained, and used effectively to provide financial or program performance data for the agency's financial statements; (2) ensure that financial and related program performance data are provided on a reliable, consistent, and timely basis to agency financial management systems; and (3) ensure that the financial statements support the assessment and revision of agency processes and performance measurement.

CCA 5127 - The agency head shall identify in the agency's IRM plan (required by PRA) major IT acquisition programs, or phase or increment of such program, that has significantly deviated from the cost, performance, or schedule goals established for the program.

CCA 5202 - The head of the agency should, to the maximum extent practicable, use modular contracting for the acquisition of major information technology systems. (This section also describes key characteristics of "modular contracting," including (1) that the system be acquired in successive acquisitions of *interoperable increments complying with common or commercially accepted IT standards*, (2) that contracts should be awarded within 180 days after the date on which the solicitation is issued, and (3) the information technology should be delivered within 18 months after the date on which the solicitation resulting in award of the contract was issued.)

2. Paperwork Reduction Act of 1995 (PRA)(Public Law 104-13)

The Paperwork Reduction Act of 1995 (PRA) is the "umbrella" IT legislation for the federal government, with other statutes elaborating on the goals contained within PRA. PRA requires agencies to use information resources to improve the efficiency and effectiveness of their operations and fulfillment of their missions.

Specific sections of PRA related to IT investments include:

PRA 44 USC 3502(7) - Definition of IRM: the process of managing information resources to accomplish agency missions and improve agency performance.

PRA 44 USC 3506(a)(4) - Agency program officials, in consultation with the Chief Information Officer and Chief Financial Officer (or comparable official), are to define program information needs and develop strategies, systems, and capabilities to meet those needs.

PRA 44 USC 3506(b)(2) - Each agency is to develop and maintain a strategic IRM plan on how IRM activities help accomplish agency missions (*the plan is to include plans for reducing information burdens imposed on the public, for enhancing public access to and dissemination of government information, and for meeting the information technology needs of the government*).

PRA 44 USC 3506(b)(3)(A) - each agency is to maintain an ongoing process to ensure that IRM operations and decisions are integrated with organizational planning, budget, financial management, human resources management, and program decisions[499].

PRA 44 USC 3506(b)(3)(C) - agencies are to establish goals for IRM to improve the productivity, efficiency, and effectiveness of agency operations and methods for measuring progress in achieving the goals.

PRA 44 USC 3506(h)(5) - Agencies are to maximize the value and assess and manage the risks of major information system initiatives through a process that (a) integrates budget, financial, and program management decisions and (b) is used to select, control, and evaluate the results of the initiatives.

PRA 44 USC 3514(a)(2)(D) - the OMB Director is to provide an annual report to the Congress on (among other things) the extent to which agencies have improved program performance and the accomplishment of agency missions through IRM.

3. Government Performance and Results Act of 1993 (GPRA)(Public Law 103-62)

GPRA requires agencies to set goals, measure performance, and report on their accomplishments. As such, an agency's IT investments should directly support the accomplishment of these goals

The specific sections of GPRA related to IT investments include:

GPRA 5 USC 306 - By September 30, 1997, agency heads are to submit to OMB and the Congress a strategic plan for their program activities, including a comprehensive mission statement covering major agency functions and operations.

GPRA 31 USC 1115 - Starting with fiscal year 1999, agencies are to prepare annual performance plans covering each program activity set forth in the budget. The plans are to establish performance goals in objective, quantifiable, and measurable form and performance indicators to be used in measuring relevant outputs, service levels, and outcomes of each program activity.

GPRA 31 USC 1116 - No later than March 31, 2000, and annually thereafter, agency heads are to prepare and submit to the President and the Congress program performance reports setting forth performance indicators and comparing actual program performance against the performance goals.

4. The Federal Acquisition Streamlining Act of 1994 (FASA)(Public Law 103-355)

Title V of FASA requires agencies to define cost, schedule, and performance goals for federal acquisition programs (to include IT projects) and monitor these programs to ensure that they remain within prescribed tolerances. If a program falls out of tolerance, FASA requires the agency head to review, take necessary actions, and, if necessary, terminate the program.

Specific sections of FASA related to IT investments include:

FASA 10 USC 2220 - The Secretary of Defense shall approve or define the cost, performance, or schedule goals for major defense acquisition programs and for each

[499] The phrase "program decisions" could be read broadly to include the private, state and local players in federal programs.

phase of the acquisition cycle; whenever the Secretary determines that major defense acquisition programs are not achieving, on average, 90 percent of the cost, performance, and schedule goals established, the Secretary shall ensure that there is timely review of the program and identify suitable actions (including termination) to be taken with respect to the program.

FASA 41 USC 263 - The head of each executive agency shall approve or define the cost, performance, and schedule goals for major agency acquisition programs (congressional policy is that each agency should achieve, on average, 90 percent of the cost and schedule goals established for major and non-major programs of the agency without reducing the performance or capabilities of the items being acquired); whenever necessary to implement the congressional policy, agency heads are to determine whether there is a continuing need for the programs that are significantly behind schedule, over budget, or not in compliance with the performance or capability requirements and identify suitable actions, including termination, to be taken.

5. Chief Financial Officers Act of 1990 (CFO)(Public Law 101-576)

Having accurate financial data is critical to understanding the costs and assessing the returns on IT investments. The CFO Act focuses on the need to significantly improve the financial management and reporting practices of the federal government

Specific sections of the CFO Act related to IT investments include:

CFO Act 31 USC 501 - Purpose statements: (1) provide for improvement, in each agency of the federal government, of systems of accounting, financial management, and internal controls to ensure the issuance of reliable financial information and to deter fraud, waste, and abuse of government resources; and (2) provide for the production of complete, reliable, timely, and consistent financial information for use by the Executive Branch and the Congress in the financing, management, and evaluation of federal programs.

CFO Act 31 USC 902(a)(3) - The agency Chief Financial Officer shall develop and maintain an integrated agency accounting and financial management system, including financial reporting and internal controls, that provides for (1) complete, reliable, consistent, and timely information which is prepared on a uniform basis and that is responsive to the financial information needs of agency management; (2) the development and reporting of cost information; (3) the integration of accounting and budgeting information; and (4) the systematic measurement of performance.

Information Technology Generally: Executive Branch Guidance

In addition to these legislative provisions, OMB and the White House have also issued several pieces of guidance related to the acquisition and management of information resources. This executive branch guidance includes

1. OMB Circular A-11
2. OMB Circular A-94
3. OMB Circular A-109
4. OMB Circular A-123
5. OMB Circular A-127
6. OMB Circular A-130
7. Executive Order 13011 Sec. 2(b)(3)

8. OMB Memorandum M-97-02

OMB Circular A-11 provides detailed instructions and guidance on the preparation and submission of agency budget requests and related materials, including program performance information. Part 2 of the Circular provides specific instructions on the preparation and submission of agency strategic plans, as required by GPRA. Part 3 provides guidance on the planning, budgeting, and acquisition management of major fixed assets and requires agencies to provide information on all major fixed asset projects included in their budget submissions to OMB.

OMB Circular A-94 provides general guidance for conducting cost-benefit and cost-effectiveness analyses. This guidance serves as a checklist for determining whether an agency has considered and included all necessary elements for sound cost-benefit and cost-effectiveness analyses. The circular also provides specific guidance on the discount rates to be used in evaluating federal programs whose benefits and costs are distributed over time.

OMB Circular A-109 establishes policies for acquiring major systems. Major systems are defined as those programs that are critical to fulfilling an agency mission, entail the allocation of relatively large resources, and warrant special management attention. Among other requirements, the circular requires that an agency acquiring a major system to (1) ensure that the system fulfills a mission need, (2) make appropriate trade-offs among investment costs, ownership costs, schedules, and performance characteristics, (3) ensure adequate system testing and evaluation, (4) accomplish system acquisition planning, built on an analysis of agency missions, (5) tailor an acquisition strategy for each program, (6) maintain a capability to predict, review, assess, negotiate, and monitor system life-cycle costs, and (7) assess cost, schedule, and performance experience against predictions for consideration at key decision points.

