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Pixelating Policy

Visualizing Issue Transformation in Virtual and Real Worlds

By Dr. Dwight Toavs, IRMC

Inside this issue:

"Pixelating" … [is when] a portion of a digital image is progressively magnified until the individual pixels (or picture elements), the basic elements of a digital image can be seen. This research describes the entire "picture" of IRM as a policy subsystem, but progressively magnifies, or pixelates, that depiction to examine the basic elements and dynamics of public policy, policy issues, issue transformation, and policy change.

The Problem of Paperwork

In Washington policy circles, it's been said, management issues are not very sexy, and this issue – federal paperwork -- was very unsexy, even for a management issue. The study of federal paperwork management began with little political fanfare; Public Law 93-556, enacted on December 27, 1974, established a Commission of the U.S. Congress to study and investigate the information-related statutes, policies, rules, regulations, procedures, and practices of the Federal Government. This was hardly glamorous work, considering the momentous political events of 1974 – Watergate hearings, President Nixon's resignation, and the Watergate trials.

Codified in the Paperwork Reduction Act of 1980, the Commission's recommendations ushered in a new management function, called "information resources management" or "IRM", to deal with the problems resulting from federal paperwork. Over the past quarter century the central concerns of information resources management have shifted from the original paperwork challenges to today's focus on information assurance, information technology governance, and line-of-business consolidation. This study examined how a policy issue, such as paperwork, was transformed over time into concerns expressed as management reform and electronic government.

Understanding issue transformation was the focus of this research; how do policy issues such as those outlined above, change over time? Information resources management, viewed as a policy subsystem, was the subject of study. Six key issues – paperwork, privacy, computer security, information technology acquisition, records and information, and management reform – were traced over 28 years. The goal of this study was to detect and identify issue transformation, and to understand the nature of the relationship between issue transformation and policy change.

Two purposes were served by this study and the results affect two audiences. For public administration and policy scholars, knowledge of policy structures and policy dynamics was advanced. Practitioners of public administration such as IT professionals, will find an examination of core issues, policies, and coalitions that contributed to the evolution and transformation of information resources management issues. This 28-year narrative provides a basis for understanding issue transformation, policy dynamics, and policy change.

Issue Transformation as Change in Issues Over Time

Issue transformation, as a public policy phenomenon, is neither adequately conceptualized nor sufficiently addressed in policy theory. Policy studies have traditionally employed decision-centric or event-centric perspectives that provided a short-term "snapshot" view of policy activities. But when one examines pol-

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icy choices – over a significant period of time and within a single policy area – the question of how and why issues and policies have evolved seems a natural question. A seemingly apparent instance of issue transformation as seen from a long-term perspective may be completely obscured when one focuses on individual decisions or isolated policy choices. David Roquefort and Roger Cobb, two of the handful of policy scholars that mention issue transformation, view issue transformation as evolutionary, with language and knowledge construction playing key roles in evolving issue interpretations. That notion – viewing issue transformation as an evolutionary phenomenon – implies that time is an important dimension of policy activities, and should be a valid research concern. By extension, policy analysts should embrace longitudinal studies – along with traditional event- or decision-centric analyses. The notion of evolution in issue transformation also suggests a research concern with the causes and course of an issue's evolution, and leads us to ask, "How might one explain issue transformation in terms of policy theory?"

Policy theory had not previously addressed the central question of this study: “In what ways are the core issues underlying public policies transformed over time, and what is the relationship between issue transformation and policy change? Or, stated in terms of US Federal information resources management policies, “In what ways and by what means were the issues underlying Federal paperwork policies of the 1970's transformed into the issues and information resources management policies of today's agency Chief Information Officers?”

Information and Information Technology in Government

Information resources management was used as the setting for identifying and examining issue transformation in a policy subsystem. A case study was constructed using the theoretical lens of Paul Sabatier and Hank Jenkins-Smith’s advocacy-coalition framework (ACF), a theory for assessing policy change over considerable periods of time. That framework’s policy subsystem maturity model provided theoretical coherence to the temporally organized events within the 28-year study. The developing or *nascent* phase spanned the period 1981 – 1996, with the *mature* policy subsystem spanning the years 1997 through 2002. Importantly, no previous study using the ACF had examined the formation of a policy subsystem; this study filled that gap in the research literature by its coverage of the formation of the IRM policy subsystem during the years of 1975 – 1980.

