

CHOOSING THE ROUTE

TO TRAVELER INFORMATION SYSTEMS DEPLOYMENT



Decision Factors for Creating
Public/Private Business Plans

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Sponsored by:



**ITS AMERICA
ADVANCED TRAVELER
INFORMATION SYSTEMS
COMMITTEE**



**UNITED STATES DEPARTMENT
OF TRANSPORTATION**

Prepared by:



**WASHINGTON STATE
TRANSPORTATION CENTER**

FOREWORD

The balance of public and private sector roles and responsibilities has been a principal topic of debate within the ATIS Committee of the Intelligent Transportation Society of America (ITS America) for many years. In February 1994, the ATIS Committee sponsored its first major effort in this area, a workshop on Service Delivery Models for ATIS. Focusing on the appropriate roles for the public and private sectors, participants developed service delivery models for exchanging information between data sources and ATIS devices. The models addressed not only technical issues but institutional and liability issues as well. The process revealed a solid consensus on the basic functions and information flows involved in collecting, fusing, and distributing traveler information. Participants had different views of the proper roles for the private and public sectors, but there was a fair amount of agreement on key issues, such as the need for a publicly provided minimum level of service.

In 1995 and 1996, as the National ITS Architecture took shape, the concept of information service providers (ISP) as fusers and disseminators of traveler information emerged. The ISP concept reflected the better understanding we were gaining about the complexity of providing timely, accurate, and useful information to travelers.

By 1997, it became clear that public officials who were leading efforts to interact with the private sector to provide ATIS services in their region or state were doing so without much assistance, save the personal contacts they may have had with officials from other areas of the country who were grappling with the same issues. What was missing was a collected body of information that would present the entire set of issues that needs to be considered when agencies plan their role in ATIS. This document is meant to serve as that body of information.

This document was written by Mark Hallenbeck and the staff of the Washington State Transportation Center. Much of the raw material for the report was derived from the ATIS Committee's October 1997 workshop, Business Models for Advanced Traveler Information Systems Deployment Workshop. A steering committee of approximately 50 volunteers reviewed drafts of the report and contributed to its completion. Funding and participation by the U.S. Department of Transportation made this effort possible. In particular, George Schoene of the Federal Highway Administration, Secretary to the ATIS Committee, and Mac Lister of the ITS Joint Program Office, the JPO's liaison to the ATIS Committee, provided essential support, guidance, and assistance.

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Although there are probably more factors to be considered, some knowledgeable people we neglected to consult, and some important business and contracting models that were overlooked, this document represents the best information presently available, and we are confident that anyone who reads it will benefit from the experience.

In the coming months, we will be working with the ATIS Committee and the U.S. DOT to determine how

best to maintain and disseminate the information. Readers' suggestions are most welcome.

Joel Markowitz
Manager, Advanced Systems
San Francisco Metropolitan
Transportation Commission
Chair, ATIS Committee, ITS America
jmarko@mtc.dst.ca.us

Rick Schuman
Director, System Applications
ITS America
rschuman@itsa.org

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Although many people contributed significantly, five individuals deserve particular thanks: Joel Markowitz of the San Francisco Metropolitan Transportation Commission, George Schoene of the Federal Highway Administration, Mack Lister of the ITS Joint Programs Office of USDOT, and Rob Puentes and Rick Schuman of ITS America.

Mark Hallenbeck
Director, Washington State
Transportation Center

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EXECUTIVE SUMMARY

Advanced traveler information systems (ATIS) are moving beyond the research stage to become fully integrated elements of urban transportation management systems. By definition, ATIS work best when multiple public and private organizations are able to cooperate. However, the details of how public agencies will work both together and with private companies to develop, deploy, operate and maintain ATIS have not been determined. Current ATIS deployment activities suggest that a variety of business approaches for deploying and operating an ATIS may be possible and appropriate.

This report discusses the issues that affect the development of a business plan for deploying and operating an ATIS. It is intended to help regions interested in ATIS understand the factors that influence the selection of a business approach to ATIS services and work through the process of balancing between needs and goals that are often mutually exclusive.

THE ATIS MARKET

An important facet of the business planning process is the fact that ATIS is a relatively new and immature business field. As such, new types of services, service delivery providers, and mechanisms for delivering information are continually being developed and marketed. In addition, other

information delivery services may have a growing influence on ATIS. A consensus in the ATIS field is that travel information may be only one of many types of customized information provided as part of an information service.

The immaturity of the ATIS field has two major effects. First, because the ATIS field is evolving so dramatically, the business plans and business relationships selected for a region are likely to need to evolve over time. Thus, the business plan developed today must be designed to accommodate change in the next few years. It must also include the ability to add and subtract participants as companies and agencies join or drop out of the ATIS. In many cases, ATIS business planning efforts under way today view their initial business plans as interim plans. These plans are intended to deploy and operate the ATIS until the market becomes stable enough to make sound, long-term business decisions.

Second, the business plan must account for the fact that, in the near term, the emergence of a large, fee-for-service-based revenue stream is unlikely beyond existing advertising revenue used to support commercial broadcasts of traffic conditions. Therefore, in most regions of the country public funding will be needed to support the underlying ATIS information structure for at least the next few years. Two major

factors lead to the well-accepted conclusion that significant consumer revenue will not be generated soon. The first factor is that, to date, few customized traveler information delivery mechanisms have penetrated the market in high rates, and until this occurs, the revenue stream from such services will remain small. The second reason is that most regions lack the geographic coverage and quality of information needed to generate widespread customer interest in fee-for-service ATIS products.

Traditionally, public agencies have heavily instrumented specific facilities or travel corridors to manage traffic and transit systems operating within those facilities. Unfortunately, this corridor-based approach to surveillance does not meet the needs of most traveler information delivery markets. To be attractive to private companies, ATIS markets must be large. The availability of information from only a fraction of the travel corridors in a region reduces the likelihood that a business or consumer will purchase a travel information service and, consequently, limits the interest of the private sector in investing or participating in the regional ATIS.

DIFFERENCES IN PERCEPTION

Differences between the public and private sectors' perception of what is important reach beyond the subject of geographic coverage. The differences between private and public responsibilities force these two groups to look differently at a number of important topics that affect the design of the ATIS business environment.

The private sector's foremost goal is to make a profit. Realization of that profit can be at a point in the future, but a private company will not

contribute resources indefinitely to an ATIS without the intent of recouping that investment. Consequently, the private sector will look to serve the markets that offer the best possible return for its investment. This means choosing to work first with regions that have large potential markets and choosing the customers and services within those markets that are likely to produce the largest revenues for the least cost.

The public sector, on the other hand, is concerned with improved operation of the transportation system and issues such as citizen needs, regional public policy goals, and the equitable treatment of its constituents. Public policy is generally to give transportation data away as often as possible to support traffic management efforts. The more informed travelers are, the more efficiently they travel and the better served they are by available transportation system options. However, if the public sector gives away travel information to meet public goals, it depresses the market for private sale of travel information, limiting the attractiveness of the market to the private sector.

Thus, in the business planning process it is important to understand how one participant's actions and intentions affect the decisions of other participants.

Differences in perspective are not restricted to differences between the public and private sectors. The perceptions of participants may split along any of many dimensions, including

- public vs. private
- local jurisdictions vs. one another
- local jurisdictions vs. regional, state, or federal government
- highways vs. transit
- operations vs. planning
- ATIS operational improvements

It is important to understand how one participant's actions and intentions affect the decisions of other participants.

vs. capital improvements.

Tensions may also exist between different departments within a single jurisdiction, agency, or firm.

Given that different participants can have very different perspectives on almost all aspects of the ATIS, the keys to developing a successful ATIS business plan, and then operating a successful ATIS, are to

- recognize that these differences exist
- understand what is important to the different participants
- create decision making mechanisms for the ATIS that account for these differences and
- create open channels of communication among participants so that differences in perspective become readily known and quickly understood by all.

Dealing with these differences, which usually change from region to region, is one major reason that the appropriate design of the ATIS business plan differs from one area to the next.

Deciding the primary purpose of an ATIS is the single most important aspect of determining the business relationships that shape its operation.

THE PRIMARY FUNCTION OF THE ATIS

When the business planning process is started, the first step should be to determine, given local conditions, what function the ATIS is intended to perform. To answer this question requires that the region consider the different perspectives of the potential participants and weigh the interests and perceptions of those participants with their willingness to contribute to the operation of the ATIS. Essentially, the sector that takes over the responsibility for the operation (including the funding) of the ATIS gets to determine this answer.

Deciding the primary purpose of an ATIS is the single most important aspect of determining the business relationships that shape its opera-

tion. The two most common views of the purpose of an ATIS function are that it

1. should be a transportation management tool to help a region meet its transportation policy goals (such as managing traffic congestion and increasing transit and carpool use)
2. should create a market opportunity that allows consumers to obtain information (better travel information) that they value.

Most regions see the ATIS as both of these. However, emphasis on the first of these viewpoints requires a public sector approach to the ATIS. The second is best served by a private sector approach. Thus, how a region balances between these two visions determines the level of government control, commitment, and responsibility for the system versus the freedom the private sector has in providing information that will generate the “best” customer response. Conversely, the level of government control and commitment to the ATIS will drive the balance point between these two approaches to the ATIS.

In general, where the public sector sees the ATIS (or specific ATIS components) as part of its “core function,” public funding is normally provided to perform these tasks. These “core functions” may range from operation of traveler information systems for transit agencies (to increase ridership and rider satisfaction) to implementation of traffic surveillance systems for ramp metering and incident management, which also provide traffic congestion information to the ATIS. Where ATIS components and/or functions are not viewed as being part of an agency's core mission, these functions either are not performed or are left to the private sector to perform.

Emphasis on private sector orientation within the business plan does not ensure private sector participation. It only increases the likelihood of that participation.

The private sector can undertake any ATIS task, from data collection to fusing different data sources into a comprehensive image of the transportation system, to delivering that image to a variety of customers in numerous ways. However, the private sector only chooses to undertake the tasks that are in its best interest. This means that the private sector chooses to participate either when it is hired by the public sector or when it believes it can generate revenue from a customer. Thus, an emphasis on private sector orientation within the business plan does not ensure private sector participation. It only increases the likelihood of that participation.

THE COMPLEXITY OF THE BUSINESS PLANNING PROCESS

The issues described above suggest the iterative nature of the ATIS business planning process. The ATIS business planning process may involve a repeated series of ongoing, parallel investigations. Conclusions drawn in one area will have ramifications for other areas. At the same time, each new decision or new piece of information can necessitate revisiting previous decisions. In many cases, decisions may have to be revisited because the assumptions on which they were based turn out to be false or because conditions have changed since the decision was made.

LEADERSHIP

Because this process requires time and energy, if the public sector will be an integral part of the ATIS, strong commitment is required. Lack of such a commitment means that ATIS will be developed without important public sector input. In most cases, a single public agency needs to assume a strong leadership

role at both the organizational and personal levels to ensure effective public sector participation.

The lead agency does not have to be a provider of ATIS services, nor should it expect to perform all of the public sector work. Rather, the lead agency's primary function is to facilitate and coordinate the many players' efforts, both public and private. In this respect, the lead public agency functions as a broker, rather than as a service provider. Among the many roles this agency must undertake is the lead in developing the business plan.

THE BUSINESS PLAN

The initial business planning effort should focus on the public sector. That is, early work should focus on the role of public agencies, how the public sector will interact with the private sector, and the ground rules for private sector participation with the public sector. This approach is suggested for two reasons: because, in most cases, the public sector controls most of the infrastructure around which the ATIS revolves and because the private sector is reluctant to compete with the public sector.

Once the public sector has clarified its role and how it will treat private sector partners, the private sector can begin to make informed business decisions about whether to enter that market. Given the private sector's expressed interest and willingness to contribute to the ATIS, the business plan can be completed, and then the contractual relationships necessary to implement the plan can be signed.