OMB Circular A-123 provides guidance on establishing, assessing, correcting, and reporting on management and internal controls. Part II provides a definition of management controls and establishes guidance for designing management structures that help ensure accountability for results as federal agencies develop and execute strategies for implementing or reengineering agency programs and operations.

OMB Circular A-127 prescribes policies and standards for developing, operating, evaluating, and reporting on financial management systems. Part 6 of the circular lays out policy guidance for establishing government-wide financial systems and compatible agency systems. Specifically, these systems are to provide complete, reliable, consistent, timely, and useful financial management information on federal government operations to enable central management agencies, individual operating agencies, divisions, bureaus, and other subunits to carry out their fiduciary responsibilities; deter fraud, waste, and abuse of federal government resources; and facilitate efficient and effective delivery of programs through relating financial consequences to program performance. Part 7 defines the specific requirements that financial management systems should have in place to meet the policy requirements established in part 6.

OMB Circular No. A-130 provides uniform government-wide information resources management policies as required by the Paperwork Reduction Act. Section 7 of the circular describes basic considerations and assumptions, while sections 8(a) and 8(b) describe information management policy and information systems and IT management policy, respectively.

OMB A-130 Section 8b(1) -- Evaluation and Performance Measurement. *Agencies are to promote the appropriate application of federal information resources by (1) seeking opportunities to improve the effectiveness and efficiency of government programs through work process redesign and the judicious application of information technology; (2) preparing and updating a cost-benefit analysis for each information system as necessary throughout its life cycle; (3) conducting cost-benefit analyses to support ongoing management oversight processes; and (4) conducting post-implementation*

reviews of information systems to validate estimated benefits and document effective management practices.

OMB A-130 Section 8b(2)--*Strategic Information Resources Management (IRM) Planning: Agencies are to establish and maintain (1) strategic information resources management planning that addresses how the management of information resources promotes the fulfillment of an agency's mission; (2) information planning that promotes the use of information throughout its life cycle to maximize the usefulness of the information, minimize the burden on the public, and preserve the appropriate integrity, availability, and confidentiality of information; and (3) operational information technology planning that links information technology to anticipated program and mission needs, reflects budget constraints, and forms the basis for budget requests. An agency's IRM planning is also to coordinate with other agency planning processes including strategic, human resources, and financial resources*.

OMB A-130 Section 8b(3)--Information Systems Management Oversight: Agencies are to establish information system management oversight mechanisms that (1) ensure that each information system meets agency mission requirements; (2) provide for periodic review of information systems; (3) ensure that the official who administers a program supported by an information system is responsible and accountable for the management of that information system throughout its life cycle; (4) provide for the appropriate training for users of federal information resources; (5) ***ensure that federal information system requirements do not unduly restrict the prerogatives of state, local, and tribal governments***; (6) ensure that major information systems proceed in a timely fashion towards agreed-upon milestones in the information system's life cycle, meet user requirements, and deliver intended benefits to the agency and affected publics; and (7) ensure that financial management systems conform to the requirements of OMB Circular A-127.

OMB A-130 Section 8b(4)--Use of Information Resources: Agencies are to create and maintain management and technical frameworks for using information resources that document linkages between mission needs, information content, and information technology capabilities. These frameworks should guide both strategic and operational IRM planning. They should also address steps necessary to create an *open systems environment*. Among other requirements, agencies are to *(1) develop information systems in a manner that facilitates necessary interoperability, application portability, and scalability of computerized applications across networks of heterogeneous hardware, software, and communications platforms, (2) ensure that improvements to existing information systems and the development of planned information systems do not unnecessarily duplicate information systems available within the same agency, from other agencies, or from the private sector, and (3) establish a level of security for all information systems that is commensurate with the risk and magnitude of the harm resulting from the loss, misuse, or unauthorized access to or modification of the information contained in these information systems*.

OMB A-130 Section 8b(5)--*Acquisition of Information Technology: Agencies are to acquire information technology in a manner that makes use of full and open competition, that maximizes return on investment, and that considers the need for accommodations of accessibility for individuals with disabilities to the extent that needs for such access exist. In addition, off-the-shelf software from commercial sources is to be acquired, unless the cost-effectiveness of developing custom software to meet mission needs is clear and has been documented*. Finally, all information technology is to be acquired in accordance with OMB Circular A-109, where appropriate.

Executive Order 13011, "Federal Information Technology," highlights the need for executive agencies to significantly improve the management of their information systems, including the acquisition of information technology, by implementing the relevant provisions of PRA, the Clinger-Cohen Act, and GPRA. Agencies are to refocus their information technology management to directly support their

strategic missions, implement an investment review process that drives budget formulation and execution for information systems, and rethink and restructure the way they perform their functions before investing in information technology to support that work. Agency heads are to strengthen the quality and decisions of employing information resources to meet mission needs through integrated analysis, planning, budgeting, and evaluation processes.

Section 2(b)2 makes agency heads responsible for establishing mission-based performance measures for information systems investments that are aligned with agency performance plans prepared pursuant to GPRA. Section 2(b)3 makes agency heads responsible for establishing agency-wide and project-level management structures and processes that are responsible and accountable for managing, selecting, controlling, and evaluating investments in information systems. Agency heads also have the authority to terminate information systems when appropriate.

OMB Memorandum M-97-02 "Funding Information Systems Investments": This memo establishes eight decision criteria that OMB will use, starting with fiscal year 1998 budget proposals, to evaluate major information system investments proposed for submission in the President's budget. *The first four decision criteria describe criteria related specifically to capital planning.* The fifth criterion establishes the critical link between planning and implementation -- the information architecture that aligns technology with mission goals. The last three criteria establish risk management principles that are intended to help provide assurance that the proposed investment will succeed.

Spatial Information Technology

Spatial Information Technology: Legislation

As the NAPA Report[500] discussed, there exists no comprehensive Congressional authorization and resources for coordination and leveraging of federal agency investments in spatial information systems, with similar investments being made by state, county, local, tribal and international governments, the private sector, non-profits and universities. On June 9, 1999, the House Subcommittee on Government Management, Information and Technology what are believed to be the first Congressional hearings on these issues.[501]

Spatial Information Technology: Executive Branch Guidance

The NAPA Report highlighted the main federal legal authority for coordinating federal spatial information policy, procurement, research and investment government-wide.[502] Two of the more important authorizations are:

1. Circular No. A-16 “Coordination of Surveying, Mapping, and Related Spatial Data

---

500 NAPA Report, Chapter 4: *Providing National Leadership and Coordination for the NSDI* and Chapter 5 *Policy Bases, Structure, and Organization to Meet Today’s and Tomorrow’s Geographic Information Challenges and Opportunities.*

501 House Subcommittee on Government Management, Information and Technology, Hearing Proceedings (June 9, 1999), http://www.house.gov/reform/gmit/hearings/testimony/990609h.htm.

502 NAPA Report, Chapter 4: *Providing National Leadership and Coordination for the NSDI* and Chapter 5 *Policy Bases, Structure, and Organization to Meet Today’s and Tomorrow’s Geographic Information Challenges and Opportunities.*

Activities,"[503] and

2. Executive Order 12906, "Coordinating Geographic Data Acquisition And Access: The National Spatial Data Infrastructure"[504]

OMB Circular No. A-16 "Coordination of Surveying, Mapping, and Related Spatial Data Activities" had as its objective: the eventual development of a national digital spatial information resource, with the involvement of Federal, State, and local governments, and the private sector. This national information resource, linked by criteria and standards, will enable sharing and efficient transfer of spatial data between producers and users. Enhanced coordination will build information partnerships among government institutions and the public and private sectors, avoiding wasteful duplication of effort and ensuring effective and economical management of information resources in meeting essential user requirements.

OMB A-16 Section 2 includes within A-16's scope most national mapping and spatial data programs in its scope, and most programs previously seen as serving single Agency needs in isolation.

OMB A-16 Section 3 recognizes that:

> Surveying, mapping, and related spatial data activities encompass a number of categories of data, including base topographic mapping, cadastral, geologic, geodetic, resource (e.g., soils, wetlands, and vegetation), cultural, demographic, and ground transportation data. These national spatial data categories have multi-agency interest. *The Coordinating Departments (see below) are to provide government-wide leadership to coordinate this multi-agency interest, including the facilitation of exchange of information and transfer of data; the establishment and implementation of standards for quality, content, and transferability; and the coordination of the collection of spatial data* ***to minimize duplication of effort where practicable and economical.*** Each Department has existing authority described in its basic mission (e.g., statutory authority or Public Law), or implied as part of its program responsibilities.