Concerns and Complaints Forced Policy Action

“Ironically, much of the force for formulation of a national public policy for information systems was motivated by the desire to restrict information gathering,” with U.S. Commerce Department officials viewing Federal information gathering activities “a major productivity-impeding burden on American business.” The paperwork and red-tape of government were seen as resulting from increased socio-economic intervention in the 1960s and 1970s. Growing discomfort with the increasing size of government was fueling calls for government reform. Information technology was rapidly permeating Federal programs in agencies ill-prepared, policy-wise, to deal with the costs and unforeseen consequences of computers in government. Early legislation, such as the Freedom of Information Act of 1966 and the Privacy Act of 1974, were narrowly drawn, reactive responses to address past agency failures to provide and protect information.

Facing growing pressure for action, Congress established a 2-year commission to investigate the problem of paperwork and to recommend solutions. The Commission on Federal Paperwork identified, characterized, and examined the core concerns, from privacy and security to paperwork, records, and information management. Attitudes that viewed information as a free good, they concluded, were key contributors to the paperwork problem and its related information dissemination and records storage problems. In its final report, the commission articulated a pragmatic vision of IRM as a legislated management reform; the mission was reducing the paperwork burden of government and effectively managing the government’s massive stores of information.

Assistance needed to pass paperwork legislation was found in a new and powerful ally, Representative Jack Brooks (D-TX). In return for his considerable support, paperwork concerns were reprioritized and information technology provisions added to the bill; the earlier characterization, perception, and definition of information resources management was altered (this, incidentally, was the first instance of issue transformation). By its passage, the Paperwork Reduction Act and information

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resources management not only defined the "relevant problems" of the fledgling policy subsystem, but also incorporated implicit notions about how to successfully implement the legislation and its objectives.

IRM From 1981-1996: A Work in Progress

The formative years of information resources management as a policy subsystem, 1981 through 1996, exhibited each of the three stages of the ACF's policy cycle: formulation; implementation; and reformulation. The formulation stage, 1981 through 1985, demonstrated the influence of external events - the deregulatory goals of the Reagan administration. In the implementation stage, 1986 – 1992, Executive Branch policies for information resources management were implemented and institutionalized in Federal agencies. The years 1993 – 1996 were a time of policy reformulation – revising and updating IRM policies.

1981-1985: Policy Formulation

The Paperwork Reduction Act of 1980 had sketched broad policy goals and ideas, however, the details of executive branch implementation policies were not finalized and published until December 1985. In a period of ideological gamesmanship and selective policy emphasis, the Reagan administration's regulatory reform initiative promoted certain information policies while avoiding others. The Information Industry Association, for example, suggested that the government should not compete with the private sector in developing or disseminating information, and that government information services should be periodically reviewed with an eye toward discontinuing those activities that compete with private industry. This approach highlighted the administration's penchant for the "competitive model" of policymaking, where the marketplace assumed the role normally ascribed to public policymaking organizations.

Executive branch agencies also played roles in slowing policy formulation. For example, provisions for policy oversight and enforcement were the focus of an extended feud between the Department of Defense (DoD) and the General Services Administration (GSA) over delegation of procurement authority (DPA) for computers. This disagreement led to legislative intervention by Senators Nunn (D-GA) and Warner (R-VA). At issue was GSA's role in control and oversight of policies for acquiring computers. The Defense Department was adamant about retaining oversight of its computer acquisitions, especially for computers related to intelligence information systems, command and control systems, and in weapons systems.

Meanwhile, coalitions of academic, library, and information science professionals, believing their concerns about records and information management issues had been marginalized, attempted to again inject a public service orientation into OMB's proposed Circular, A-130, *Management of Federal Information Resources.* Ultimately the Reagan administration's preference for the market model of policy making resulted in "OMB making information policy decisions based on the criterion of cost-effectiveness."

1986-1992: Institutionalizing IRM

Institutional concerns dominated the implementation phase in the evolution of IRM. Agencies, many of which had earlier only acknowledged the notion of IRM, now faced the real work of implementing the Paperwork Reduction Act as viewed by the Reagan administration.

Creating a cohesive management activity for information resources was problematic. Each of the specializations brought together in the Paperwork Reduction Act's vision of IRM had its own clientele; funding sources; champions; and basis for existence in policy, regulation, and legislation. Under the dual pressures of budgets and oversight, agencies implemented the IRM concept on paper and adopted the "market model" in information intensive programs to meet the administration's mandate for information and institutional efficiency.