As noted earlier, the business plan should address the subject of change. How will the region address inevitable changes? How will the region transition from this plan to one that reflects conditions in the

future? In the end, the business plan should outline the basic goals, relationships, and financial underpinnings of the ATIS. It should

- define the market that will be exploited
- describe how funding will be obtained and how that funding will be expended
- estimate the cost of doing business
- list who will be involved in the effort and describe the relation-

ships among the business partners

- describe to decision makers the risks/rewards inherent in the market, and
- conclude that a positive business opportunity exists.

Having a good business plan is key to implementing a successful ATIS because an effective business plan reflects careful consideration and resolution of the issues that affect ATIS operation.

CHAPTER 1 INTRODUCTION

Advanced traveler information systems (ATIS) are moving beyond the research stage to become fully integrated elements of urban transportation management systems. By definition, ATIS require cooperation between public and private organizations. However, to date, states have not determined in detail how public agencies will work with private companies to develop, deploy, operate, and maintain ATIS. Perhaps more importantly, evidence suggests that there are many ways in which these groups can work together, and therefore the relationships that promote successful ATIS deployment and operation are likely to differ across the nation, at least in the near term.

This document provides guidance to public agencies and their partners in defining and understanding the issues they must consider and resolve to deploy, maintain, and operate ATIS. It describes possible courses of action and identifies the relevant decision makers. This document also describes the advantages and disadvantages of given public/public and public/private relationships, provides implementation examples of given alternatives, and indicates specific local conditions (e.g., the extent of existing infrastructure) that may render some alternatives more appropriate than others.

Given the immaturity of the technologies, the variety of public political and organizational structures that operate transportation systems, and the uncertainties of budding public/private business relationships, it is apparent that no one single business model or practice is “best” for the deployment and operation of ATIS.

AN ATIS BUSINESS MODEL FRAMEWORK

A key characteristic of advanced traveler information systems (ATIS) is that the field is new and emerging. The immaturity of the field means that new types of services, service delivery providers, and mechanisms for delivering information are continually being developed and marketed. In addition, the field of traveler information is only one among many new services that provide numerous kinds of information. These may have a growing influence on ATIS, which will have to be able to interface with these new products and providers.

Another important characteristic is that active public/public and public/private partnerships are required to create the most capable ATIS (for example, individual route guidance systems that depend on real-time traffic congestion information or personalized transit schedule information given to users at the office). In most cases today, the public sector supplies information to the private sector, which in turn personalizes that information (or adds value in other ways) and delivers it to customers. The relationships between participating public agencies and private, information service providers are often new to both the public agencies and private companies involved. Public agencies must work closely together

Because the ATIS field is evolving so dramatically, the business plans and relationships selected for a region are likely to evolve over time.

in ways that often cross political and organizational barriers. Care, attention, and time are required to successfully mesh the cultures and priorities of these groups.

Given the immaturity of the technologies, the variety of public political and organizational structures that operate transportation systems, and the uncertainties of budding public/private business relationships, it is apparent that no single business model or practice is “best” for the deployment and operation of ATIS systems throughout the country. In some areas, the public sector has decided to control many core ATIS functions to achieve significant public goals. In other regions of the country, these functions have been given to the private sector, either because the public sector believes the private sector can perform those tasks more efficiently or because no public resources are available.

To develop the framework described in this document, the ATIS Committee of the Intelligent Transportation Society of America (ITS America) and the project team examined the business practices associated with ATIS systems now deployed in the United States and developed an understanding of the business practices that will support the efficient operation of specific ATIS.

To help regions select successful business plans, this document describes the various issues that play a significant role in determining what business relationships are most appropriate for a given ATIS effort. Understanding these issues will allow participants to analyze inevitable trade-offs. Besides describing the issues that a region needs to consider, this report illustrates alternative ways that those issues have been successfully resolved. It also

describes the advantages and disadvantages of those alternatives, as well as the special conditions that often determine the selection of specific alternatives.

This framework does not directly answer the questions that must be resolved to select specific business relationships. However, it does provide guidance for public and private sector groups to answer these questions for themselves, given their knowledge of local political, fiscal, and institutional realities.

Note that because the ATIS field is evolving so dramatically, the business plans and relationships selected for a region are likely to evolve over time. That is, as the market size and revenue potential for ATIS services become more clear, new and different public and private relationships may become appropriate. If the market proves as large as many hope, significant private resources may become available for ATIS functions. If the ATIS market turns out to be disappointingly small or if strong political forces require control of the system to remain in public sector hands (to ensure that ATIS efforts reinforce public policies), then the public sector may need to take on (or at least pay for) functions that many agencies currently hope will be provided by the private sector.

This guide assumes that its principal readers will be members of the public sector because the public sector often has “first choice” regarding its level of involvement in the ATIS business. Few private firms want to compete with public agencies because public agencies are not required (and are often forbidden) to make a profit. This puts private firms in the difficult position of having to provide information that is significantly better than that already freely available to generate customer

Understanding and publicizing the roles and functions that the public sector intends to undertake is an important function of the business planning process.

interest and revenue. Therefore, understanding and publicizing the roles and functions that the public sector intends to undertake is an important function of the business planning process.

However, members of the private sector will also benefit from this material, both because the public sector will use this material to determine (in concert with the private sector) the roles it will adopt and the roles it will encourage the private sector to undertake, and because a review of the material should help companies understand the pressures, policies, and constraints that mold public sector decisions. Once private firms understand those public sector constraints, they will be able to deal more effectively and successfully with those agencies.

OVERVIEW OF ATIS

Just what is an advanced traveler information system? Answering this simple question is both harder than it might first appear and a necessary first step in defining the business relationships needed to support the operation of that system.

In its barest form, an ATIS is any set of data collection and dissemination tools that provides travelers with information they desire about their travel options. Such a system can be very complex (data collected via remote sensors that feed information to specialized devices carried by individual travelers or in vehicles), or relatively modest (radio reports and variable message signs that provide traffic condition updates). The level of complexity drives the technical knowledge needed to design and operate the system and, to a certain extent, defines the types of markets the ATIS can serve. These subjects are covered later in this document.

CHOOSING AN OPERATIONAL OBJECTIVE

Of perhaps greater importance for public agencies to answer early in the business planning process is the question, "What do we want the ATIS to accomplish?" The two different answers, or operational philosophies, below determine how this question significantly affects the structure of the ATIS business approach. These two answers are that the ATIS is

- a transportation management tool to help a region meet its transportation policy goals (such as managing traffic congestion and increasing transit and carpool use)
- a market opportunity that allows consumers to obtain information (helpful travel information) that they value.

In reality, an ATIS can be both of these. Just how much of each of these philosophies is adopted will determine the government's level of government control over, commitment of resources to, and responsibility for the system, as well as the freedom the private sector has in providing information that will produce the best revenue return for a given level of expenditure. In all cases, the public/private relationships that create the ATIS are shaped by a series of trade-offs that can be linked to the differences in these philosophies. Several examples illustrate those trade-offs.

One common public objective for the ATIS is to give as many people as possible access to ATIS information. This serves the public goal of providing the best information to the most travelers so that they can make informed travel decisions. This should result in better trip making decisions and reduced congestion, delay, and travel frustration. The implications of this philosophy are multiple types of

"What do we want the ATIS to accomplish?"

Choosing the balance between two different operational philosophies determines the structure of the ATIS business approach. The ATIS may be viewed as

- a transportation management tool to help a region meet its transportation policy goals
- a market opportunity that allows consumers to obtain information that they value.

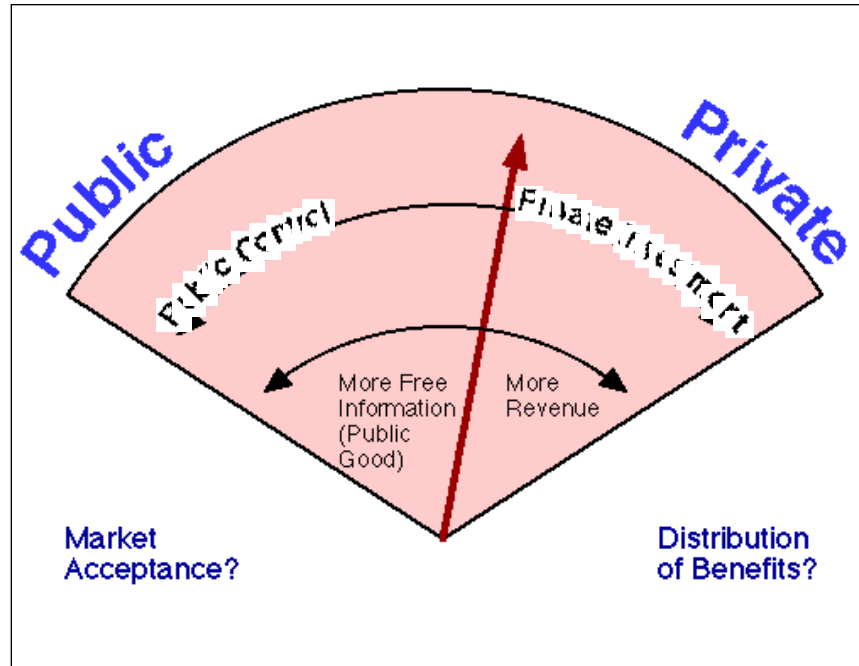


Figure 1-1. Some public and private objectives such as revenue generation and free delivery of information are mutually exclusive.

delivery mechanisms and free (or very low cost) information. This is particularly important because economically disadvantaged travelers are quite often those most willing to forgo single occupant vehicle travel for shared ride modes.

However, giving away large amounts of information significantly depresses the market for the sale of information. (Who will buy information when they can get it free?) Thus, the political decision to provide as much information as possible reduces the incentive for the private sector to enter the market (Figure 1-1) and may stifle the development of personalized services that satisfy the needs of travelers. This decreases the likelihood of attracting private capital to help build and operate the ATIS and results in a system built and operated primarily at public expense.

As another example, if the ATIS is intended to run as a purely “for profit” venture, in many parts of the country the inclusion of transit

information in the near term is unlikely. This is because in many regional markets, transit ridership is a very small share of the overall transportation market and is thus viewed by many private sector participants as having low revenue potential given the cost of obtaining and providing useful information to consumers.

Thus, the basic questions, “What is the ATIS?” and “What do we want the ATIS to accomplish?” must be answered within the context of a series of other concerns and priorities. In fact, answering these two questions often becomes an iterative process in which a region balances its public policy desires with local financial realities, the interests of the private sector (which also change regionally), and the changing economies of the information services market. These issues are discussed in Chapter 2 of this report.

NECESSARY ATIS FUNCTIONS

Not only is the philosophy that drives each ATIS likely to differ from region to region, but the physical systems that make up the ATIS also differ dramatically. The amount of data available in a region changes significantly with the amount of data collection infrastructure that is in place. The type of data available and who “owns” and controls that information also changes, as does the extent to which those data are available for use in modern information delivery systems. These data collection systems can be either publicly or privately owned and operated, and the infrastructure that exists and who owns and/or operates it can have a major influence on the selection of the appropriate public/private business relationships.

Regardless of the technological sophistication or size of the ATIS, three basic functions must occur in every system:

- data collection
- data fusion (the process of combining data collected from one or more sources into an image of transportation system performance)
- data dissemination.

Each of these functions can be performed by a variety of public agencies and private firms. Each function may be performed in different ways by different groups. In fact, different groups may operate redundant systems (i.e., collecting the same data in different ways), and different regional ATIS may operate with different degrees of cooperation between public and private groups that perform these functions.

Data Collection

Data collection is central to the ATIS effort. However, there are no specifications for what data to

collect, how to collect them, or who should collect them. Data can be provided to the ATIS by automated monitoring systems (loops, cameras, probe vehicles), by visual inspection (observers in a traffic operations center, patrol vehicles), and by schedules and other documentation.