OMB A-16 Section 3 goes on to allocate primary responsibility for layers of the "national digital spatial information resource" to five Coordinating Departments, being those having greatest programmatic familiarity and consequence from the shared data's accuracy and functionality:

1. Agriculture with soils and vegetation,
2. Commerce with national geodetic surveys, nautical and aeronautical charts, standards activities, census and sample surveys,
3. Interior with general responsibility for coordinated planning and execution of these functions and related surveying, mapping, and spatial data
4. State with mapping international boundaries (excluding Canada and Mexico's borders with the United States), and
5. Transportation with national ground transportation data.

OMB A-16 Section 4 establishes an interagency coordinating committee called the "Federal Geographic Data Committee" (FGDC) to achieve A-16's purposes and chaired by the Department of Interior. A-16 states that FGDC include representatives from the 5 Coordinating

---

[503] OMB, Circular No. A-16 (Revised) (October 19, 1999), http://www.whitehouse.gov/OMB/circulars/a016/a016.html#3.

[504] Executive Order 12906 (April 11, 1994), Federal Register (April 13, 1994), Volume 59, Number 71, pp. 17671-17674, http://www.fgdc.gov/publications/documents/geninfo/execord.html.

Agencies (Agriculture, Commerce, Interior, State and Transportation) and Defense, Energy, Housing and Urban Development, the Federal Emergency Management Agency (FEMA), the Environmental Protection Agency (EPA), the National Aeronautics and Space Administration (NASA), and the National Archives and Records Administration (NARA). Other agencies desiring to participate may do so by writing the Secretary of Interior.

FGDC's stated purpose is to promote the coordinated development, use, sharing, and dissemination of surveying, mapping, and related spatial data. This objective supports surveying and mapping activities, aids geographic information system use, and assists land managers, technical support organizations, and other users in meeting their program objectives through:

1. Promoting the development, maintenance, and management of distributed data base systems that are national in scope for surveying, mapping, and related spatial data;
2. Encouraging the development and implementation of standards, exchange formats, specifications, procedures, and guidelines;
3. Promoting technology development, transfer, and exchange;
4. Promoting interaction with other existing Federal coordinating mechanisms that have interest in the generation, collection, use, and transfer of spatial data;
5. Publishing periodic technical and management articles and reports;
6. Performing special studies and providing special reports and briefings to OMB on major initiatives to facilitate understanding of the relationship of spatial data technologies with agency programs; and
7. Ensuring that activities related to Circular A-16 support national security, national defense, and emergency preparedness programs.

FGDC is also required to provide guidance and promote cooperation and coordination among Federal, State, and local government agencies and in the private sector in the collection, production, and sharing of surveying, mapping, and related spatial data.

While OMB A-16 does not mention savings and leveraging of federal funds invested in digital spatial data and support systems as a specific FGDC objective, the "financing" concept is used throughout A-16 to delineate the scope of FGDC's mission as extending to all data "financed in whole or in part by Federal funds." To the extent that FGDC determines it needs authority to pursue cooperative financing or other collaborating responsibilities appropriate to carrying out OMB A-16, Section 3 permits FGDC to seeks OMB's concurrence and the authority will be granted.

Executive Order 12906, "Coordinating Geographic Data Acquisition And Access: The National Spatial Data Infrastructure"[505] implements a recommendation of the National Performance Review that the executive branch develop, in cooperation with State, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data in such areas as transportation, community development, agriculture, emergency response, environmental management, and information technology

The Federal Geographic Data Committee ("FGDC"), established by the Office of Management and Budget ("OMB") Circular No. A-16 ("Coordination of Surveying, Mapping, and Related

[505] Executive Order 12906 (April 11, 1994), Federal Register (April 13, 1994), Volume 59, Number 71, pp. 17671-17674, http://www.fgdc.gov/publications/documents/geninfo/execord.html.

Spatial Data Activities") and chaired by the Secretary of the Department of the Interior ("Secretary") or the Secretary's designee, is tasked to coordinate the Federal Government's development of the NSDI.

Executive Order 12906 authorizes FGDC to develop spatial data standards (Section 4), a Clearinghouse (Section 3), the Framework (Section 5) and other components of the NSDI. Executive Order 12906 strengthens OMB A-16, and does not narrow A-16's breadth, scope or vision.

Under 12906's authority to enter into partnerships for data acquisition, the Secretary of Interior, under the auspices of the FGDC, is required to develop *strategies for maximizing cooperative participatory efforts with State, local, and tribal governments, the private sector, and other nonfederal organizations to share costs and improve efficiencies of acquiring geospatial data consistent with* Executive Order 12906 and, implicitly OMB A-16.

Intergovernmental Cooperation

Intergovernmental Cooperation Legislation - Generally

Congress requires that the federal government approach technology inter-governmentally to

- improve the efficiency of federal-state-local-private administration of federal programs,
- reduce the duplication of information resource investments, and
- exchange technology experience and research with state and local governments.

The Intergovernmental Cooperation Act of 1968 (**ICA**),[506] requires that federal agencies closely cooperate with state and local governments in using and sharing technology and technical services.

The Intergovernmental Cooperation Act authorizes Federal Agencies to:

- *achieve the fullest cooperation and coordination of activities among the levels of government (including special purpose units of local government like water authorities) in order to improve the operation of our federal system in an increasingly complex society,*
- *improve the administration of grants-in-aid to the States,*
- *permit provision of reimbursable technical services to State and local government,*
- *establish coordinated Intergovernmental policy and administration of development assistance programs,*
- provide for the acquisition, use, and disposition of land within urban areas by Federal agencies in conformity with local government programs,
- provide for periodic congressional review of Federal grants-in-aid, and
- achieve related other purposes and efficiencies.

Specific sections of the Intergovernmental Cooperation Act related to IT investments include:

ICA Section 201 creates an *Intrinsic Data Mandate*[507] on every Federal department or agency

---

506 Public Law 90-577, 82 Stat. 1098, http://www.os.dhhs.gov/progorg/grantsnet/adminis/law-intg.htm,

507 *Intrinsic Data Mandates* are the data that a specific agency demands of itself to assure that agency decisions reflect the reality of a specific neighborhood or industry, and are sensitive to the effects sought to be improved through the government program. ICA 201 requires that the federal agency develop data on funds availability and use of grants-in-aid to the detail of thousands of county or smaller political subdivisions requested by each of 50 state governors or legislatures. *Extrinsic Data Mandates* are the data that a specific

that administers a grants-in-aid program to notify the Governor, the State legislature or their designee of the purpose and amounts of actual grants-in-aid available and paid to the State or to its political subdivisions.

ICA 202 creates an *Extrinsic Data Mandate*[508] on every State agency receiving federal grants-in-aid to account for how, where and why the funds were allocated, and (implicitly) gives the federal Agency and Comptroller General of the US access to all state or local records and computer systems affecting the funds' use.

ICA Title III (Sections 301-305) authorize federal Agencies to provide special or technical services to state and local governments .

ICA Section 301 declares:

> *It is the purpose of this title to encourage intergovernmental cooperation in the conduct of specialized or technical services and provision of facilities essential to the administration of State or local governmental activities, many of which are nationwide in scope and financed in part by Federal funds; to enable State or local governments to avoid unnecessary duplication of special service functions; and to authorize all departments and agencies of the executive branch of the Federal Government which do not have such authority to provide reimbursable specialized or technical services to State and local governments.*

ICA Section 302 lets Federal departments and agencies with special technical competencies provide them to requesting states and their political subdivisions. It considers the privates sector's interest in bidding on state and local technical services in light of the intergovernmental opportunities of permitting collaboration and technology transfer. State/local recipients of such services must reimburse the direct and indirect costs thereof, and under ICA Section 303, the federal Agency providing the requested service keeps such reimbursements as an additional credit to their programmatic appropriations. In essence, ICA Sections 302 and 303 enable federal, state and local technology collaborations. On the state and local procurement side, intergovernmental cooperation can accelerate a collaborative government/vendor ability to enter into a contract for fast-changing technology implementation by unifying the intergovernmental process of requests for information, proposal, contract award and contract administration.