In Federal agencies, IRM was narrowly defined and initially situated within either the agency's comptroller or administrative organizations. Other information activities, such as printing and publishing, micrographics, agency libraries, audiovisual, and internal mail distribution functions were excluded from the definition of IRM. Organizations struggled with a variety of structural approaches to integrate the four diverse professional and technical cultures now comprising IRM: the culture of computing, the culture of procurement (later redefined as information technology acquisition), the culture of telecommunications, and the culture of records management. Leadership of IRM organizations was heavily biased in favor of computing professionals.

1993-1996: Policy Reformulation and Management Reforms

In January 1993, the Clinton administration and the Congress embarked on parallel agendas to reform executive branch bureaucracies. Congressional reforms

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Technology and the Human Factor...in Combat

Wireless Local Area Network (WLAN) Systems for Tactical Combat Applications

By Colonel Herzi Halevi, Israeli Army
ICAF, International Fellow, and Information Highway Student

In the summer of 2001 the paratroopers' battalion that was under my command was chosen to experiment with a combat WLAN system. It was a very interesting experience though my conclusions may be different from what most people would expect.

This article deals with the usage of WLAN systems for tactical combat applications. I analyzed four dimensions of this subject:

- D2K2A - the essence of this system which is the process of transforming *Data to Knowledge and Knowledge to Action*.
- Cultural challenge – the effect this type of system has on other aspects of command and control and the joint effect of these systems.
- Joint nature of the technology – the impact of WLAN in supporting joint forces.
- Technological challenge - focusing on the security aspects of this technology.

Ever since the days fighters had to wave flags and bugle with horns, this type of a combat communication system was probably every commander's dream. Supporting real-time communication, almost unlimited capacity and varied formats of information (picture, voice, etc.), this technological vision has become a reality.

D2K2A

Processing data to knowledge is a common challenge of the information age. Combat tactical WLAN systems create another stage among the chain – converting knowledge to action. The main parameters of this phase are the timeliness and quality of decision, but, unfortunately both are inversely related (refer to figure on the next page). While in combat, one has to make the right decision, but it has to be made at the right time. The value of a good but late decision, sometimes, is even worst than a less-than-good decision that was at the right time.

Dealing with WLAN systems, our focus is mainly on the technological components since this is the new, innovative element that affects the timeliness and quality of decisions. It is clear that the information age places a new challenge for field commander, namely, how to manage the overflow of information, which is also now faced by the platoon leader whether when he is fighting or planning.

Because battle commanding demands multi-focusing -- even without communication systems, we have to examine carefully how the human mind can process this elevated amount of information. It has to be done with the goal of a high quality decision and without harming other aspects of the battle command. The solution for this problem is mainly a cultural one. Before getting to solutions, I would like to elaborate on the cultural problem.

"...it is not who that has the information who wins, but who that best manages the information."

Cultural Challenge

The cultural problem is not about the technology but how people can use these new technologies to their advantage. I see two different aspects of this problem -- from the tactical perspective, i.e., the commanders in the field; and from the headquarters' perspective, i.e., those who give the orders and have a new way to view the battlefield and have an influence on it.

◊ **Field commanders' point of view** - A battlefield is a very complicated working environment. What is strongly needed from the commander in the field is a strong ability to sense and integrate a wealth of information within a short period of time. This sensing process must be followed by a sound decision-making process. Our senses work by stimuli -- the more tangible and clear the stimulus is, the higher the priority it gets. From this natural relationship is related to the main problem of tactical WLAN systems. The concern is that the commander will tend to neglect field sensing in favor of watching the monitor screen, a clear and tangible temptation. The commander can gain a lot from a UAV's continuum picture or any other remote sensing data, but the tradeoff between actual field and remote sensing data should be managed very carefully. These new technologies might create a distraction for the commander since his greatest challenge is to concentrate on the right thing at the right time.