Among the most common pieces of information collected for use within ATIS efforts are the following:

Traffic Information

- traffic speeds at specific points in the roadway system
- travel times between given points
- congestion indicators along segments of roadway
- incident locations
- traffic volumes

Transit Information

- transit routes
- transit schedules
- fare information
- deviations from existing schedules (late bus notifications)
- current transit vehicle locations

These are supplemented by analytical information provided by personnel who help operate the transportation system. For example, in some cases, incident respondents estimate the expected duration of incidents.

The ATIS industry is still attempting to standardize the data collected and used as a means of reducing the cost of manipulating, storing, and reporting the information contained in the data. This task is particularly important for private manufacturers of information reception devices. Travelers will not buy these devices unless there is a consistent data stream to provide nationally available traveler information services. Also, device makers want to build and market devices that can operate in any region of the country. That will be possible only if every region produces data that are

Regardless of the technological sophistication or size of the ATIS, three basic functions must occur in every system:

- data collection
- data fusion
- data dissemination.

similar, unless the device makers write region-specific software, a process that is too expensive to make economic sense.

Data standards that affect ATIS operation include the following:

- the types of data provided (see above)
- the representation of those data (e.g., How slowly does traffic on a freeway have to be moving before it is considered congested?)
- the quality control checks placed on the data to ensure that the data collection devices operate correctly
- how often the data are collected and made available to ATIS service providers
- the geographic area that is covered (e.g., Freeways only? A certain percentage of a region's roadway system?)

These standards are important to more than the ATIS community. Much of the data used by ATIS are (or can be) provided by advanced public transportation and traffic management systems, and developers of these systems are wrestling with many of these same issues.

A final issue is that the "data needs" of an ATIS are entirely dependent on the information service function that it performs. That is, the data needed to operate a real-time route guidance system are different from those needed to supply radio-based reports. The real-time system needs link-specific speed and delay information, whereas the radio system requires incident (including "non-incident based congestion") locations, durations, and extents.

In a related issue, the data that are acceptable for a publicly funded effort will often be different than those needed by a privately run operation. For example, a publicly

funded effort may be satisfied with providing data on a single corridor, particularly if the data are being collected for transportation management purposes. The marginal cost of the ATIS effort may be small, and the political benefits of providing the public with those data may be reasonably high. However, for a privately run system, a single corridor may not provide a large enough market to warrant the investment needed to build and operate the ATIS service.

Differences in perspective regarding which data are important (given how each ATIS participant plans to use data) often lead to disagreements between participating groups (both between public agencies and between public agencies and private companies) on issues such as

- which data should be collected
- where those data should be collected
- how much data should be collected
- whether raw or summarized data should be available for use
- the value of those data.

The results of these disagreements can be duplication of some data collection efforts and lack of cooperation or participation in ATIS efforts. Conversely, cooperation in responding to data collection issues can result in data collection cost savings, improved data for both operations and ATIS functions, and better overall public/public and public/private agency relationships.

It is important to realize that data collection can be a function of both the public and private sectors. Currently, public sector agencies tend to control the majority of data collection in the United States.

Much of the data are collected to help the agency meet its traffic or transit management responsibilities. However, private firms perform this

The geographic coverage of traffic monitoring systems that are acceptable to the public sector (corridors or specific facilities) is often not sufficient for the private sector, which needs areawide coverage



Data collection is central to the ATIS effort. However, there are no specifications for what data to collect, how to collect them, or who should collect them.

same type of data collection function in at least two cases.

In the first case, private companies may provide what are essentially public facilities under contract to public agencies. This tends to occur where state agencies operate with staff limitations that prevent them from performing what would normally be considered public sector responsibilities, or where analysis has shown that the private sector can provide those functions more cost effectively than the public sector. In these cases, the private sector may build, operate, and maintain monitoring and control facilities on publicly owned roadways as part of a contractual relationship with a state (or other public jurisdiction).

In the second case, a private service provider (usually an ATIS service provider) believes that the publicly available information does not meet its specific data needs and therefore creates a data collection system to meet its own needs. This decision is based on the assumption that the benefits provided by that private monitoring system will exceed the cost of that system. The best example of this type of private data collection system is the use of airplanes in major urban areas to provide video and audio information about traffic congestion, which is then broadcast over commercial radio and television.

In addition to such manual efforts, other private data collection systems exist. For example, in England Trafficmaster has installed a system of radar detectors that provide congestion information at major points throughout the English motorway system. In many U.S. cities, radio stations that provide frequent traffic reports have free cellular phone numbers that allow motorists to report traffic problems without charge.

The existence of private data collection does not guarantee that those data will be shared with public agencies, even when the same private companies obtain public information for free. No standards currently direct public/private sharing of data. Each case must be dealt with independently as part of structuring the business relationship.

Data Fusion

Data fusion is the process of taking "raw" data from the data collection process and converting them into a form usable for information dissemination purposes. The fusion process can (but does not necessarily) include the following functions:

Combining data from different sources, including the following

- matching data so that information from different data collection sources (e.g., cameras, loops, and transit vehicles) can provide alternative measurements of the same facility segment
- comparing and selecting the "better" measure of conditions when two or more different sensors report on conditions for the same location
- using one data source to confirm a condition reported through another source (e.g., incident verification)

Performing quality control and quality assurance checks to ensure the validity of the data reported

Adding value to the available data, including the following tasks:

- computing new variables from collected data, such as
 - computing speed from vehicle volume and lane occupancy data
 - computing transit arrival times from vehicle location data

- computing travel times from available estimates of speed and historical measurements of traffic conditions over time
- forecasting traffic volumes at one location given volumes at some other point
- forecasting transit arrival times on the basis of current conditions and historical patterns
- converting data from one format to another (e.g., converting 20-second data by lane into 5-minute averages for an entire roadway section)
- compiling data from multiple sources into a single data feed consistent with an end user's needs (e.g., producing a specially formatted data feed that meets an independent service provider's desired input format)

The data fusion process can take place in one or many steps. It can be done

- as the last step in a "data collection" process (e.g., converting raw detector data into a discreet measurement variable)
- as part of a central database function (combining loop and camera referencing systems within a traffic operations center)
- as part of an integrated, distributed database system (e.g., adding manually collected incident descriptions such as "accident at 45th Street blocks two lanes, expect 20-minute duration" to a congestion indicator for a freeway segment)
- as part of the value-added service that an information provider performs before broadcasting information to its customers (e.g., predicting travel times on three alternative routes

for a customer traveling from points A to B)

At its lowest level, the data fusion process provides access to data collected as part of a monitoring system. This often involves the use of "additional" computers whose specific task is to capture copies of data being collected for some other purpose and then serve as a communication point that gives outside users (other public agencies, private service providers) access to those data in a proscribed manner.

At a more sophisticated level, these same "raw" data are further massaged into more sophisticated estimates that have greater value to specific customers. These value added services may be performed by the agency that collects the initial "raw" data, by an information disseminator, or by a third party that collects data from one or more source, adds value to it, and gives it to the information service provider.

Not all information service providers want the same data or data in the same format. In many instances, the "value" in the data collected is the result of the fusion and dissemination procedures that private companies contribute to the ATIS process. Some service providers want to receive data that are "raw," whereas other independent service providers see their service as an information delivery function, and their expertise is in selecting the specific values to be provided and the mechanism to deliver the information, not in the mathematical computation of a traffic variable. This group of information service providers is more than happy to receive data that have been manipulated by others who have a better understanding of the vagaries of transportation system performance.



The public sector tends to control traditional highway oriented variable message signs.

Data Dissemination

The last function of ATIS is the physical dissemination of transportation system information. The public sector already disseminates transportation information. Transit properties provide large amounts of route, schedule, fare, and other information to riders and potential riders. Traffic agencies provide congestion and incident information.

This task can be as simple as having an operator select a message option from a menu of variable message sign alternatives, or as complex as sending message packets over a wireless communications network to an in-vehicle route guidance device that then computes and updates recommended driving instructions. As with the other two ATIS functions, these tasks can be performed by the public or private sectors, or by a combination of both.

The data dissemination tasks of most current ATIS efforts tend to be split between the public and private sectors. The public sector tends to control traditional highway oriented variable message signs (VMS)¹ and highway advisory radio (HAR), as well as transit rider information systems (e.g., telephone based

schedule assistance). The private sector tends to produce commercial media broadcasts (radio and TV). Private companies are also marketing various personal communications devices to which traffic condition and transit system information can be broadcast. The entity that performs the broadcast to that device is sometimes a private organization and sometimes a public agency. When a private agency does that broadcast, it sometimes does so under contract to a public agency and sometimes as a purely private business (although some data for that business may originate at a public agency).

Determining the role of the public sector in the data dissemination function is a major task within the business planning effort. Maintaining control of the data distribution function allows the public sector to gain the maximum possible use of the system to achieve public policy goals. However, such control tends to reduce the ability of the private sector to innovate and market transportation information services, which in turn reduces the private sector's opportunity to generate revenue to help build and expand the information distribution system.

¹ Also known as changeable message signs (CMS) and dynamic messaging signs (DMS).

Conversely, the more control over the data distribution system the private sector is given, the greater the opportunity for private sector innovation to increase the market, help finance system construction, and generate revenue that can be used to expand the ATIS. This approach drives the information distribution system toward market based results, which in turn means that some public goals such as social equity (that is, giving all travelers access to the data) may be given lower priority. (After all, the private company will need to market its services to those who can afford to pay.) The private sector will develop services that consumers want, as opposed to services that public sector agencies may wish consumers had.

Deciding what role the public sector will play in each of these three functions is the major effort within the business planning process. It requires that a region balance a variety of factors.

DISTRIBUTING RESPONSIBILITY

Deciding what role the public sector will play in each of these three functions is the major effort within the business planning process. It requires that a region balance a variety of factors, including the following:

- the scope and type of transportation system benefits to be gained from the system (Will the system encourage mode shifts? Will the system route traffic onto arterials? Will the system benefit the community as a whole or primarily just the user of a specific device?)
- the need for revenue (Who will pay for the construction and operation of the various ATIS functions? Is sufficient infrastructure in place to collect the required data, and if not, how will that additional infrastructure be paid for?)
- the ability and willingness of different public agencies to work

with each other and the private sector

- the other public policy needs of the region (What data are made available to the public? How are they presented? Who will have access to them and at what cost to the user?)
- the desire to improve this technology and provide business opportunities for the private sector
- the legal realities of public/private business relationships in the region.

These issues and many others are discussed in this report.

OVERVIEW OF BUSINESS PLANS

An ATIS business plan must pay special attention to the definition of roles for both the public and private participants in the ATIS venture. Because of the potential for public/private competition (which is considered bad if created unintentionally), the business plan must specify which functions the public agencies will perform and how private firms can be expected to interact with those public agencies. This is particularly important because the public and private sectors must cooperate for an ATIS to be successful, and the public and private sectors tend to view ATIS operations very differently.

As noted earlier, the initial business plan should focus on the public sector. That is, the business plan must focus on the role of public agencies, how the public sector will interact with the private sector, and the ground rules for private sector participation. This approach is suggested because the public sector controls most of the infrastructure around which the ATIS revolves. Without public sector participation, the ATIS is often limited in the scope

A business plan is a summary document that outlines the basic goals, relationships, and financial underpinnings of a given business venture.

It is a document that

- defines the market that will be exploited
- describes how revenue will be generated and how much revenue should be expected
- estimates the costs of doing business and how these costs will be financed
- lists who will be involved in the effort and describes the relationships among the business partners
- describes to decision makers (usually lenders) the risks and rewards inherent in the market
- concludes that a positive business opportunity exists.

and depth of information it can provide.

Once the public sector has clarified its own role and how private sector partners can expect to be treated, the private sector can begin to make informed business decisions about whether to enter that market. Once they decide to enter a given market, private sector firms will also likely write their own business plans, incorporating into those plans their expected relationships with the public sector.

The public sector plan should also be used to define to public officials the necessary public resources and the reasons that public agencies will play the roles defined for them. This is because the business plan must also help convince public decision makers to allocate the necessary public resources to the ATIS effort. This will be accomplished by helping them understand the public benefits obtained from the system and why public funds are best spent in the recommended manner.