ICA Section 401 uses intergovernmental responsibility for "urbanization" as the principle and excuse for collaborative effort:

> The economic and social development of the Nation and the achievement of satisfactory levels of living depend upon the sound and orderly development of all areas, both urban and rural. Moreover, in a time of rapid urbanization, the sound and orderly development of urban communities depends to a large degree upon the social and economic health and the sound development of smaller communities and rural areas. The President shall, therefore. establish rules and regulations governing the formulation, evaluation, and review of Federal programs and projects having a significant impact on area and community development, including programs providing Federal assistance to the States and localities, to the end that

---

agency demands from other members of the public or private sectors. For instance, a Federal mandate imposed on state governments to supply data on the neighborhoods affected by a federal program would be an Extrinsic Data Mandate. For a more detailed discussion of Data Mandates see Bruce Cahan (Urban Logic, Inc.), *Issues Paper: Data Mandates* submitted to the Committee on Technology of the National Science & Technology Council in connection with their Summit on Priorities for Federal Innovation Reform (December 1, 1999), http://www.whitehouse.gov/WH/EOP/OSTP/html/rand/summit/cahan.doc. Also see Chapter 4: The Role for Federal IRM Policy & Existing Data Mandates.

[508] Id.

they shall most effectively serve these basic objectives. Such rules and regulations shall provide for full consideration of the concurrent achievement of the following specific objectives and, to the extent authorized by law, reasoned choices shall be made between such objectives when they conflict:

- Appropriate land uses for housing, commercial, industrial, governmental, institutional, and other purposes;
- Wise development and conservation of natural resources, including land, water, minerals, wildlife, and others;
- Balanced transportation systems, including highway, air, water, pedestrian, mass transit, and other modes for the movement of people and goods;
- Adequate outdoor recreation and open space;
- Protection of areas of unique natural beauty, historical and scientific interest;
- Properly planned community facilities, including utilities for the supply of power, water, and communications, for the safe disposal of wastes, and for other purposes; and
- Concern for high standards of design.

ICA Section 401 continues:

> All viewpoints national, regional, State, and local shall, to the extent possible, be fully considered and taken into account in planning Federal or federally assisted development programs and projects. State and local government objectives, together with the objectives of regional organizations shall be considered and evaluated within a framework of national public objectives, as expressed in Federal law, and available projections of future national conditions and needs of regions, States, and localities shall be considered in plan formulation, evaluation, and review.
>
> To the maximum extent possible, consistent with national objectives, all Federal aid for development purposes shall be consistent with and further the objectives of State, regional, and local comprehensive planning. Consideration shall be given to all developmental aspects of our total national community, including but not limited to housing, transportation, economic development, natural and human resources development, community facilities, and the general improvement of living environments.
>
> Each Federal department and agency administering a development assistance program shall, to the maximum extent practicable, consult with and seek advice from all other significantly affected Federal departments and agencies in an effort to assure fully coordinated programs.
>
> Insofar as possible, systematic planning required by individual Federal programs (such as highway construction, urban renewal, and open space) shall be coordinated with and, to the extent authorized by law, made part of comprehensive local and areawide development planning.

ICA Sections 802 and 803 make it the Federal land policy to acquire, dispose or change the use of Agency real property in a manner consistent with local planning, zoning and land use practices.[509] Specifically:

---

[509] This imposes multiple qualitative decisions on federal Agencies and justifies mechanisms for intergovernmental information resource management.

> It is the purpose of this title to promote more harmonious intergovernmental relations and to encourage sound planning, zoning, and land use practices by prescribing uniform policies and procedures whereby the Administrator shall acquire, use, and dispose of land in urban areas in order that urban land transactions entered into for the General Services Administration or on behalf of other Federal agencies shall, to the greatest extent practicable, be consistent with zoning and land-use practices and shall be made to the greatest extent practicable in accordance with planning and development objectives of the local governments and local planning agencies concerned

ICA Section 601 retains to the Senate and House Committees jurisdiction and oversight to review and implement ways to improve the efficiency and effectiveness of grants-in-aid programs.

ICA Section 602 requires the Comptroller General to perform such studies of grants-in-aid that would reduce duplication, improve effectiveness, efficiency, economy and uniform administration and align budgetary, accounting, reporting and other procedures.

Intergovernmental Legislation – A Few Environmental & Transportation Examples

Federal policies favoring intergovernmental dialogue, cooperation, accountability and leveraging of combined human, physical and financial assets are embedded in many federal laws. (A summary of all such policies is beyond the scope of this Report, but may figure into future work on The Role for Federal IRM Policy & Existing Data Mandates discussed in Chapter 4.)

For example, NEPA (National Environmental Policy Act) requires intergovernmental and public-private cooperation in achieving national goals in local settings.[510] Under 42 USC §4332, all federal Agency regulations must be reviewed and comport with the intent of NEPA.

In achieving the goals of intermodal transportation, TEA-21 (The Transportation Equity Act for the 21st Century) requires that the Secretary of Transportation to:[511]

> (7) consult with the heads of other departments, agencies, and instrumentalities of the United States Government on the transportation requirements of the Government, including encouraging them to establish and observe policies consistent with maintaining a coordinated transportation system in procuring transportation or in operating their own transport services;
>
> (8) consult and cooperate with State and local governments, carriers, labor, and other interested persons, including, when appropriate, holding informal public hearings; and
>
> (9) develop and coordinate Federal policy on financing transportation infrastructure, including the provision of direct Federal credit assistance and other techniques used to leverage Federal transportation funds.

An enabler of such creative financing appears in 49 USC 5309(g) permitting the Secretary of Transportation to enter into letter of contingent commitment for mass transportation projects that anticipate future funds availability, facilitating better capital planning and financing arrangements for projects spanning multiple intergovernmental budget years, thereby letting more complex intermodal projects proceed.

TEA-21 continues the use of metropolitan planning organizations (MPOs) to prioritize projects and

---

510 42 USC §§4321-4334.

511 49 USC §301.

administer federal transportation funds effectively in local and regional contexts.[512]

De Facto Intergovernmental / State-Led Collaboration: One-Call Notification Laws for Safety in Underground Digging Operations

All 50 States and many countries have adopted laws that require the excavator of underground space to first notify a central office that alerts all telephone companies, utilities, pipeline companies, governmental departments of public works, and other owners of subsurface infrastructure to provide information necessary to mark the affected street before digging can proceed.

TEA-21 adopts uniform minimum national standards for state One-Call Notification programs, requires that the Secretary of Transportation report to Congress on state program effectiveness and compliance with the minimum standards, and awards grants to states to enhance their programs.[513]

TEA-21 also required that the Department of Transportation study best practices for One-Call Centers.[514] The resulting report[515] highlighted the disparities in One-Call Notification programs state-by-state, the barriers that exist to reliably sharing accurate, historic and timely data in digital form, and emphasized the critical need and resources required to bring spatial information systems/GIS, GPS and other related technologies into all such systems.[516]

---

512 23 USC §134.

513 TEA-21 (PL 105-178) Subtitle C: Comprehensive One Call Notification, 49 USC §§6101 – 6108. Congress appropriated $1 million in FY 2000 and $5 million in FY 2001 to support such grants. Clearly, "creative financing" will be required to enhance and maintain such One-Call systems at the level of minimum national standards, let alone at the "best practices identified in the *Common Ground* Study, fn. 515.

514 TEA-21 (PL 105-178) Subtitle C: Comprehensive One Call Notification, 49 USC §6105.

515 United States Department of Transportation - Research and Special Programs Administration: Office of Pipeline Safety, *Common Ground Study of One-Call Systems and Damage Prevention Best Practices* (August 1999), http://www.cycla.com/opsiswc/docs/s8/p0026/090499_Composite.pdf (**Common Ground Study**).

516 Common Ground Study, *Chapter 6: Mapping Task Team Best Practices*, http://www.cycla.com/opsiswc/docs/s8/p0026/Mapping.pdf.