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- **The headquarters' point of view** - The commander, who sits in the headquarters and has ideal conditions to absorb data within a comfortable working environment, can significantly upgrade his knowledge of the incidents in the battlefield with the new technologies. This can be achieved from watching the "big picture" transmitted in real time from the UAV to small tactical sensors that are located with the troops (small cameras, GPS-based location sensors, etc.). **The cultural challenge is to take the right level of intervention.** The same natural mechanism that was mentioned before urges us to react to what we perceive – the commander in charge can mistakenly get the feeling that he controls the operation in the same way as the commander in field. This illusion can result in over-interventions which will harm the ability of field commanders maintaining command of their troops. In other words, **the new technology can unintentionally break the chain of command which has a critical posture in combat reality.**

For examples of cultural problems, visit: http://handle.dtic.mil/100.2/ADA382095

Joint Aspects of WLAN

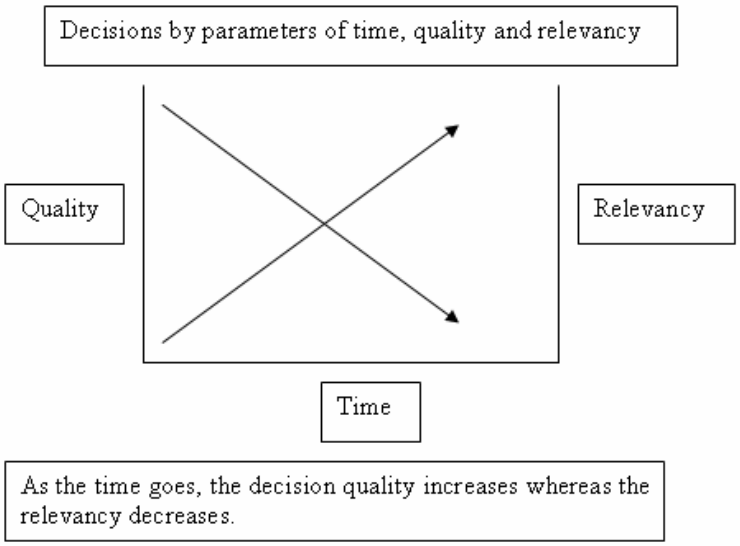
The joint aspect of the WLAN, which is part of the cultural problem, has two dimensions – the inter-services and the international aspects. Whereas the inter-services dimension is more likely to be addressed as part of the joint process, the international aspect is much more complicated -- it is related to a cultural-technological gap. Here I will focus on the international dimension.

Globalization and technology have changed the battlefield like many other aspects of our lives. In the past, the challenges of joint interoperability were different languages and diverse ways of fighting. On top of these problems, the information technology adds the complexity of communication. **Different communication systems make a stiffer barrier than the variety of languages.** During "Noble Anvil" -- the international operation in Kosovo, many problems stemmed from the gap between the U.S.' advanced systems and the older European's systems. It prevented the ability to cooperate particularly in transmitting real time information to the European forces.

To see more about operation "Noble Anvil," visit: http://handle.dtic.mil/100.2/ADA382095

The approach for solving this problem is not easy to define. The communication system of a military organization is directly influenced by the country's industry and level of technology. I envision three ways to solve the problem:

- Align the communications capabilities by supplying all allied countries with the same equipment. This means upgrading the military systems above the country's current level of technology. However, this is an impractical direction due to the inability to maintain the systems for the long term and the cost of such a step.
- Choose a communication system that is the lowest common denominator. Unfortunately, the problem with this solution is the reduction in capabilities by not using the best equipment for battle missions.
- Adapt the level of cooperation to the variation of communication systems the different allies have. This is the only practical solution though not an easy one to implement.



Behind this last approach is the need to train personnel and plan the interoperability requirements with the constraint of using different communication's equipment. The constraint that can result from this modus operandi is the failure to grant all forces the same level of information and the inability to place two forces, each with different communications systems, in the same tactical arena.

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Technology and the Human Factor...in Combat (cont.)

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Technological Challenge

In the past, the main problems from the technological point of view were concerned about miniaturization, efficient graphical tools, bandwidth and others. Today, state-of-the-art technology gives a satisfactory solution for these issues. Now**, the main problem that bothers both the users and developers is the level of security of the network links.** WLAN systems transmit the information by using radio waves. The ability to receive the transmitted data is only a matter of location and having the right receiver. Encrypting the data is the best solution so far, but it still has two problems: the encryption code takes up the link's payload; and encryption codes are not 100% secure from cracking. The advantage of tactical systems for battle managing is the half-life value of the data over time, i.e., tactical information for combat usually will be used right after it was transmitted. From this characteristic I can identify a potential solution. **The combination of using systems with encryption that will prevent immediate cracking, coupled with transmitting the data immediately before combat can create a sufficient solution.**