Finally, the business plan must acknowledge that the ATIS industry is still evolving. This means that the business plan itself may need to evolve over time as new participants and technologies enter the market, as market forces define technology

winners and losers, and as public sentiment toward transportation and government change. Thus, the business plan needs to acknowledge that some flexibility is necessary in the public/private relationships. This flexibility must allow new relationships to occur over time as conditions warrant, while holding harmless those participants who were willing to join the ATIS effort early in its development.

REPORT ORGANIZATION

The second chapter of this document discusses the issues that must be considered during the development of a business plan. Chapter 3 presents general business plan models around which business plans can be devised and introduces specific contracting mechanisms that will govern the relationships between ATIS participants. Chapter 4 provides some instructions to help regions consider all the issues that can significantly affect their selection of a business approach to the ATIS. The appendices provide references to specific people and agencies that have dealt with ATIS business planning issues, more detailed discussion of contracting options, and other helpful background information.

CHAPTER 2 ISSUES TO ADDRESS WHEN A BUSINESS PLAN IS DEVELOPED

The development of an appropriate business plan for an ATIS is subject to a variety of inputs and constraints. Any of these elements can be a deciding factor in the selection of specific business relationships. In addition, each element has an impact on how the other elements are viewed, so that each must be considered in light of the others.

A good example of this is the need for revenue generation. Most public sector ATIS participants would like their ATIS to generate revenue that could be used to help offset the public sector cost of collecting and offering data. However, whereas all agencies feel that revenue is “important” or “good,” the relative importance of revenue to specific agencies is dependent on the availability of infrastructure, the political realities of revenue usage, and the relative need to encourage private partner participation.

This chapter explores the different issues that affect the development and implementation of a business plan for ATIS. With an understanding of these issues, ATIS partnerships will be able to determine their own balance between competing needs and ideals. Achieving this balance is critical to developing a successful business plan.

The material in this chapter is based on several sources:

- analogous public-public and public-private relationships in other industries
- ATIS experiences from across the country
- issues in common with other transportation services (e.g., inter-jurisdictional coordination).

This chapter discusses each of the basic business planning issues in reasonable detail, including the ways each issue can be resolved and the effects each alternative resolution might have on other business planning issues. Where possible, examples from current practice illustrate how and why different partnerships have made particular decisions for their ATIS and how those decisions have led to other decisions.

This chapter is broken into the following topic areas, which are NOT listed in order of importance or consideration. Areas of concern to the business planning process include

- the role of the ATIS
- leadership of the ATIS effort
- prospective participants and their roles
- perspectives of the ATIS participants
- coordination among participants
- infrastructure (availability, planned facilities, and needs)
- revenue (needs for and sources of)

The development of an appropriate business plan for an ATIS is subject to a variety of inputs and constraints, each of which affects how the others are viewed. Thus each must be considered in light of the others.

- legal and administrative issues
- structuring public/private partnerships.

In many cases, these subjects are intertwined. For example, the selection of a “leader” requires knowing the intended outcome of the effort (the role of the ATIS) and the participants. However, it is not possible to select and recruit all of the participants without a leader. Furthermore, the perspectives of those participants and the resources and capabilities they contribute will alter the role that is finally determined for the ATIS. Consequently, many of these issues have to be addressed simultaneously, so that feedback from the consideration of one issue helps to form the resolution of the others.

The most important decision regarding the ATIS is the role it will play in the transportation system’s operation.

THE ROLE OF THE ATIS

The most important decision regarding the ATIS is the role it will play in the transportation system’s operation. For example, will the ATIS’s primary role be a tool that can help manage travel demand (encouraging mode, route, and/or temporal shifts) as part of a larger public infrastructure and operations management effort? Or will the ATIS be primarily a “consumer oriented” system to provide travelers with information that is beneficial to their quality of life?

Most ATIS efforts will want to accomplish both of these goals. However, variations in the relative importance of these roles will result in an ATIS that is either public policy driven or consumer (market) driven. Both of these approaches are reasonable and realistic, but they tend to require different business plans and partner relationships.

An ATIS that is heavily oriented toward meeting major public policy goals will require significantly more financial and managerial input from

the public sector than a consumer oriented service. To meet public policy goals, the public sector will have to ensure that specific types of data are available and that the information is presented in forms and formats that help achieve public goals. An ATIS focused on achieving common public policy goals such as increased high occupancy vehicle use requires collection and delivery of information related to transit and high occupancy vehicle use. Such a focus allows the system’s implementation to be geographically segmented (that is, the ATIS can be implemented one corridor at a time) because the goal is to make the system effective in a given location rather than to reach the largest possible market. This approach also implies that the public sector will fund the creation and, in some cases, operation of services that serve the public good but that have limited commercial market potential.

The consumer oriented alternative is a market driven approach that requires the dissemination of information for which consumers are willing to pay. An ATIS focused on consumer marketability must be accessible to the largest possible audience, which in most markets tends to be single occupant vehicles. It must also cover the widest possible geographic area to increase the number of potential customers. Such a system is likely to focus on broad, area-wide information (such as general incident reports and general traffic congestion information) rather than on the detailed modal and corridor-specific information necessary to influence modal shifts. Consequently, consumer oriented ATIS may focus on fewer modes of travel and may even ignore specific market segments (e.g., captive transit riders) because those market segments are not likely to

Two leadership roles are required. The first is the public sector leader. The second is the primary operator of the ATIS data source, which can be filled by either the public or private sector.

provide significant revenue sources. The advantage of the consumer oriented approach to ATIS is that it has a greater chance of generating revenue to support its operation. It is also more likely to be eagerly championed by consumer electronics manufacturers because they will also be looking for the largest consumer markets possible. The disadvantage of this approach is that it is less likely to help achieve public policy goals. For example, in many regions the devices and information provided as part of a consumer oriented system do not include substantial transit information.

In balancing these two approaches, the public sector has to remember that its preferences for the role of the ATIS must often be tempered by financial and political realities. In a perfect world a jurisdiction might desire a public policy oriented ATIS. However, because it lacks the funding to operate the ATIS, it will accept the consumer oriented approach offered by the private sector in return for greater private sector support in that market.

The balancing also affects the consumer approach. Because the ATIS market is uncertain, many private companies want public sector support for system development. In return for this support, many private sector firms are happy to emphasize aspects of the ATIS that promote public policy efforts. In addition, the private sector is almost always willing to distribute information provided freely by the public sector when that information can benefit the private sector's consumers, particularly when the marginal cost of adding that information is small.

Finally, note that these approaches are not mutually exclusive. In many markets, the information that holds significant consumer interest is

the same information that matches public policy.

ATIS LEADERSHIP

One of the crucial steps that must occur early in the ATIS effort is the selection of the agencies or companies that will provide primary leadership. Two leadership roles are required. These can be filled by one public agency or by a public agency and a private company. The first role is the public sector leader. The second role is the primary operator of the ATIS data source, which can be filled by either the public or private sector.

Strong leadership must exist at both the organizational and personal levels. That is, not only must the agency leading the effort be committed to this task, but talented individuals are needed to organize, inspire, and direct the participating ATIS partners in creating, adopting, and implementing a successful ATIS business plan.

PUBLIC SECTOR LEADER

The lead public agency is the primary facilitator of public agency ATIS efforts. In the contracting terms used later in this report, the public sector leader "arranges" for the ATIS service to be provided. Its roles include the following:

- encouraging public sector participation in the ATIS
- beginning and maintaining momentum for the development and implementation of the business plan
- providing the contracting mechanisms through which one or more private sector firms participate in the ATIS
- maintaining the public agency agreements (often memorandums of understanding) through which public agencies cooperate. Note that serving as the public

Possible Tasks for the Lead Public Agency

- Incorporate ATIS improvements within the regional project planning and programming process and ensure the ATIS complies with the national ITS architecture.
- Initiate among regional stakeholders informal partnerships or formal working groups that develop an overall technical approach and general policies for coordinated action.
- Chair meetings of such partnerships or working groups.
- Listen to agencies' and private firms' concerns.
- Introduce new committee members to group's accomplishments.
- Make presentations to other agency, business, and community groups.
- Meet with elected officials to solicit funding.
- Troubleshoot on ATIS projects.
- Ensure that plans, specs, and estimates are consistent with available funding and the group's vision.
- Promote ongoing communication among partners.
- Monitor the overall effort, ensure that work—whether by agencies or consultants—gets done.
- Monitor ATIS programs and business news in other regions

sector lead in the ATIS effort does not require an agency to actually provide ATIS products or services to end users (although government provision of such services is one of many alternative arrangements). Rather, the lead agency's primary function is to coordinate the efforts of the many players, both public and private. In this respect, the lead public agency functions as a broker rather than as a service provider. Thus, in this era of "reinventing government," public-private partnerships, and ATIS business plans, the lead agency defines problems and assembles resources that others, in concert, use to solve regional problems.

For example, in the Washington, D.C., area, the Virginia Department of Transportation has taken on much of the lead public sector agency's role by handling all of the contracts and letter agreements for the regional ATIS. In San Francisco, the Metropolitan Transportation Commission has taken on much of the lead public sector role of promoting and facilitating the public sector's support of the TravInfo project.

Because it serves as a catalyst, rather than as a service producer, the lead agency must be sensitive to any perception that it is dictating to other players or attempting to manage their work. The lead public agency should therefore strive to be perceived as a facilitator, initiating meetings, coordinating program development, and following up with other players. This is particularly important when the lead agency happens to be the state department of transportation, since state-local relationships are often characterized by wariness. (See the sections on perspectives and coordination later in this chapter.)

State departments of transportation and metropolitan planning

organizations most commonly lead ATIS efforts. Their leadership roles stem logically from departments of transportations' responsibility for advanced traffic management systems (ATMS), upon which many ATIS are based, and metropolitan planning organizations' role in regional transportation planning and coordination. However, other entities, such as local jurisdictions or special districts, may also lead the effort. In the end, the selected agency normally has the highest interest in ensuring the success of the ATIS.

The following questions may aid in identifying a lead agency for an ATIS business plan effort.

- Which agency views ATIS as part of its core mission?
- Which agency is most interested in seeing the ATIS deployed?
- Does an agency have a special interest or ability that makes it a natural leader?
- Which agency has, or is willing to make available, the staffing and resources necessary to lead an ATIS effort?
- Which agency has already demonstrated a high level of interest in providing information to the public by having built substantial infrastructure?
- Where can an "ATIS champion," who understands and can work effectively with both public and private sectors and who has the commitment and energy to "make things happen," be found?

Another consideration in selecting the appropriate lead public sector agency is whether a mandate exists for a given agency to undertake that ATIS role. Here, the term "mandate" refers to the financial, legal, or political justification for that program. In other words, does acting as the public sector leader of the ATIS effort enhance the core mission for which the legislature

created the agency? If it does, then the agency has a legitimate interest in undertaking this role. If it does not, then the agency should not undertake this role.

LEAD ATIS OPERATOR

The lead ATIS operator is the entity in charge of the day-to-day implementation and operation of the ATIS system. In a publicly oriented ATIS, this is usually the same agency that fulfills the lead public sector role. However, in many ATIS efforts around the country, this role is played by a private company, acting either under contract to the lead public sector agency or as a franchise holder in a competitive market.

Although the leadership of more than one ATIS operator is possible (i.e., in a competitive market), to date this has not happened in the United States. It is also possible that, as with the lead public sector agency, this role may shift over time. This will occur both because companies will enter and leave the marketplace and because ATIS operations may change over time, altering the roles of various participants.

The lead ATIS operator must have the technical resources (staff, experience, funding) to operate and further develop the system. The lead operator must also be aware of the needs and concerns of the other ATIS participants and must make operating decisions accordingly. The lead operator is responsible for the following:

- ensuring that collected data are available to the agencies and companies that wish to distribute that information
- operating the ATIS day-to-day (but not the day-to-day operation of all ATIS components, which are the responsibility of their owners and operators)
- recruiting new partners (both

public and private) into the ATIS effort

- contracting with those new partners
- ensuring that the operation of the ATIS meets the constraints defined in earlier agreements to guarantee the continued participation of ATIS partners
- keeping up with technological changes in the industry
- changing the underlying ATIS data infrastructure to account for changes in each of the ATIS partner's physical infrastructure
- ensuring that all ATIS participants are aware of those changes and are aware of the options for handling them.