Appendix C: White Paper for a Leveraging Association

PROPOSAL

U.S. Community Technology Partners:

The public-private partnership helping Regional, Industry & Interest Group Consortia Build the National Spatial Data Infrastructure

Executive Summary

U.S. Community Technology Partners (**the Association or USCTP**) is proposed as a dynamic collaboration among the major Spatial Technology customers, vendors and public and private stakeholders. The main objective of the Association will be to establish and promote a toolkit of business and finance processes that grow cooperative data sharing initiatives and meet the long-term needs of its members.

The Association will service the financial, operational, professional and other needs of the growing number of community spatial data, information and technology consortia and other spatial data sharing initiatives taking root all across America (**Consortia**). These Consortia come in all shapes and sizes, reflecting the age and experience of spatial data sharing in their respective cities, counties and regions (**Regional Consortia**). For industries with specialized business, community relations and governmental relations needs (such as energy, insurance, telecommunications and environmental remediation), a Consortium may reflect that specialization across multiple states and regions (**Industry Consortia**). For groups interested in specific environmental, housing or other causes, a Consortium may reflect those interests across multiple states and regions (**Interest Group Consortia**). The Association will treat Consortia like customers, and aim to overcome common operational and financial hurdles to spatial data infrastructure development through development and dissemination of replicatable solutions. Bundling these services assures Consortia new options for growth. Consortia and their members would remain forever free to find other means of obtaining these six services on better market terms – participation in the recommended initiatives would be entirely voluntary, not compulsory.

Through a flexible inter-Agency representative of Federal interests,[517] the priorities, ingenuity and programmatic options of Federal Agencies (**Federal Partners**) will be represented in the Association and conveyed in a coherent manner to Consortia. Federal Partners will use the Association to streamline their data sharing outreach activities, making it easier for Agencies to enter into reliable, long-term arrangements across the country.

The Association also will identify logical non-federal partners (**Business Partners**) Federal and Business Partners will have the option to use the Association to expand Consortia strategies in 6 key areas: Internet portals, financing, systems quality, procurement, legal expertise and technology transfer.

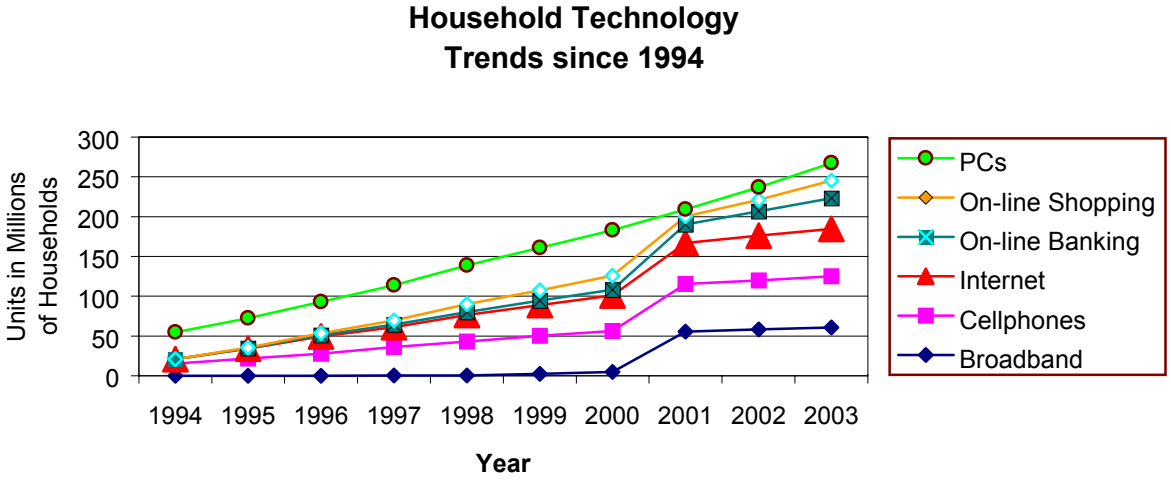
[517] Such representation could be provided by the Federal Geographic Data Committee (FGDC) evolving into a federal Performance-Based Organization (**PBO**).

The Association will develop and offer multiple products in support of the National Spatial Data Infrastructure (**NSDI**) and the Consortia driving implementation of the NSDI, including:

- Establish Finance Service Centers to research and adopt appropriate Underwriting Criteria and create a financial marketplace for debt and equity capital from non-Federal sources to routinely capitalize data, information and technology services investments in Data Consortia and other shared data development efforts.
- Develop standard Internet Website Applications (**Portals**) that bundle the Spatial data and other tools needed to perform common geoprocessing operations, such as: environmental monitoring, demographic analysis, infrastructure needs assessment and budgeting. These portals will provide an organizational network of links to support data coordination and data sharing. The portals also should enable aggregate populations of data practitioners with like needs to more efficiently engage in e-marketing and e-commerce in software and services.
- Expand the review, adoption and promulgation of National Spatial Data Standards and geoprocessing interface standards to create an Interoperable computing environment essential to the Digital Economy
- Develop Best Practices and Normative Procurement Guidelines for Institutional Purchasers of Spatial Systems based on the proposed functional use of those systems. These Practices and Guidelines will incorporate National and Industry Data Quality and Transfer Standards fostering an Interoperable computing environment, and reflect the "real world" situations (such as emergency response) typically found in communities that rely on Spatial Data's ubiquity as a translator for other forms of data. These Practices and Guidelines would foster the shared appreciation and implementation of privacy, computer matching and computer security for Community and Industry Data Consortia and their members.

The Need for Expand Mechanisms for Federal Participation in Data Sharing

In 1994, Executive Order 12906 ordered the Federal Geographic Data Committee (**FGDC**) to oversee construction of the National Spatial Data Infrastructure (**NSDI**) component of the National Information Infrastructure (**NII**). FGDC's focus is geodata content standards and the requisite metadata. In 1994, private companies constituting the Spatial Industry – including many of the



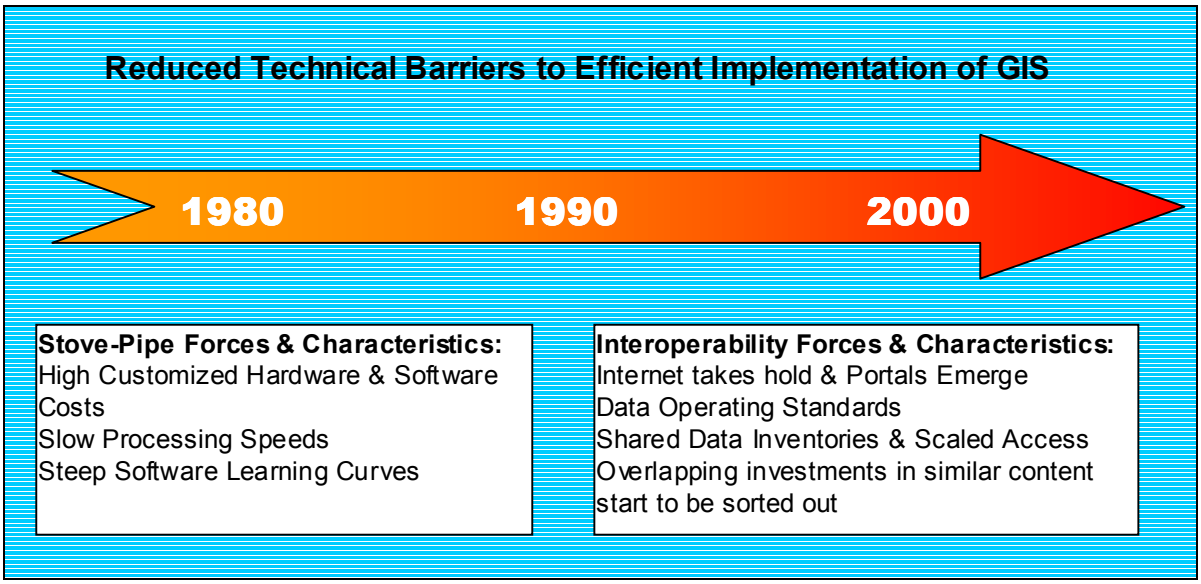
country's largest IT Providers - in partnership with its public and private customers formed OpenGIS Consortium, Inc. (**OGC**). OGC was organized to create standard software interfaces to enable

geoprocessing interoperability.