For the DOD policy on the daily use of WLAN, visit: http://www.nwfusion.com/news/2004/0503dod.html

For more information about the civilian aspects, visit: http://www.sans.org/rr/whitepapers/wireless/1010.php

Summary

In this summary I will focus on the connection between the D2K2A and the cultural problem. I perceive the link's security issue and the joint aspect as more technical themes. I have mentioned my opinion about the direction to cope with these problems. I think that the cultural problem is the most complex one. One can argue that this problem can also be solved by another technological improvement that will process the knowledge to action in a better way, but I think that it will always get back to the individuals who use the system.

The challenge is knowing how to gain from the technology without risking command and control capabilities. It is mainly about training and education -- from the "big bosses" who must be restrained in spite of the great knowledge they have, to the field commanders who have to know when and to what degree to use this tool. **A new culture of discipline should be developed in order to bolster this innovative change.** We tend to focus on the technology, because of the changes it makes, but in this case, the focus must be on the human aspect and not on the technology. The followed recommendations address the system's characteristics and the ways a commander should use it.

For information about the Marines' experience with WLAN, visit: http://handle.dtic.mil/100.2/ADA379706

Recommendations

- The **pace of change** in the battle field management should be commensurate with the forces' ability to absorb and digest the change and not the pace of technology. This will help in keeping the focus on the human aspect.
- Develop systems with **filtering capabilities** in order to cope with the information flow -- send what the tactical levels need and not all the information the system has. The output of this recommendation is that **the system manager has to be someone that has a command experience,** thus he will be aware of the field commander's desired modus operandi.
- **Rely on well-known user interfaces** to ease the system operation. For example, the use of Outlook as mail software to connect users can decrease significantly the adaptation difficulties.
- To solve the field commander's dilemma of how to use this tool, it is better to create a new position in each team to operate and monitor the system. This person will have to know when to call the commander's attention based on evaluating the information's relevance and the commander's **ability** to accept new information.

In the experiment I did with my battalion, I realized that a wonderful technology has the potential of causing severe problems. My main lesson learned was that *it is not who that has the information who wins, but who that best manages the information.*

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Voice over Internet Protocol (VOIP) for the Enterprise

By Brian Barnes, William (Schatten) Douglas, Felice Gant and Derrick Wright --"Changing World of the CIO" Students

Voice over Internet Protocol (VoIP), also known as IP telephony and Internet Voice, is a technology that allows you to make telephone calls using a broadband Internet connection instead of a regular (or analog) phone line. VoIP uses the Internet Protocol (IP) to transmit voice as packets over an IP network. It can be achieved on any data network that uses IP, such as the Internet, intranets and local area networks. VoIP converts the voice signal from your telephone into a digital signal that travels over the network then converts it back at the other end so you can speak to anyone with a regular phone number.

VoIP has several advantages over traditional circuit switching systems:

Integration of voice and data - The integration of voice and data traffic will be demanded by multi-application software. The inevitable evolution will be web servers capable of interacting with voice, data and images.

Simplification - An integrated infrastructure that supports all forms of communication allows more standardization and lesser equipment management. The result is a fault-tolerant design.

Cost reduction - The Public Switched Telephone Networks' (PSTN) toll services can be bypassed using the Internet backbone, which means slashing the prices of the long distance calls.

Inter-office trunking over the corporate intranet - Tie trunks between company-owned PBXs could be replaced by an Intranet link and would provide large savings at a good quality of service.

Fax over IP - Real time facsimile transmission is an immediate application of VoIP. Facsimile services, which use dial-up PSTN services, are affected by high cost for long distance, analog signal quality and machine compatibility.

Have you taken an IRM College Intensive Course via Distributed Learning? If not, have you wondered about the types of assignments the students accomplish throughout the course?

This article is an example of the results of one assignment during the 12-week distributed learning Changing World of the CIO Course. During this week the students were focusing on "Information Technology Trends and Assessments." This particular group of students developed a Decision Document regarding Voice Over Internet Protocol (VOIP). During this same week, other groups of students wrote about Biometrics and Radio Frequency Identification (RFID). Throughout this interactive course, students complete a mix of individual and group assignments. A few of the other assignments include developing best practice articles, debating whether IT matters, and case study role-playing.