Selection of the lead ATIS operator is one of the most challenging tasks for the public agencies involved in the ATIS effort. Choosing the correct business plan is part of that process because the business relationship between the public sector (usually the lead public sector agency) and the lead ATIS operator must be determined. Chapter 3 discusses the variety of contracting options available for this task and how those options affect the operation of the ATIS system.

Choosing the appropriate ATIS operator and the business relationship that will exist involves balancing the advantages and disadvantages of a variety of alternative strategies across a range of subject areas. In general, the selection of the ATIS operator involves carefully balancing the financial means of the various public agencies, the technical capabilities of the public agencies, their interest in performing this role, the level of interest in the ATIS from the private sector, the likelihood that a private business can operate successfully in the market, the level of resources the private sector is willing to provide, the regional legal

constraints for public/private contracting relationships, and the political importance of the various factors that affect public transportation decisions.

In general, private companies offer the following advantages when they shoulder the role of ATIS operator:

- They are more able to respond quickly to changing needs within the ATIS.
- They have greater flexibility in hiring, firing, and retaining critical staff.
- They are more likely to understand and successfully deploy emerging technologies in the ATIS marketplace.
- They have more incentives and a better “business culture” for creating cost effective approaches for ATIS.
- They have more incentives and a better “business culture” for attracting new private sector partners.
- They are accustomed to being consumer oriented.
- They tend to be more inventive at resolving problems and making technical advances.

On the other hand, public sector agencies offer the following advantages:

- They are accustomed to working in the public arena, where proposed changes in the transportation system often attract significant public outcry.
- Consequently, they are more sensitive to the social and political impacts of changes in the transportation system.
- They are more financially secure (i.e., there is little fear of a state DOT suddenly going bankrupt, thus ending ATIS service, although they can “pull the plug” for other reasons).
- They control the vast majority of

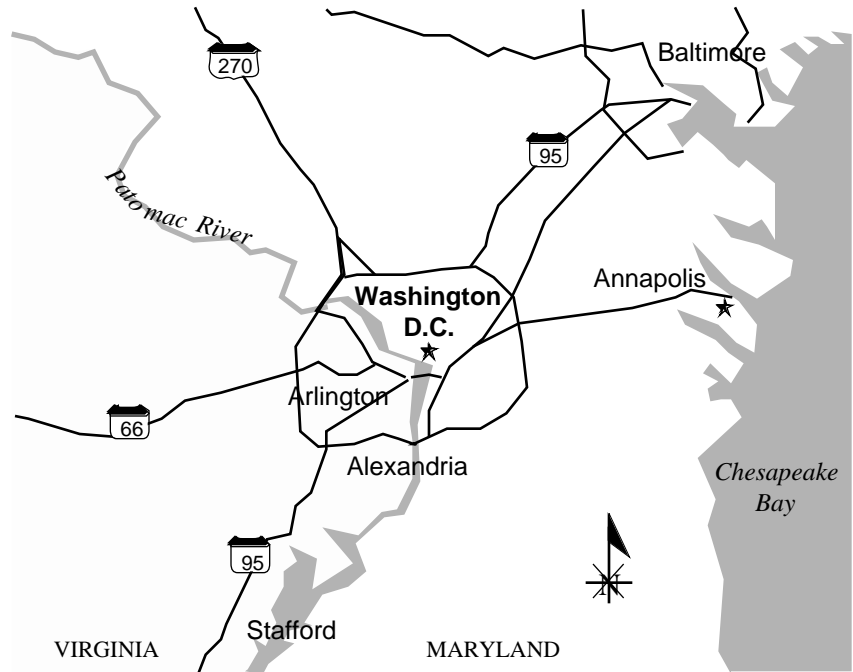
the transportation infrastructure that is the subject of the ATIS, and many of the data that are used to describe the performance of those facilities come from their control systems.

- They often have a better working knowledge of and more technical experience with the monitoring systems that collect information about facility performance.
- They are better able to apply for and obtain government funding at both the federal and state levels.

To date, different successful ATIS efforts have operated under the direction of both public agencies and private firms.

As an example, in the metropolitan Washington, D.C., area, Partners in Motion, the consortium of 26 public agencies that operate and oversee the area’s transportation facilities, selected a private firm (SmartRoutes) to operate the ATIS using data supplied by the participating public agencies. The ATIS had been built by a second private contractor (Battelle Memorial Institute). Virginia DOT (VDOT) has taken on the role of lead public agency. VDOT manages the contracts with both Battelle and SmartRoutes. VDOT also maintains separate letters of participation with each of the involved public agencies. These letters are nonbinding and stipulate that 1) VDOT is the contracting agent on behalf of the region, and 2) the agency will not distribute “fused” data it receives from SmartRoutes for outside use without the consent of the private partners (although it can freely give out its own “raw” data).

SmartRoutes is in charge of combining the various public agency data sources. It provides these fused data back to the public agencies for their use and is able to sell these



Washington, D.C., area.

data to other private firms or customers. Public agencies perform the majority of transportation system monitoring functions that supply data to the ATIS. They are responsible for the operation and maintenance of these monitoring systems. SmartRoutes has added 24 closed-circuit TV camera locations to those already provided by the public sector.

This particular arrangement resulted in large part from the jurisdictional complexity of the Washington, D.C., region. Because it comprises so many jurisdictions (the District of Columbia, Maryland, Virginia, and multiple cities and counties), getting all jurisdictions to agree on common activities was nearly impossible. In addition, various funding and procurement laws made conducting joint projects difficult. Allowing the private sector to perform much of the inter-jurisdictional work, with input and direction from the public sector, was far easier.

An alternative approach has

been taken in the Gary-Chicago-Milwaukee corridor. This ATIS is an outgrowth of the traveler information system that Illinois DOT (IDOT) has operated for many years as part of its extensive freeway and arterial management efforts in the Chicago metropolitan area. IDOT serves as both the lead public agency and as the ATIS operator, primarily because of its long experience with traveler information systems, the existing data collection systems that are a part of this effort, and the department's strong continued interest in providing these services to the region in support of its traffic and transportation management efforts. Interagency agreements define how data will be shared among both public and private participants.

PROSPECTIVE PARTICIPANTS

Another early step in the development of an ATIS business plan is to determine which individuals, agencies, firms, and jurisdictions

should be involved in the ATIS effort. Any of the three basic functions of the ATIS (data collection, data fusion, and information dissemination) can be performed by either the public or private sectors. Both public and private sector groups can collect data, combine data from diverse sources, add value to collected data in a variety of ways, and disseminate information to customers. In many cases, more than one agency or company can perform these functions, and within a given ATIS, different groups may perform similar or even redundant functions (e.g., collecting the same data in different ways).

Consequently, selecting participants is often more of an “inclusive” rather than “exclusive” process, and any group that adds net value to the ATIS may be encouraged to participate. For example, an ATIS normally relies on multiple ways of disseminating data, and thus almost any group interested in disseminating data may be considered for inclusion in the ATIS effort. However, there are exceptions. These exceptions tend to involve participants who wish to undertake an activity that other participants perceive as detrimental. Understanding how other participants view the ATIS is an important aspect of selecting participants and is covered later in this chapter.

It is important to involve potential private sector players in the ATIS effort from the outset. Raman K. Patel, of PB Farradyne, who worked on the I-95 Corridor Coalition ATIS business plan, has pointed out that the private sector can provide ATIS experience and knowledge, risk management expertise, private capital, and information service provider (ISP) to ISP arrangements and interfaces. In addition, the private sector can help the public sector become more customer-

oriented by capitalizing on market experience and can push ATIS forward by applying the best available technology more quickly than can the public sector.¹

The following questions are intended to ensure that all of the appropriate agencies have been included in the business planning effort, and at the same time, that their roles and interactions have been considered.

- Which public agencies and private firms are current or potential data sources?
- Which public agencies and private firms are current or potential data fusers?
- Which public agencies and private firms are current or potential data disseminators?
- Which public agencies and private firms have current or potential need for the data and services that the ATIS will provide? Even if they're not currently involved in data collection, fusion, or dissemination (for example, local jurisdictions with little or no data collection infrastructure or regional ITS fleet operations)?

This information should also be contained in the ITS element of the regional transportation plan.

Participants in 15 of the largest ATIS efforts (Figure 2-1) range from state and local governments to various public transportation authorities (ports, toll facility operators), wireless communications companies, transportation service providers (railroads, taxicab companies, trucking companies), electronic device manufacturers, and various information service providers. To date, the federal government has also participated in ATIS efforts, although the level of USDOT ITS program funds is expected to decline as ATIS systems become less experimental.

¹ Business Models for Advanced Traveler Information Systems Deployment. Proceedings of the ATIS Business Models Workshop. October 6-8, 1997, San Diego, p. 51.

² Business Models for Advanced Traveler Information Systems Deployment. Proceedings of the ATIS Business Models Workshop. October 6-8, 1997, San Diego, pp. 92-94.

In many cases, the public and private sectors view the value of the public sector's data differently. The public sector tends to view performance information from a freeway corridor as highly valuable. The private sector may view those same data as too limited, wanting information that covers an entire metropolitan area.

The length and diversity of this list attests to the fact that many types of organizations may have a stake in ATIS business plan development.

Some of these agencies and companies will be involved because provision of information meets their agency or company goals. Others will participate because they are being paid to provide some function necessary for the ATIS, whether building a system or device used by someone else, or operating or maintaining something built by themselves or another party.

Simply inviting potential partners to join an ATIS effort will not necessarily produce significant interest from either the public or private sector. Each party (whether public or private) will look at the benefits to be gained and the costs to participate and will decide whether the expected net benefits warrant the use of their scarce resources. In fact, several lead public agencies have complained about the lack of private sector interest in their specific markets.² The private sector has responded

that in some cases the expected return on investment is not sufficient to attract their limited capital.

In many cases, the public and private sectors view the value of the public sector's data very differently. For example, the public sector tends to view excellent performance information on a freeway corridor as a highly valuable resource. The private sector may believe that those same data, for example, would be valuable if they covered an entire metropolitan area, but since they cover just a corridor, the potential market is too small to warrant their participation. (More on how different perceptions can affect the ATIS business plan is included in the next section.) In this case, if the public sector requires private sector expertise or systems to operate the desired ATIS function, then it will have to offer additional incentives to attract companies capable of providing that function. This may mean that the public sector must contract with those companies to provide a given service. In other instances, smaller incentives (such as ceding

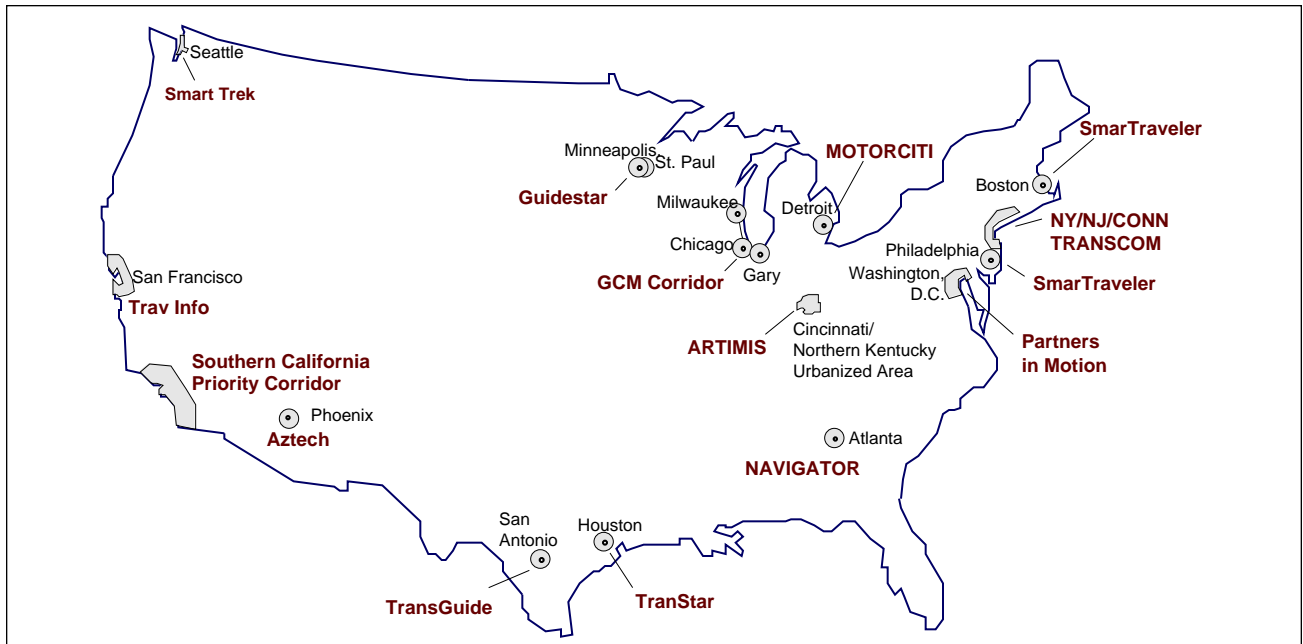


Figure 2-1. Participants in the country's 15 largest ATIS efforts.

control of publicly collected data to the private company or subsidizing the operation of a private sector enterprise) is sufficient to induce private participation in the ATIS.