1999, five years after E.O. 12906, 38% of American homes regularly log on to the Internet over their personal computers.[518] Starting with access to the World Wide Web in 1994, North America entered the Digital Decade -- a 10-year period during which Forrester Research predicts:[519]

> "50% of consumers will adopt a digital lifestyle. By 2003, these households will weave critical technologies -- PCs, cellular phones, and the Net -- into their lives. The remainder of the Digital Decade will be marked by four trends:
>
> 1. maturation of the home PC market;
> 2. flattening cellular penetration;
> 3. **meteoric Internet growth** [emphasis added]; and
> 4. retailing and investing shifting Netward."

In the Spatial portion of this Digital Transformation, *Interoperability* is supplanting prior barriers to efficient implementation as depicted in the chart below:



To support the growth of geospatial processing interoperability, OGC developed Interoperability Specifications through public and private efforts that have moved rapidly from theoretical to product: The first of the series of OpenGIS interface specifications have been published and an active consensus process continues to extend the set of capabilities that one system can instruct another to perform. In tandem with workable data standards that reflect Federal and international consensus, this new addition to the IT infrastructure is beginning to make georeferenced data and geoprocessing capabilities part of everyone's information environment. But geoprocessing interoperability will not solve the problems caused by uncoordinated naming of geographic features, attributes, and relationships, and by non-coordinated descriptions of data sets (metadata). Progress on addressing these and other implementation barriers is being made through the efforts of FGDC, OpenGIS, the

---

518 See, Forrester Research, *The Digital Decade*, at http://www.forrester.com/ER/Research/Report/0,1338,5411,FF.html#figure5.

519 See, Forrester Research, *The Digital Decade*, at http://www.forrester.com/ER/Research/Report/0,1338,5411,FF.html#figure2.

International Standards Organization, and others.

Today's Information Technology infrastructure is dotted with convergent communities: Spatial Processing, Cable, Telecommunications, the Internet, relational database and the legacy systems of the past. The Year 2000 Bug has demonstrated the modern level of interdependence among coexisting and converging communities across all institutional demarcations: public, private, international, federal, state, local, and even civilian and military. Some of these technology communities are, like the infrastructure they form, unappreciated, taken for granted and underfunded. As a member of the larger IT infrastructure, the NSDI must capitalize on its place and points of contact with the large number of users who have simultaneously invested in the NII.

To leverage the dynamics of such communities, it is important to dovetail with multiple Presidential Executive Orders and Directives that affect E.O. 12096's operations, notably:

1976 OSTP: Office of Science & Technology Policy[520]

1990 US Global Change Research Program[521] (now under NSTC)

1992 National Coordination Office for Computing, Information and Communications[522]

1993 NSTC: National Science & Technology Council, a Cabinet-level council chaired by President[523]

1993 GITS: Government Information Technology Services Board[524]

1996 CIO (Chief Information Officers) Council[525]

1998 CIAO: The Crucial Infrastructure Assurance Office of the President[526]

The industries, regions, interest groups and people served by such Presidential Offices, Programs, Executive Orders and Initiatives will benefit from a robust NSDI. Other traditional communities (cities, towns, regions and tribes), industry "communities" (utilities, telecommunications, health care, environmental remediation, real estate development, infrastructure, etc.) and third sector communities (non-profit organizations, university research centers and public-private entities) would reap multiple economies in adaptive speed and focused decision-support.

This NSDI requires significant ongoing non-Federal leadership and partnership to be relevant in the Internet-based economy of the early 21st Century. Simply put, the Federal Government no longer has the funds or the data to build an NSDI on its own, nor does it have the market mandate to coordinate the NSDI. However, the Federal Government does have the responsibility to develop and carry out the standards, security and uniform community access to the NSDI, particularly as relates to fulfilling the civilian and defense uses of the technology to implement federal programs at the local level (i.e., FEMA, CIAO).

The following table and diagram of roles, public-private interactions and specific lines of business for development is intended to foster further discussion as to the exact nature of a non-profit organization to best support the local and regional data sharing initiatives among federal, state and

---

520 42 USC 6611

521 http://www.gcrio.org/gcact1990.html.

522 Sally Howe, Director of the National Coordination Office confirms that no E.O. was used.

523 E.O. 12881, at http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/execorder12881.html.

524 Codified in 1996 in E.O. 13011, http://www.gits.gov/htm/backgrnd.htm.

525 E.O. 13011, at http://www.cio.gov/charter.htm.

526 PDD 63, http://www.ciao.gov/about.html.

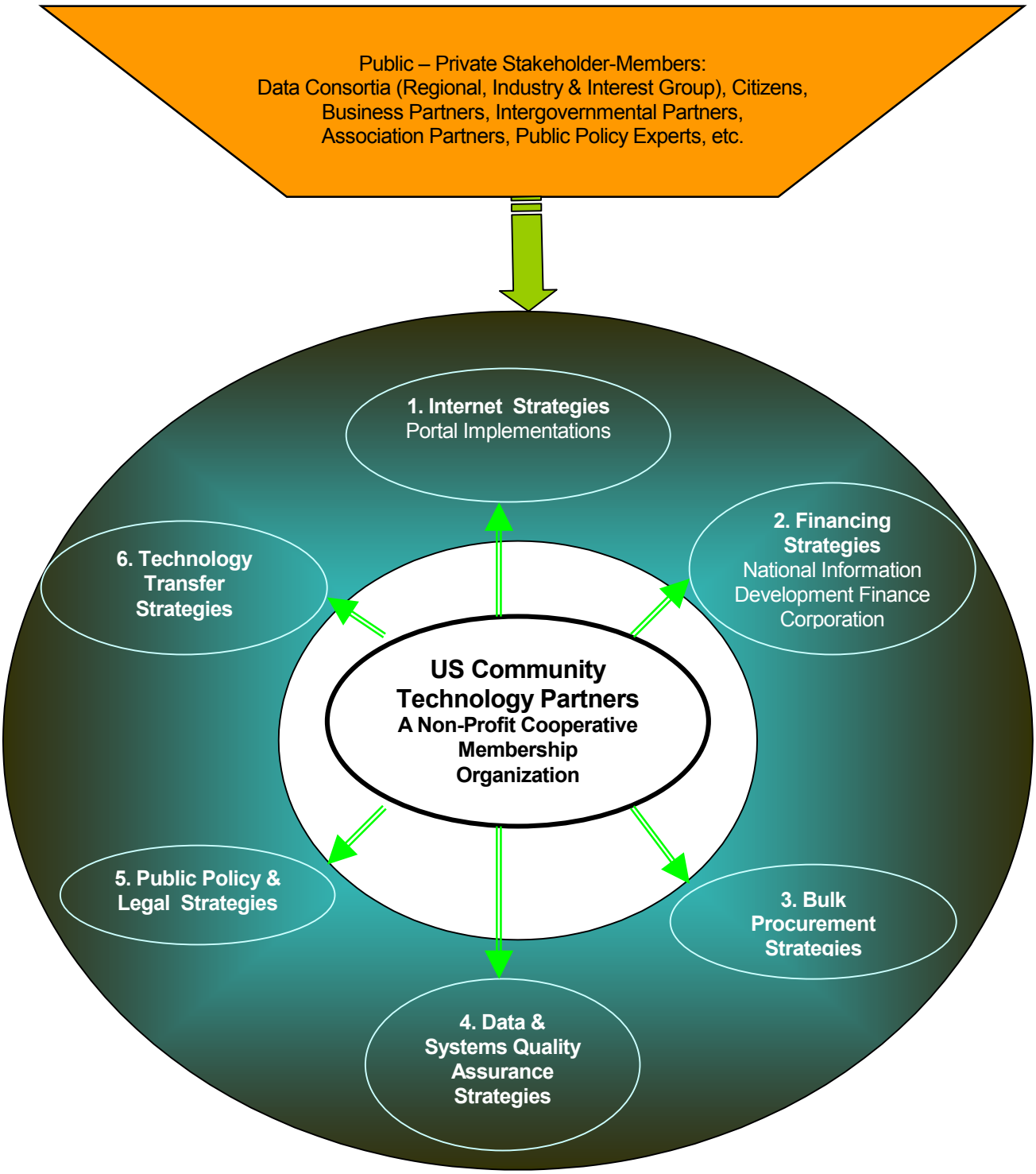
local governments and the private sector.