Why not add an IRM College Distributed Learning course to your repertoire of accomplishments?

- Dr. Kathleen Schulin, Course Leader, Changing World of the CIO

Potential Issues and Challenges

VoIP is coming of age but it still faces some potential issues and challenges especially in an enterprise environment. There are several problems with the VoIP technology as it stands today: interoperability, security, bandwidth management issues, the lack of directory services, and the lack of its ability to integrate with Emergency 911 call centers.

VoIP places serious requirements on the IP network. The network has to be capable of handling time-critical voice packets together with a significant load of data packets generated by applications.

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Voice over Internet Protocol for the Enterprise (Cont.)

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Also, there are security issues associated with the technology such as distributed denial of service attacks on VoIP PBX's. National Institute of Standards and Technology (NIST) provided cautionary advice for offices considering moving their telephone systems to VoIP. These include: building logically separate voice and data networks instead of a single converged network; using strong authentication and access control at the voice gateway; using VoIP firewalls and routinely testing them; provide backup power for key components; and avoid the use of VoIP "softphones" (ordinary PC with special software) where either security or privacy is a priority.

VoIP promises to provide: 1) increased efficiency; 2) improved integration with other information technologies; 3) better opportunities in service and application innovation; and 4) cost savings.

All of these stumbling blocks will keep VoIP technology from being implemented immediately into enterprises. Until these problems are fixed, standard PBXs will remain the norm for voice communications. These problems arise from the lack of a single standard being adopted by the software and hardware vendors.

Military and Government Usage

According to recent research conducted by World Wide Worx, more than 50% of the companies polled recently said they would use VoIP for the first time during 2005. VoIP is here and deployments are expanding.

The Department of Commerce's swift acceptance of VoIP resulted from the events of September 11 and the desire for an advanced emergency voice communications system capable of providing a "reverse 9-1-1" function that could alert employees during an emergency. Commerce department can broadcast live or canned messages in voice or text on each Cisco phone's LCD as well as over the public address system.

The US Department of Treasury operates one of the world's largest networks, called TCS (Treasury Communications System). They have been diligently preparing to revamp it into the new TCE (Treasury Communication Enterprise). Among the various types of capabilities discussed are VoIP and the ability to communicate at the desktop in various ways.

Many military units in Iraq and Afghanistan are currently using VoIP. The flexibility and the speed of deployment and mobility seem to be the biggest advantage for the military. DISA has been exploring VoIP as a way to combine voice, data and video services onto one network. The Navy is currently testing VoIP as a transport for ship-to-shore voice and fax communications. We are going to see military, government and industry joining the real digital world and realize the benefits of costs savings brought about by VoIP.

Performance Metrics

How an enterprise perceives the overall Quality of Service of a VoIP system is critical to defining a performance metrics. VoIP services must not have a noticeably lower performance rate than other traditional PSTN's. Defining performance metrics to measure voice quality in conjunction with availability detection can enhance VoIP. As a result, a well-managed network plays an essential role in keeping a VoIP system up and running properly.

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Several things should be considered when measuring performance metrics for VoIP:

1) Packet loss levels
2) Delay
3) Signal, noise and echo levels
4) Call quality – such as latency and jitter
5) Configuration data for determining the cause of poor call quality

One should not overlook traditional metrics such as reliability, availability, scalability, cost, customer satisfaction and improved business processes.

The Future

The future of VoIP is very promising. By 2003, over 83 billion minutes of voice traffic was carried over IP. The economic and flexibly of this technology is allowing VoIP to become a major force among today's new technologies. According to Peter J. Howe, "Internet phone service opens the gates to a host of cutting-edge services that few people have at the office: some of these services are one computer mailbox that will allow a customer to receive voice mail and e-mail, making phone calls from your laptop, and "find me" and "follow me" services that will ring your home, work, and wireless phones using one number."

Traditional phone service providers like AT&T are not the only providers of VoIP, cable companies are also part of the playing field. Some of the technologies that are being looked at in relationship to VoIP are instant messaging, drivers for VoIP, and standards that will drive the usage of VoIP. Long term trends include wireless VoIP (such as VoIP over Wi-Fi), open source VoIP technologies, and broadband user services. It will be a while before communications companies put VoIP in full usage because with any emerging technologies, hurdles have to be overcome.