Public agencies can be similarly hesitant about joining an ATIS effort. Sometimes public agencies do not have the available resources to participate. In other situations, concerns about the use of data will limit the interest of these agencies. As with the private sector, if a public agency's participation is viewed as vital to the ATIS, then further incentives may be necessary. A common incentive for public agencies is subsidization of the data collection or data transmission cost

for supplying data to the ATIS.

Finally, some groups may want to be part of the ATIS but will play only very minor roles. Having a structure that allows these groups to participate, stay abreast of improvements in the ATIS, and support or use the new capabilities—without having to be involved in major decision making—can lead to broad acceptance and support of the ATIS. These groups may include participants such as large employers that are willing to be early adopters of the ATIS delivery systems or local agencies that provide relatively little (if any) data to the system but that may be significantly affected by the region's transportation system.

Table 2-1. Potential roles agencies may undertake³

Public Sector

Federal Transportation Agencies (provide funding and technical assistance)

Federal Highway Administration

Federal Transit Administration

Other Federal Agencies (provide data, disseminate information)

National Park Service

National Weather Service

State Agencies (provide, fuse, disseminate, consume data)

State department of transportation

Research institutes and universities

Finance and economic development

Local Agencies (provide, fuse, disseminate, consume data)

Regional planning organizations

Transit agencies

Local jurisdictions (elected and agency officials): planning, public works, transportation, finance

Police and fire departments

Sheriff's office

Emergency service operators

Airports

Tourism office

Marine ports

Local Agencies (consume data / interested in system performance)

Community-based transportation groups or alliances

Community transportation groups

Private Sector

Design, Build, Collect Data, Operate Systems

³ The listings in this table are only a broad example of roles that different public agencies and private companies might undertake when participating in an ATIS.

- Traffic Condition Monitoring and Reporting Companies
- Design and/or Build Data Systems
- Transportation planning/engineering consulting firms
- Research institutes and universities
- Systems integrators
- ATIS specialist companies
- Supply ATIS Functionality
- Cable companies
- Cellular telephone operators
- Telecommunications companies
- Electronics vendors
- Software developers
- Disseminate Data To End Users
 - Independent service providers that market information
 - Over wireless services: cellular, FM subcarrier, paging
 - Or through specific devices: in-vehicle navigation services, other personal digital assistant manufacturers
 - Over the Internet or other wire-based communications service
 - Media (radio, TV, Internet, newspaper)
 - Cable companies
- Makers of ATIS Components/Equipment
 - Traffic equipment vendors
 - Automotive companies
 - Electronics companies
 - Computer hardware manufacturers
 - Traffic signal vendors
- Consumers of Information
 - Commercial trucking organizations
 - Parcel delivery firms
 - Logistics firms
 - Fleet management systems
 - Railroads
 - Large employers

PERSPECTIVES OF PARTICIPANTS

Regardless of which groups are involved in the ATIS, the development of the business plan and the operation of ATIS must be sensitive to the perspectives of the various current and potential participants. A fully functional ATIS normally includes a number of public agencies, as well as a variety of private companies. Each participant, regardless of the role it plays in the ATIS, offers different capabilities,

goals, and perhaps most importantly, perspectives. These perspectives affect a variety of issues that drive the design, operation, and evolution of an ATIS.

For example, an agency or company's perspective affects

- how it views the role of the ATIS
- what data it views as important (both for collection and dissemination)
- what geographic coverage is important
- the importance of revenue

- generation
- the need for control of the ATIS and/or the information that will be broadcast
- its view of the value of competition within the ATIS process
- how it measures the success or failure of the ATIS
- its view of the reliability of the system and the importance of that reliability
- its view of the accuracy of the information produced by the system and the importance of that accuracy
- the relative value of particular social and political goals, such as social equity and the need to provide equal access to public information for all social, economic, and ethnic groups
- who it views as the primary customer of the ATIS
- the role of government versus that of the private sector.

How these issues are resolved determines the willingness of different agencies and firms to participate in the ATIS, which in turn drives the types of business relationships that must be formed to successfully operate the ATIS. In the following subsections, alternative views of these issues illustrate the importance of different participants' perspectives on ATIS operations.

WHAT IS THE ROLE OF THE ATIS?

As discussed earlier (see The Role of the ATIS), the underlying motivations of the public and private sectors are different. A private sector company needs to make a profit or fold. A public sector organization needs to address citizen needs and regional public policy goals or it will lose the political support of those who direct the agency's operations.

The business approach to

operating the ATIS must reflect the balance between these two sets of motivations. The greater the role the ATIS is expected to play in managing the regional transportation system, the more public sector input (financial support and operational control) is required. The less public sector financial support there is for the system or the stronger the public policy support for private sector oriented solutions, the more the ATIS must include activities that will profit the private sector.

WHAT DATA ARE IMPORTANT?

The data for any ATIS-based information dissemination service will vary. For example, the data necessary to effectively operate a variable message sign are considerably different than those necessary to provide region-wide traffic reports to local radio stations. These are different than those necessary to provide real-time route planning, which are different than those needed to provide real-time transit arrival information. Therefore, the perspectives on which data should be collected and their value are dependent on what an agency or company wants to accomplish with them.

During the San Diego Conference on ATIS Business Models, attendees pointed out that public agencies and private sector companies often view the value of data considerably differently. In several cases, differences in perceptions of the value of specific data have led to frustration on the part of ATIS participants because

- private sector partners were not lining up to use (and in some cases pay for) data the public sector perceived as valuable, or
- data that the private sector perceived as valuable were not being made available by the

public sector.

Many public agencies view the data they collect as extremely valuable, given the cost of the infrastructure needed to collect them and/or their value in the operation of traffic and transit management systems. However, those data may be at a level of detail well beyond what the private sector requires for its purposes. At the same time, the detailed data are often available for only a relatively small geographic area because the public sector tends to instrument the most congested few miles first. This restricts the size of the market that could be served. These geographically limited data sets are insufficient for a number of planned ATIS services, such as real-time route planning.

In the case of transit, many transit properties do not view their existing data sources as “extremely valuable.” However, transit properties are aware that they need to attract and retain new riders. The effective dissemination of information about their available services could be a cost-effective way of winning these new riders.

In many cases the private sector already has sources to provide the information its needs for the locations covered by the public sector. The value of the public sector data may be even further limited by the uncertainty of the ATIS market (that is, if paying customers for the final product do not exist, the data for that product have no value). These significant differences in perceived value have meant that the public sector has sometimes misjudged the revenue it might generate by providing access to those data.

The key to the ATIS business planning effort is to understand that many private sector partners will choose whether to participate in a regional ATIS on the basis of the availability of data. “Availability” includes the types of data available, their quality and completeness (geographic, modal, and time-of-day coverage), and how those attributes relate to the same data attributes in other regions of the country. (See Table 2-2.) Therefore, conversations about data availability must occur early in the ATIS effort so that the public and private partners can

Table 2-2. Important distinctions in data availability

Types of data used	Point speeds, travel times, incident locations, incident duration, traffic volumes, travel advisories (construction closures, event information), weather, video images
Quality of the data	Accuracy, reliability, frequency of updates (currency), precision, timeliness of data delivery
Completeness of the data	Geographic extent of coverage (various facilities and/or various cities/counties), modes covered, time of day and day of week when data are available
Cost of the data	Dollar cost to obtain the data, physical manner in which the data are provided (electronic links, timeliness of updates, robustness of the data link, level of standardization with other urban areas)

Geographically limited data sets are insufficient for a number of planned ATIS services.

determine whether data will be available and, if so, how best to obtain them.

WHAT GEOGRAPHIC COVERAGE IS IMPORTANT?

Public sector oriented ATIS efforts tend to be based on particular facilities or corridors. The usual process is that a department of transportation or other agency installs the monitoring infrastructure necessary to understand facility performance in congested, hazardous, or strategically important areas. It then uses this information to better manage those facilities, which serves the public policy goals of improving the transportation system in high priority areas.

Although some private sector ATIS participants can utilize this type of narrow geographic coverage (monitoring the "usual bottlenecks" effectively is beneficial for radio traffic reports), others need much broader geographic coverage to sustain a viable business. For instance, a business whose appliance repair staff serve an entire metropolitan area wants traffic information for more than just a corridor. If the only data available are for a single corridor or bottleneck, then the market size for the device is relatively limited. The appliance repair business is unlikely to be willing to pay for such traffic information.

At the same time, many of these markets do not need the depth of coverage that traditional advanced traffic management activities are able to provide. Therefore, for some ATIS service providers, the coverage within a geographic region can be fairly shallow, as long as the "key" points are covered or a mechanism exists (e.g., airplanes flying over the region) to help them detect problems.

HOW IMPORTANT IS REVENUE GENERATION?

Obviously, revenue generation is very important to a private sector participant. Nevertheless, even public sector agencies are interested in revenue generation because, in many cases, that revenue can be used to offset the operation of the public sector portion of the ATIS.⁴ However, the San Diego Conference⁵ revealed the clear consensus that extensive revenue generation (beyond what media broadcast services already produce) is unlikely in the near future.

One reason is that the technologies needed to disseminate ATIS information commercially are not mature. Another reason is that, historically, many successful new technologies have had to lower initial prices, lowering early revenue generation, in order to build their markets. Overpricing services to generate revenue before the market has gained strength may kill the market altogether by preventing demand from growing.

Whether large amounts of revenue are ever generated by ATIS functions is a question for the market to decide over time.

From a business planning perspective it is important to determine the role of revenue generation (or the potential for revenue generation) in relation to the need to meet other ATIS goals. These other goals include, but are not limited to, public policy issues such as disseminating information to as many travelers as possible, ensuring that information is available to people of all economic stratas and/or geographic areas, and ensuring that public resources are available to all members of the public.

⁴ Special contract relationships may be necessary to obtain access to these funds, but most states are able to accomplish these tasks. For example, instead of paying a state DOT for access to data, a private company may provide in-kind services (such as a communications bandwidth) that equal that same value.

⁵ Business Models for Advanced Traveler Information Systems Deployment, Proceedings of the ATIS Business Models Workshop, October 6-8, 1997, San Diego

HOW IMPORTANT ARE SOCIAL AND POLITICAL GOALS SUCH AS SOCIAL EQUITY?

This is the corollary to the question about the need for revenue generation. As stated earlier, public policy is generally to give transportation data away as often as possible to support transportation management efforts. The more informed travelers are, the more efficiently they travel and the better served they are by available transportation system options. However, the more data they receive for free, the less willing customers will be to pay for those data, which lowers the revenue that can be expected from selling that information.