Core Strategy	Primary Mechanisms	Collaborative Services Researched, Pooled, Offered & Arranged
1. Internet	Consistent with Data & Systems Quality Assurance Strategies and Public Policy/Legal Strategies: ▪ Portal Implementations ▪ EDI implementation of eCommerce, eBusiness &eGovernment	Website Design & Maintenance ▪ Data Assembly Arrangements ▪ Build Common Browsing & Decision Support Tools ▪ Design a "Public Access" area as a Digital Democracy Toolkit that exceeds current Freedom of Information Act functionality for citizens & businesses seeking to use spatial information resources ▪ Sale of Advertising ▪ Content Supply Arrangements ▪ Brand Administration for Content ▪ Visitor Tracking consistent w/security & privacy policies ▪ EDI data byproducts standardized & re-offered to Data Enhancers
2. Financing & Insurance	National Information Development & Finance Corporation working through investment banks, underwriters and insurance companies and using as underwriting criteria Data & Systems Quality Assurance Strategies and Public Policy/Legal Strategies	▪ Regular Survey of Co-Investment Interest ▪ Investment Advisory Services Pooling & Securitization of Investments Originated ▪ Creation of Wall St. Bonds, Equity & Hybrid instruments to increase Liquidity ▪ Consortia Credit Enhancement ▪ Consortia Risk & other Insurance Products ▪ Data Quality Surety Bonds
3. Bulk Procurement	Coordinate Bid Terms & Conditions through associations & business-to-business procurement streamlining companies consistent with Data & Systems Quality Assurance and Public Policy/Legal Strategies	Procurement Best Practices ▪ Assembles requests for Bulk Bidding ▪ Issues Bulk RFPs for Basic GIS ▪ Implements Data & Systems Quality Assurance Strategies through Bidding
4. Data & Systems Quality Assurance	Leverage Work by National & International Bodies to develop and administer standards for: ▪ Interoperability ▪ Data & Metadata Compliance & Cleaning ▪ Legacy Transitions ▪ Security ▪ Privacy ▪ Authentication	▪ Cooperate with Ongoing Standards Development Processes & Organizations ▪ Launch through 3rd parties Independent Means for Data & System Audits and Proofs of Concept ▪ Co-Sponsor Solutions Test-bed Laboratory to tackle shared Policy & Technical Issues

Core Strategy	Primary Mechanisms	Collaborative Services Researched, Pooled, Offered & Arranged
5. Public Policy & Legal	Best Practices for mediating issues of using spatial information responsibly ▪ Design robust outreach to maximize identification of good & bad implementations and fast-track policy response to issues ▪ Engage associations, government advisory committees & interest groups to percolate, vet & prototype ideas for process reinvention & technology solutions	▪ Data Licensing ▪ Privacy Guidelines & Audits ▪ Data Malpractice ▪ First Amendment -Freedom of the Press options
6. Technology Transfer	Consistent with Data & Systems Quality Assurance and Public Policy/Legal Strategies: ▪ Maximize adoption & Minimize risk of new Technologies ▪ Anticipate priorities for "Functional" Technology	▪ Catalogue relevant Research & Development and product/service announcements in Commercial, Government & Academic institutions ▪ Share experience across institutions ▪ Pool Consortia interest in applying Technology Transfer in specific user environments

The new working relationships and positive interdependencies established by providing these services are depicted on the next page.

Diagram of U.S. Community Technology Partners' Operating Units



U.S. Community Technology Partners Fulfills FGDC's Goals for The NSDI

The Federal Partners, through the FGDC, have 4 Goals for the NSDI:[527]

1. ***Outreach***: Increase Awareness of NSDI Vision & Benefits
2. ***Interoperability***: Develop Common Solutions Across Diverse Communities
3. ***Data Pooling***: Develop & Maintain Common Collections of Spatial Data
4. ***Trust***: Build Relationships to Support NSDI

Each of the 6 Strategic Service Areas for the Association (described in the balance of this Proposal) supports FGDC's Goals. The following matrix illustrates how the Association will translate FGDC's Goals into a multi-participant, inclusive and responsive agenda that is managed as part of a membership organization pursuing traditional, coherent, and clearly-defined Business Strategies:

Association's Capabilities / ***FGDC's Goals***	*Input & Core Oversight from Public-Private Stakeholders*	*Internet Portal Strategies*	*Financing Strategies*	*Procurement Strategies*	*Technology Transfer*	*System Quality Strategies*	*Public Policy & Legal Strategies*
1. Policy Outreach & Debate	▲	●	▲	▲	▲	▲	▲
2. Interoperability	▲	▲	●	▲	▲	▲	●
3. Data Pooling	▲	▲	●	▲	▲	●	●
4. Build Trust & Share Solutions	▲	▲	▲	●	▲	●	▲

▲ = Primary Focus & Effect ● = Secondary Focus & Effect

Brand Creation & Management

The Association will manage the establishment of a ***Brand*** or service mark signifying Spatial Data users' and authors' trust in the process of creating and disseminating useful Spatial Data. The FGDC sees this as an important goal of the NSDI today.

U.S. Community Technology Partners' Core Oversight & Management

The Association's strength comes from the fact that it is organized as an extension of, and works through, its Public and Private Stakeholder members. It is the only organization to weave together the intergovernmental (federal-state-local-tribal) and public-private relationships that constitute the institutional elements of the National Spatial Data Infrastructure. It provides a forum where the policy discussions of the last 2 decades among stakeholders can be aired, prototypical solutions tested, and attention and resources focused on refining tangible solutions and workable, standardized

527 FGDC, *A Strategy for the National Spatial Data Infrastructure* (April 1997).

processes.

The Association would have a Board of Directors, rotating bi-annually after the first 3 years. Board members would represent all stakeholders, assuring that the public interest in spatial data access and relative privacy would be taken into consideration in all Association activities. Certainly, a public debate should craft the appropriate balance of representation and leadership.[528]

Through appropriate inter-organizational agreements to coordinate policy development, regular public Town Hall briefings and discussion groups on the Association's Website, the public's views and the benefit of thinking from major policy work by privacy, public access, data security, intellectual property and other public interest researchers would be woven into the policy formation and management oversight functions of the Board.

U.S. Community Technology Partners' Members Rights & Services

As a non-profit cooperative association, membership is open to all public and private organizations that support the charter and goals of the Association. Members include representation from all levels of Government (federal, state, local, regional and tribal) and all levels of the Private Sector (IT vendors, consultants, utilities and other institutional purchasers, universities and non-profits).

The core membership classifications (Community Data Consortia, Industry Data Consortia, Federal Partners and Business Partners) will enhance membership rights, responsibilities and services as experience with the Partnership's programs and Core Strategic Services warrant. Member services

---

528 *For purposes of illustration only*, the Association's representation could reflect and leverage existing stakeholders and their organizational interest in NSDI:

Initially an interim Board of 7 directors could be selected as follows:

- 2 by OpenGIS Consortium
- 2 by Inter-organizational Agreement of NGA: National Governors Association, NACo: National Association of Counties, ICMA: International City/County Managers Association, and NLC: National League of Cities and US Conference of Mayors
- 2 from active Community Data Consortia
- 1 by Inter-organizational Agreement of Public Technology Inc. and Urban Logic Inc.