VoIP promises to provide: 1) increased efficiency; 2) improved integration with other information technologies; 3) better opportunities in service and application innovation; and 4) cost savings. Industry analysts from firms such as Gartner Research and Meta Group confirm these predictions.

In a recent report, according to a prediction by the technology research group, Gartner, VOIP-capable phone systems will constitute 97 percent of equipment shipments by 2007. As with any major initiative, the reasons driving the change are the many potential cost savings. According to a report by the Meta Group, when an "impending event" requires reevaluation of telephony requirements, businesses consider implementing IP telephony in 90 percent of the cases.

Conclusion

Voice over IP is becoming a key driver in the evolution of voice communications. On 8 March 2005, the Federal Communications Commission (FCC), charged with regulating interstate and international communications by radio, television, wire, satellite and cable, issued an order that involved this technology. According to Commissioner Kathleen Q. Abernathy, "This [FCC] decision provides much-needed clarity regarding the jurisdictional status of Vonage's Digital Voice service and other VoIP services. By fencing off these services from unnecessary regulation, this Order will help unleash a torrent of innovation. Indeed, by facilitating the IP revolution, rather than erecting roadblocks, our [FCC] action will drive greater broadband adoption and deployment, and thereby promote economic development and consumer welfare."

Under this environment, telephone companies and other service providers are aggressively marketing new hardware, software, and other related services. The promises are for increased efficiency, improved integration with other information technologies, provide for new opportunities in service and application innovation, and eventually will replace existing legacy telephone services.

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VON magazine, issue: July/Aug 2004

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focused on making the bureaucracy more accountable by using traditional managerial interventions, the Government Performance and Results Act of 1993 (GPRA), to be phased in over a seven year period. The Clinton administration's efforts emphasized the Gulliver approach, freeing good people in the bureaucracy to do the right thing through process reform - reengineering. The National Performance Review (NPR) focused on identifying and ridding agencies of burdensome and unnecessary regulations and processes. The assumption that newly reengineered processes would be enabled by information technology (IT) was central to the NPR's approach to achieving a "government that works better and costs less."

The reform-oriented 104th and 105th Congresses produced an amazing quantity of IRM-related reform legislation. The Government Performance and Results Act (1993) was followed by the Federal Acquisition Streamlining Act (1994) and a significant revision to the Paperwork Reduction Act (1995). Reforms culminated with the Information Technology Management Reform Act (ITMRA) and the Federal Acquisition Reform Act (FARA), later renamed the Clinger-Cohen Act of 1996 in honor of its House and Senate sponsors, William Clinger [R-PA] and William Cohen [R-ME]). The FARA changed information technology acquisition guidance, while the ITMRA brought Chief Information Officers (CIOs) into federal agencies, extended performance management and strategic planning to agency information technology activities, and closed out the era of the Brooks Act by repealing its 30-year-old provisions.

IRM 1997-2002: A Mature Policy Subsystem

Early in this period agency CIOs were challenged to implement legislated management reforms while simultaneously dealing with reengineering and downsizing initiatives. Successful agency CIOs assumed key leadership roles within their agencies and in the newly established Federal CIO Council, established by the 1996 Executive Order 13011. During this period, new technologies, new uses for technology, and new concerns, such as the Year 2000 problem, or Y2K, surfaced.

Rapid and sometimes unprecedented changes in technology and its application triggered actions as well as reactions. Commercialization of the Internet through electronic commerce altered key IT acquisition policies and provided a myriad of new business opportunities. The Internet also strained traditional brick and mortar business models, complicated tax policy and economic development jurisdictions, and spawned both pro and anti-Internet taxation movements. Adoption of Internet technologies, such as the World Wide Web and the Hypertext Transport Protocol (HTTP), profoundly transformed government information dissemination. The Year 2000 date problem took on strategic national and global importance, prompting public and private enterprises alike to verify and guarantee the technological sufficiency and security of their computing infrastructures. Not all changes were positive, as evidenced by the Melissa computer virus, and electronic intrusion, alteration, and destruction of Web sites and databases by hackers, prompting legislative initiatives to improve computer security.

Telecommunications deregulation and the sale of potions of the radio frequency spectrum provided the foundation for wireless communications (cellular communications) and data communications (wireless fidelity or Wi-Fi). The rapid proliferation of pornography on the Internet triggered reaction in the form of the Communications Decency Act and related law enforcement and public safety initiatives. Public key encryption, generally agreed as fundamental to verifying identity in electronic environments and a key to realizing the promise of electronic government, was not achieved during the time period of this study.