The issues of social equity and political goals extend beyond simply balancing revenue versus “free information.” A big question for the public sector partners in an ATIS will be which information they want to provide to customers. For example, if the market for traffic information was large enough but the market for transit information was not large, the public sector might decide to build information systems especially for transit systems while letting the private sector build traffic performance information systems. Another approach might be for the public sector to give away transit data to information service providers while requiring payment for traffic information. A third arrangement might be to require information service providers to provide transit information via the same media as they provide traffic information in return for free or reduced cost access to all public information.

Decisions of this nature allow the public sector to emphasize specific public policy goals. However, like all restrictions placed on the private sector, this type of

emphasis on specific “non-commercial” goals is likely to have some impact on the willingness of private sector partners to participate and, consequently, on other types of benefits that the public sector can obtain.

Bill Finkbeiner, a Washington State legislator who also worked on the Microsoft Sidewalk Trafficview application, had these words of advice at the San Diego conference. “Don’t foist social goals on emerging technologies. This is a tendency of governments in general. If people dictate that information must be available to everyone, whether or not they have a computer, in-vehicle device, etc., the markets won’t develop. In an emerging market, you get the consumer on board and demonstrate there is a market, then you go for the larger market. If you make conditions on offering traffic information across all platforms, you make it difficult for the private sector to grow the market.”

WHO CONTROLS THE ATIS?

The topic of “control” involves many issues. Of these, the most important are probably what data (particularly data from ITS devices) are available for general distribution and what types of information are disseminated. Both public agencies and private companies have concerns about the distribution of specific data items. For example,

- Video camera images of incident scenes can create liability problems for the facility operator. Consequently, many highway agencies do not allow outside access to closed-circuit TV images when the cameras are viewing an incident scene and do not record those images.
- Travel times from vehicle probes can be used to track specific vehicles. Whereas access is



Both public agencies and private companies have concerns about the distribution of specific types of data.

normally provided to the travel time information collected from those probes, access to the vehicle identification information is almost always restricted, even though those data might serve other useful purposes.

- Cities are often leery of releasing arterial performance data because they are concerned that such information will encourage traffic diversion onto certain streets, worsening conditions and enraging the residents who live and work along those streets.
- Some private companies are concerned that another private company controlling access to data for a region will hurt their competitive position in that marketplace.
- Similarly, private firms have frequently objected to public agencies hiring other private firms to perform the “data control” function (including the data fusion process) because public funds are then being used to support a competing private enterprise.⁶

From a business planning perspective, it must be clear that control of the data is not free. That is, the more control over providing ATIS information an agency (or company) wants, the more resources (money or other) that agency or company should expect to contribute toward the ATIS. For example, if a public agency wants to restrict access to specific types of data, it is less likely (not unlikely) to obtain unrestricted access to other agency’s data or to generate as much revenue from selling its data as it would if all of its data were available. Another potential consequence from restricting access to specific data or from requiring control of those data is that some agencies and companies will choose to not participate in a given region’s ATIS.

It is important to spell out in the business plan and in the agreements that underlie the business plan the rights to data that each ATIS participant has. Although these rights may change over time (an agency may decide that some data are not as sensitive as it originally thought, or the public outcry about the use of

⁶ Currently, it appears that this is legal in most regions of the country as long as the original selection of the private operator is an open and competitive process. However, use of this process may reduce the interest of competing firms in entering these markets.

The decision of whether ATIS should be competitive or monopolistic relates to who has rights to access publicly collected data.

⁷ In a “duopoly” two firms have similar rights. A good example of this structure is the analog cellular telephone market of the mid-1990s in which two companies per city were competitively awarded the rights to offer analog cellular telephone service. This allowed some competition in each market, but it restricted the amount of that competition to ensure that profits would be sufficient to allow that service to survive.

⁸ For example, in the Partners in Motion agreement for the Washington, D.C. area, each public agency can give out its own data to anyone it wants to. However, only the selected private ATIS operator, SmartRoutes, can provide access to the “fused” data that is compiled from all participating data sources. Basically, this allows any private company the choice of either obtaining the SmartRoutes data feed (under SmartRoute’s conditions) or convincing the public agencies to support a secondary data feed (one to SmartRoutes, one to this second company) and then performing its own data fusion function.

⁹ This conclusion was voiced at the ATIS Business Models Workshop, held October 6-8, 1997, San Diego. Business Models for Advanced Traveler Information Systems Deployment, Proceedings of the ATIS Business Models Workshop, October 6-8, 1997, San Diego

other data may cause a public agency to restrict access to those data), it is important that the process participants can follow to change these rights is publicly defined.

SHOULD ATIS BE COMPETITIVE OR MONOPOLISTIC?

The issue of competitiveness is central to the debate surrounding many ATIS business planning efforts. This question is highly related to the issue of control discussed previously. In general, the concern is over who has rights to access publicly collected data. Does the public sector control those data (in which case all private sector companies have the same basic rights to those data)? Does one private firm control access to those data (under contract to a public sector agency)? If so, does that firm have to provide access to those data, or can it restrict access to maximize its revenue? Does more than one private firm have access to those data (essentially, a competitive duopoly⁷)?

In general, competition drives down the prices consumers pay and results in better (more innovative) service from the competing companies. However, for fledgling technologies and services, too much competition may cause firms to go bankrupt, preventing the market from successfully reaching critical mass. Thus, for some technologies, particularly where significant infrastructure investments are required, regulated monopolies or duopolies are often established to help “nurture” the technology in its earliest phases.

An important question for the business plan involves the sources of data for prospective participants (particularly the private sector). Is a single source of fused data available, or do information service providers

have to go to multiple original sources for raw data and fuse their own? If a single source is available, is it a monopoly, or do information service providers have the option of going to other raw data providers? Finally, will more than one source of fused data be available?

A number of the public/private agreements signed in the last two years include clauses that grant exclusive rights for the marketing and distribution of “fused” data (i.e., data that have been combined from multiple public and private sources) to the private sector firm that is performing the fusion function. These “exclusivity” clauses are viewed by different groups as either a help or hindrance to private participation, depending on the relationship of each group to the private firm that has control of the data. In many cases, private sector companies are given the opportunity either to obtain data from this exclusive provider of “fused” data or to attempt to obtain “raw” data from each of the participating public agencies.⁸

One negative view of exclusive arrangements is that providing exclusive control of fused public data to a single private firm increases the cost of the data to other potential private sector participants. This cost increase is assumed to decrease the number of private sector participants, thus decreasing total market penetration and limiting the number and type of services available through the ATIS. A number of private sector participants, particularly those who market services sent to consumer electronic devices, have expressed this opinion publicly and have stated that they would participate in these ATIS efforts only when all other potential markets had been investigated.⁹

One positive view of exclusive

If exclusivity reduces the cost of an information service provider's access to data, then an exclusive arrangement will be beneficial. If the data access cost is driven higher to pay for the overhead costs and/or profit of that lone data provider, then exclusivity will be detrimental.

arrangements is that such an agreement can significantly reduce the time and resources necessary for the public sector to conduct its ATIS effort by reducing agencies' administrative and service burden. This is because in exclusive arrangements, the public sector agency is able to deal with only one private sector firm, not several. This reduces the number of "client contacts" that require public staff and the number and size (bandwidth) of electronic connections that these agencies must support. In essence, much of the overhead function for the ATIS is transferred to the single private sector provider, resulting in significant savings to the public sector. Exclusivity is also viewed as a possible means by which a more standardized data format could be achieved. (If one firm controlled large segments of the ATIS data market, national interoperability could be achieved through use of that provider's data formats.)

Another common view within the public sector is that exclusivity may be a "necessary evil." That is, in some regions exclusivity may be necessary to create the ATIS market in the first place. Exclusivity may be granted to a private firm when that firm needs the increased revenue generation potential (protection from competition) that such a clause provides. This is normally the case when the private firm has agreed to invest in costly components that are necessary to develop some portion of the ATIS (e.g., new surveillance infrastructure, the data fusion server). The public agency that grants these rights does so (in part) to avoid paying the cost of these improvements.

In this situation, the disadvantages are that the public sector may lose some control of its data, while consumers may gain less from the

decreased competition within the private sector. This lower level of private sector competition may in turn slow market penetration, resulting in fewer choices for the consumer. The firm granted exclusive rights also assumes more risk by having to provide a greater initial investment. In some situations, decision makers will agree that these disadvantages are more than offset by the reduction in public sector costs and, for the monopoly firm, greater profit potential. In other markets, the disadvantages will outweigh the benefits.

One conclusion that can be drawn from this dilemma is that if exclusivity reduces the cost of an information service provider's access to data (because of standardization and/or the fact that the exclusive arranger takes care of the jurisdictional and organization contracting problems), then an exclusive arrangement will have an overall beneficial effect. If the data access cost is driven higher to pay for the overhead costs and/or profit of that lone data provider, then exclusivity will have a detrimental effect on ATIS participation and deployment. Thus selecting between exclusive and nonexclusive arrangements must be done by balancing the benefits from such an arrangement against the opportunity costs that occur from making such a decision.¹⁰

HOW IS THE SUCCESS OF THE ATIS MEASURED?

A difference in perspective on this issue may not have as significant an impact on the business plan as other issues, but it can cause groups to view the performance of the system very differently. Obviously, for a private concern, the primary metric is the financial success of the venture. This means that the private sector is interested in whether the

¹⁰ If standard formats and procedures for transmitting publicly collected raw transportation system performance data are adopted nationally, views of the benefits of exclusivity may change. For example, if national standards for data transmission are adopted, obtaining and fusing data from multiple sources might become as easy as obtaining data from a single source. If this were the case, the primary benefits of having a single, separate source for accessing public data might come from the data fusion or other added value services such a company might provide. In addition, if too many users requested public data, so that the public agency's capabilities to support data access were exceeded, the cost of upgrading the available communications bandwidth might possibly be transferred to that exclusive data provider.

revenue generated by all aspects of the ATIS effort surpass (or are growing enough that in the acceptable future they will surpass) the costs associated with performing its ATIS task. Secondary to these concerns (but certainly important) are the company's concerns about its public image and its contribution to the region.

The public sector would like to witness measurable improvements in the performance of the transportation system (reduced travel times, increased use of shared ride transportation, and others); however, motorists can gain considerable psychological benefit by simply obtaining information about the transportation system's performance. (For example, telling people stuck in traffic who are late for appointments that they will be free of that jam in another mile will ease their anxiety. This will not only increase their support for the information system but quite possibly reduce the chance of other incidents by preventing them, in states of frustration, from taking reckless actions.) So for the public sector side, the measures of most significance will likely be whether the public is using the ATIS

and whether the public perceives that 1) the ATIS is beneficial and 2) that the public sector should continue to maintain its current operation.

HOW IS RELIABILITY MEASURED AND WHAT CONSTITUTES "ACCEPTABLE RELIABILITY?"

A concern that many private sector participants have is whether the data provided for dissemination will be consistently available, that is, how often the data delivery system will fail. If a customer needs information, and that information is "frequently" not available (or is perceived to be frequently unavailable), the customer is likely to cancel the service. Therefore, private companies that sell services (and invest money in devices, infrastructure, marketing, and other costs) are rightfully concerned that the data sources function when they are supposed to. Even if the data from these sources are free, the magnitude of the other sunk costs associated with delivery of ATIS information is sufficient to deter many companies without assurances that the data will be consistently available.

Public sector agencies that use



"Reliability" can be viewed differently, depending on what is known about the data and how the data are used.

these data for operational purposes share similar concerns about system reliability. One reason that many public sector agencies maintain control over the transportation system monitoring infrastructure is that they are concerned about their reliance on these same data sources.

However, note that “reliability” can be viewed differently, depending on what is known about the data and how the data are used. As an example, for a freeway with four lanes of loop detectors, how many of those detectors must be operating at a given time for the data from that section to be considered “reliable”? The answer to that question depends on the intended use of the data and the ability of that application to handle missing or invalid data. The number of data points needed to estimate whether a traffic jam has occurred is fewer than the number of data points needed to detect fluctuations in volume, necessary to optimize nearby ramp metering rates.