In addition, a 9-member federal advisory council to the Board would be appointed in an "ex-officio" capacity as follows:

- 1 by FGDC
- 1 by the GITS Board or if the GITS Board does not perform its present functions, by the Office of Science and Technology Policy
- 1 by OMB
- 1 to be filled by FGDC with a steward for specific FGDC or Association focus areas. For instance, the federal advisory council could start with NIMA bringing its knowledge of the federal community's information security and technology transfer capabilities. This slot would rotate every 2 years as FGDC determined.
- 1 by the Chair of the House Committee on Science & Technology
- 1 by the Chair of the Senate Committee on Government Operations
- 2 federal representatives involved in active Community Data Consortia
- 1 federal representative involved in active Industry Data Consortia

The FGDC and GITS representatives would be expected to rotate from among key Agencies and Departments (in accordance with FGDC and GITS, respectively, policies) to achieve the broadest level of input from their constituencies. For instance, the USGS' National Mapping Division might represent FGDC, then EPA or DOT might occupy FGDC's slot.

will include access to the Strategic Services of the Association at rates that reflect appropriate discount for membership dues. Members will be free to arrange for these services on their own (as has been done traditionally) or, if more efficient and advantageous, through the Association. Members also will use the Association as a means of disseminating their data and applications to the wider NSDI user-base. To assure them of the broadest opportunity for bulk procurement and pooled financing, members agree to give the Association notice and the opportunity for other members to bid in all public and private procurements involving Spatial Technology or Data Services. Upon receiving such notice, the Association's public and private members wishing to respond to the procurement notice may do so either directly or as part of a teaming arrangement with the Association itself.

Discussion of U.S. Community Technology Partners' 6 Core Strategies

The fluid nature of the Association's Mission and Role demands that its products and services start and grow as Strategies. This fosters inter-Strategic thinking, and permits adding new Strategies as the IT environment allows.

The Association's Internet Portal Strategy

The Association will design and maintain Web "portals," portal templates, and portal components for NSDI stakeholder groups. The objective of this activity is to leverage powerful Internet capabilities (human communication, on-line processing services, on-line data access, etc.) to improve data coordination and data quality, improve government information technology procurement processes, and to maximize society's return on its investment in geodata. For producers and primary users of NSDI data, the Association will provide Web pages which are like "desktops" that focus the attention of the user, structure the user's information and work environment, make it easier to find and use appropriate information and services, and make efficient the user's main work tasks and workgroup relationships. An NSDI portal contain windows into: pre-qualified data; stakeholder group geodata forums (geodata dictionary proceedings and geodata metadata proceedings); metadata collection tools; decision support tools; certification authorities; book lists; event lists; virtual meeting rooms for online sessions and presentations; inter-stakeholder-group discussions; web-cam views (real-time and past-event-edited) of critical real-world sites; single-purpose spatial products and services; Virtual Private Network windows for special responsibilities related to such activities as disaster management; and tailored views into the offerings of geodata "superstores". Profits from advertising and other sources are used to defray the cost to stakeholders of providing these portal services.

To develop its offerings in this line of business, the Association will serve as and support a test-bed for Internet-ready applications development to facilitate common query and analysis functions demanded within and between government units and by businesses and the public at large. These applications, packaged in Internet portals designed for specific NSDI stakeholder groups, would be built along functional lines that correspond to a user needs survey administered regularly by the Association or its Spatial Data Cooperative members. These test-beds would help showcase the NSDI Vision by giving citizens Web-based progress reports and simulations to "feel" what an Interoperable Geoprocessing Environment is and experience NSDI's true potential.

The Association's Financing Strategy

The Association would operate a Financial Services Center (analogous to NACo's Financial Services Center and NASBIC: National Association of Small Business Investment Corporations) to offer a range of financing solutions and structures to Members. Because members are likely at different stages in enhancing an existing GIS or considering whether to build a GIS or depend on NSDI-available data, alternative financing structures will be

required. Each structure, however, would use underwriting criteria consistent with the Systems Quality, standards promotion, Procurement and other Strategic Products and Services offered by or through the Association. The Association would conduct or support research and analysis to improve understanding of the Economics and Economic Relationships that dictate the cost and feasibility of coordinating the NSDI.

The Association's Procurement Strategy

Part of the frustration faced by government units arises from budget worries, risks, questions, delays, changes in technology specifications and other procurement process issues. The Association's Procurement Strategies group would formulate accelerated procurement solutions to permit members to get "the biggest bang for the buck." For the first time, members in the same city, county or region would have an institutional mechanism to know what similar procurements are contemplated by neighboring jurisdictional units, utilities and other institutional purchasers of geoprocessing and geodata. This knowledge would be nationally available, so that fiscally-meaningful patterns of procurement by agencies or businesses providing similar services could be identified and their purchasing clout increased. Members would be free to bid wherever best suits them. But the option to purchase geoprocessing in bulk, or band together for geodata collection and services through the Association or its member Consortia would be a powerful member benefit.

The Association's Technology Transfer Strategies

Procurement options in spatial information have exploded with the commercialization of technologies and applications pioneered and supported by federal defense, intelligence and civilian Agencies. Increasingly, commercial companies and agencies are seeking partners to implement new uses for cutting-edge technologies that already exist or are on the drawing board. At the same time, Consortia represent a special advantage to prototype and test these transfers at less risk and expense than each Consortia member would otherwise incur individually. Technology Transfer should be in both directions to reduce the cost of updating Spatial Data, enhance analysis and integration with other forms of data, and speed the effective coordination of Consortia members in emergency, environmental or other appropriate contexts.

The Association's Systems Quality Strategies

Interoperability in the real world requires a transactional opportunity to arrange the decisions that build an IT space as stovepipe vs. interoperable. Much of the initial common ground drawing FGDC and OpenGIS Consortium together revolved around the opportunities to marry system and data standards in commercializable products and systems designs. In order to serve as a feedback from the frontlines, the System Quality Strategies would develop or support test beds or pilot projects in local, corporate, government, university, library and international settings to prove and refine the elements of Interoperability that demonstrate key savings and improvements in service (i.e. improving agriculture efficiencies, community policing). Systems Quality Strategies would survey Best Practices or Stepping Stones for NSDI Partnering. This Strategic Group would assemble these Winning Strategies into an Annual Investment Guide to the NSDI and Interoperable Spatial Underwriting Criteria to help Stakeholders understand, improve and coordinate on their Spatial Investment choices.

The Association's Public Policy Development & Legal Strategies

The laws affecting dissemination of Spatial Data include: FOIA: Freedom of Information Act, Copyright, Tort/Negligence, Contract/Warranty, Privacy, Security Threat, Data Malpractice and normal Licensing issues. The 1998 NAPA: National Academy of Public Administration

Report *Geographic Information for the 21st Century* highlighted these issues for future resolution. All of these issues affect how much Spatial Data stakeholders expect to (1) access through NSDI, (2) provide to NSDI and (3) keep from the NSDI. These issues also affect the Internet, Procurement and Financing Strategies, placing limits and rights that arise from such Strategies. The Association will need legal advice on such issues, and work with its members' legal counsel to achieve common licensing, financing and other documentation and conventions.

Organizing the Association

To start business as the Association, a small representative group of the Stakeholders needs to:

1. Meet to refine this Proposal and add a budget;
2. Reaffirm that the Stakeholder Group agrees with its representative;
3. Allocate among the Stakeholders the budget as well as in kind contributions of people, systems, telecommunications and other infrastructure
4. Draft the Charter of the Association and legally review it in the most ad hoc, expeditious way
5. Ask the Stakeholders to ratify the Association's Charter and contribute their portions of the core budget and assets

The mediating role of the Association

To borrow a phrase from BASF:

> *The Association does not make Spatial Data, it makes the Spatial Data products you and your Community use better.*

As has been explained, the Association will not be a central repository of Spatial Data, nor will it be a Clearinghouse. Rather, the Association will be a service bureau, offering a toolkit of business processes that foster the development of Spatial Data Consortia, i.e., community Spatial Data warehouses, utilities and other cooperative data sharing initiatives.

In its shared investment and underwriting approach to pooling Spatial Data investments, the Association will build on and make commercially meaningful the FGDC's strong start on Framework Data and Transfer Standards. By providing a common legal and procurement setting, the Association will build nationally cohesive options that adapt to the 50 State and numerous local settings in which Spatial Data is created and used. And by launching Internet Portals, the Association will encourage the building of business and government solutions that incorporate quality Spatial Data and geoprocessing into everyday institutional decision support processes. All of this activity makes the Association members stronger in their own right, and as resources in the NSDI.

References

[To be added if LEXIS-NEXIS' *FullAuthority* product update for Word 2000 supports an automated inventory of these references].