As the power and capability of information technology increased, the social consequences of information technology implementation choices became increasingly apparent. While facial recognition technology can be used to enhance airport security, it was viewed by many as unnecessarily intrusive into individual privacy. Computerized voting, supporting democratic voting processes and secret balloting, also created an audit trail of voters. "Packet sniffers," software created to investigate computer fraud on the Internet, indiscriminately scanned the e-mail and Web traffic of all subscribers using that Internet service provider. Awareness was dawning throughout the society that policy concerns were increasingly interwoven with technology. And as information technology became increasingly preferred as an instrument of policy implementation, as is the case with electronic government initiatives, the policy questions were becoming more important, the issues were becoming more complex, and the policy environment more dynamic.

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Study Results and Its Contributions

This study posited a definition of issue transformation, developed a research framework to search for evidence of issue transformation, and identified 17 instances of issue transformation, 16 of which lead to documented policy changes. Conclusions of interest to the policy community are:

- ◊ Policy issue transformation is a real policy phenomenon, and one that results from conscious and concerted human effort to redefine a policy problem and influence policy change.
- ◊ Issue transformation can be detected and tracked, and typically precedes and results in policy change. One might conclude that issue transformation facilitates or paves the way for policy change. Tracking issue transformation provides a useful means to detect and track dissatisfaction with the policy status quo and to assess the need for policy change.
- ◊ Issue transformation appears to be an intermediate or transition phase between the end of one policy cycle and the beginning of the next policy cycle dealing with that issue.
- ◊ Issue transformation alters the content, or substance, of the policy issue; it may also alter the intended recipient of the policy action, and frequently alters both.

Contributions to public administration are practical and potentially more far-reaching. Issue transformation is fundamentally linked with issue definition and policy change, and our perceptions of problems and solutions. Information resources management, and its IT-centric solutions, is now generally seen as the key enabler of modern information technology-mediated governance. This view alters the traditional content and context of public management by its claims on resources, by bringing new players into policymaking and implementation, and by elevating information resources management to a level deserving scholarly study and educational focus in public administration programs.

It is also imperative to address the influx of information technology professionals into senior executive and policy positions, a trend that changes the knowledge and

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Pixelating Policy (cont.)

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skills mix, experience base, and expectations of public administrators. Traditional public administrators are increasingly ill prepared to deal with the range of technology-infused issues facing today's CIOs and their staffs. Most agency Chief Information Officers are senior specialists, experienced in agency and technology matters, but relative newcomers to policymaking and policy implementation. Providing information technology professionals relevant policy models, grounded in research and theory, may increase their effectiveness in providing IT support for key programs and in implementing technology-based solutions to existing problems.

In addition, there is a long-documented need to include information resources management as an educational component in public administration education programs. The accelerating transition to information-technology-enabled processes, information-technology-based service delivery, electronic benefits transfer programs, and electronic commerce for buying goods and services – in short, electronic government – creates a compelling case for integrating information resources management into public administration education generally, and public management education specifically. Linkages to topics in policy education might then contribute to identifying and defining key issues, and sensing shifts in their definitions. In each of the public administration applications noted, understanding the impact of issue transformation, as an ingredient of policy change, is critically important in addressing the changes in public administration as a practice, and as a discipline involved in a theory-practice dialogue.

In concluding, a word about the title "Pixelating Policy." The notion of "pixelating" is a metaphorical reference to a digital imaging technique, in which a portion of a digital image is progressively magnified until the individual pixels (or picture elements), the basic elements of a digital image can be seen. This research describes the entire "picture" of IRM as a policy subsystem, but progressively magnifies, or pixelates, that depiction to examine the basic elements and dynamics of public policy, policy issues, issue transformation, and policy change.

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About the Author

Currently a professor of systems management in the Information Resources Management College, Dwight Toavs successfully defended his Ph.D. dissertation at Virginia Tech's Center for Public Administration and Policy (CPAP). Dwight's dissertation won Virginia Tech's 2004-2005 University Outstanding Dissertation Award in Social Sciences. It also has been nominated by CPAP for a national prize, the Leonard White Award of the American Political Science Association for the best doctoral dissertation in the field of public administration.

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