In many cases, not only must data be “reliable,” but appropriate flags must be placed in the database to alert the system when sensors are not acting reliably to prevent “false” information from being disseminated. This is particularly important for services trying to build customer confidence.

WHAT IS “ACCURATE DATA” AND HOW IMPORTANT IS THAT ACCURACY?

Highly related to the issue of “data reliability” is the issue of “data accuracy.” Of specific concern to private sector companies is that the information they sell be correct. The obvious reason is that customers will soon stop paying for information if it is wrong. Thus, the accuracy of statements about transportation

system performance becomes more important as customers begin to pay for that information. (If the data are disseminated for “free,” say via radio broadcast supported by advertising, the concern about the “accuracy” of the data is less than if the customer is paying directly for the service.)

Tied to the issue of “accuracy” is the issue of timeliness. One reason that radio traffic reports are “inaccurate” is that reports are often 10 to 15 minutes apart, and conditions can change dramatically between the time the location was last observed and the time of the broadcast. Therefore, data sellers are also concerned that their systems be responsive enough to match customers’ expected uses.

Agencies often have different expectations about data accuracy than consumers. A good example of this is transit location information. The following example illustrates how a monitoring system that provides “accurate” data for one application is not capable of providing “accurate” data for a different application.

Transit authorities can use “real-time” transit location information to detect late coaches, which can require significant overtime payments to drivers and cause significant delay to customers. When a coach is “late enough,” the transit authority can take action (send out an extra coach to start the next planned run for that bus, send out a replacement driver) to improve the system’s performance. However, “late enough” is a nebulous term; to the authority, the bus may not be “late” until it is more than 20 minutes off schedule.

This same vehicle location information may be given to customers because one desired ATIS function is the ability to tell transit users when their bus will arrive. However, a customer’s perception of “late” is very different than the transit

Agencies often have different expectations about data accuracy than consumers.

authority's 20-minute definition. Therefore, the ATIS that transmits the expected arrival time message can not rely on the transit authority's definition of "late." In addition, the location referencing system has to be much more precise to meet customers' needs than to meet the transit authority's needs. An error of 2 minutes in arrival time in relation to a decision value of 20 minutes is not a problem; an error of 2 minutes in relation to a prediction that a bus will arrive at a bus stop 3 minutes late is high enough to make the prediction useless. Because of their concern that transit users would quickly learn to distrust arrival predictions and thus decide to not use an expensive bus stop information delivery system, transit authorities may be reluctant to pursue this type of information system if they have to rely on a bus location system designed to meet their operational definition of "late."

Differences like these in the perception of data "accuracy" can easily lead to confusion about the availability of data. At the same time, they can make some agencies reluctant to allow access to data that they believe could be easily "mis-used," which can cause friction among participants.

WHO IS THE PRIMARY ATIS CUSTOMER?

On this question, the perspectives of participants will relate to their view of the role of the ATIS. This topic is important to the development of the business plan in that the ATIS can only be successful if the primary customer is happy with its products.

If the role of the data collection, fusion, and transfer process is primarily to provide neighboring jurisdictions with improved transportation system information for managing their facilities, the "primary customer" of the ATIS is operating agencies. Similarly, if this function is provided by a private company under contract to a public agency, its primary customer becomes that agency and that contract.

On the other hand, if the primary reason for the ATIS is to provide travelers, businesses, and commercial carriers with information at some price (whether that "price" is in the form of advertising revenue or a subscription or service fee), then the primary customer is the individual end user. Such a system is then deemed successful only if a sufficient number of travelers participate in the system.

A final example of how the perspective of the "ultimate customer" changes the decision making for an ATIS system is based on the availability of arterial information. Three perspectives are given, the city that controls the traffic signal system, the state department of transportation that operates the area freeway system, and the private sector provider that wants to access the arterial performance data to provide route planning services.

The City's View

The benefits of participating (providing traffic signal system data) in the regional ATIS can be reduced traffic congestion and better mobility (and consequently economic growth) for people and goods in the city. A reward for sharing data with neighboring jurisdictions is facility performance data from those other jurisdictions. These data allow the city to better operate the signal system that manages the arterial



network. Participating in the ATIS also helps the overall regional transportation system, which in the long run should economically benefit the city. Allowing use of city data in the private sector in-vehicle system helps people use city streets more efficiently and may make the city more attractive to businesses and residents.

However, publicly broadcasting the fact that the arterial streets are not congested may generate increased traffic (because drivers now know that these arterials can be used to avoid a freeway bottleneck). This can create considerable political upheaval if local residents believe that the city is encouraging such an increase. In addition, such growth may outstrip the benefits obtained from better management of the street network.

The State's View

The state sees the addition of arterial data as beneficial. The data allow neighboring traffic networks to coordinate their control strategies. This should promote better regional traffic flow and help decrease environmental impacts. In addition, when the freeway is congested, some vehicles will be able to use the available arterial capacity, reducing congestion on the freeway. Having arterial data also makes the ATIS coverage more complete. This should encourage more people to use the system, resulting in better travel decisions throughout the region.

The Route Planning Firm's View

For the firm marketing data for this purpose, the availability of data is the most important issue. The greater the geographic coverage of its system, the greater the market potential. The more alternatives it

can provide its customers (even negative choices, such as "Don't detour onto the arterials because they are worse than the congested freeway."), the more value customers will find in its services, and the more likely the company will be able to sell those services. Thus, the private firm is not really interested in the global outcome of providing traffic performance information. It is primarily interested in whether its customers find this information valuable and whether the information encourages growth in the number of clients.

Ultimately, the city (who controls the data) has to decide what data to make available and who can obtain that information. The city may decide that it is willing to share its arterial data with neighboring jurisdictions and the state department of transportation for traffic management purposes but that it will not make that information available for dissemination to the public. On the other hand, it may decide that the benefits of providing data to the public (increasing the attractiveness of the city to businesses because workers can get to and from their jobs more easily) outweigh the possible negative consequences. Most likely this decision will be expressed as part of a memorandum of understanding (MOU) or other similar agreement with the lead public sector agency. This document will spell out what data are available and how they can be used by other ATIS participants. The memorandum of understanding will also spell out what rights to others' data (or other benefits) the city will get in return.

THE ROLE OF GOVERNMENT VERSUS THAT OF THE PRIVATE SECTOR

There is considerable debate in many parts of the country over the



appropriate roles of the government and the private sector. Where individuals draw this line is a function of their political views and their reliance on and experience with services provided by both the public and private sectors. Certainly in some parts of the country the expected role of the public sector is much broader than in others.

Answering this question for ATIS implementation is even more difficult because of the conflicting needs described throughout this document, namely the need

- for public sector support of this emerging field
- to meet public policy goals of equal access to government information
- to attract private sector investment
- to encourage private sector innovation.

Several points made at the San Diego Conference (from a private sector perspective) suggest considerations in drawing this line between the public and private sectors:

- The public sector should be careful to not smother the private sector by competing with it. The number of customers available in the early stages of implementation is finite, and the private sector needs those customers to increase the size of the market.
- The public sector should not impose social roles on emerging technologies. If it places conditions on the information that can be delivered, it hinders the private sector in taking advantage of customer demands, which, in turn, prevents the private sector from increasing the market.
- The public sector needs to concentrate its limited resources on the tasks that only it can

provide, letting the private sector deliver the remaining tasks where it has that interest.

PERSPECTIVE AND BUSINESS PLANS—A SUMMARY

Differences in perspective are not restricted to differences between the public and private sectors. Participants may be split along any of many dimensions, including

- public vs. private
- local jurisdictions vs. one another
- local jurisdictions vs. regional, state, or federal government
- highways vs. transit
- operations vs. planning
- ATIS operational improvements vs. capital improvements.

Tensions may also exist among different departments within a single jurisdiction, agency, or firm.

Given that participants can have very different perspectives on almost all aspects of the ATIS, the keys to developing a successful ATIS business plan and then operating a successful ATIS are to

- recognize that these differences exist
- understand what is important to the participants
- create decision making mechanisms for the ATIS that account for these differences (see Coordination Among Participants, below)
- create open channels of communication among participants so that differences in perspective become readily known and quickly understood by all.

These key actions help the participants to agree on the issues for which consensus can be achieved. It also allows participants to negotiate and refine proposals to meet the needs of all.

“The major obstacle that continues to hamper the deployment of a fully interoperable intermodal ITS system is not technological in nature. It is the frailties of human nature and agencies’ long-established “turfs” that bedevil the problem.”

COORDINATION AMONG PARTICIPANTS

Because of differences in perspective, one of the biggest obstacles to developing and implementing an effective ATIS is successfully coordinating the efforts and resources of the many players involved. Nels Ericson summarized the problem succinctly in *ITS World*, “The major obstacle that continues to hamper the deployment of a fully interoperable intermodal ITS system is not technological in nature. It is the frailties of human nature and agencies’ long-established “turfs” that bedevil the problem.”¹¹ Therefore, a major goal of the business planning process is to develop and describe the structures that will facilitate interagency and inter-jurisdictional coordination. Where possible, coordination helps all participants in the ATIS achieve their goals.

To do this, the business plan should define the roles and expectations of the ATIS participants. In addition, in laying the groundwork required to develop the business plan, participants should identify the issues that demand the most coordination and define mechanisms for resolving conflicts if they occur. Another important part of the business planning effort is to set up a management structure to carry out this coordination.

WHY IS COORDINATION IMPORTANT?

Beyond the resolution of differences in opinion that stem from the various perspectives of the ATIS participants, the benefits of coordination include

- a reduction in the number of conflicts among the participants
- cost savings from less duplication of effort
- cost savings from pooled

purchasing of equipment and software

- cost savings from heeding the lessons learned by other experienced partners
- the identification of missing pieces in the ATIS
- the identification of expertise, experience, and resources among the participants so that those skills and capabilities can be utilized most effectively.

Finally, and perhaps most importantly, coordination is important because transportation problems such as congestion, as well as the means of mitigating those problems, transcend local political boundaries. The driver who faces congestion along a roadway that winds through four jurisdictions wants and needs only to move across those boundaries as efficiently as possible. Many of the tasks required to facilitate that smooth trip, such as optimizing traffic signals (an advanced traffic management system function that can provide data for ATIS) require accurate, reliable, and compatible data across those same jurisdictional boundaries. This is only possible with jurisdictional cooperation and coordination.

Significant savings are also possible when jurisdictions coordinate their equipment purchases. For example, it may be more efficient for one jurisdiction to purchase expensive technology and then contract with adjoining jurisdictions for service. For example, in Seattle, closed-circuit TV images from multiple jurisdictions are interconnected through a single video switch operated by the Washington State Department of Transportation. This gives both public and private users simplified access to those images (they have to connect to only one source), takes advantage of existing public agency fiber optic communi-

¹¹ “A Meeting of Minds, A Surrendering of Turf: The First Steps to Successful ITS,” Nels Ericson, *ITS World*, July/August 1996.

¹² “The Bitter Costs of Municipal Sibling Rivalry,” Alan Ehrenhalt. *Governing*, May 1995.

¹³ Business Models for Advanced Traveler Information Systems Deployment, Proceedings of the ATIS Business Models Workshop, October 6-8, 1997, San Diego, page A-105

¹⁴ Relating to Other Governments,” in the *Effective Local Government Manager* (2nd ed. 1993. Washington DC: International City/County Management Association.

¹⁵ “Overcoming Barriers To ITS—Lessons Learned From Other Technologies” by the Urban Institute, Cambridge Systematics, Canfield Paddock and Stone PLC, and MTA-EMCI, for the Federal Highway Administration, 1995, page 199

"There's a vicious circle operating right now in the public life of any metropolitan area, large or small. The worse fiscal pressures become, the more important it is for localities to pool their resources and save money.... This is a time when local governments in any metropolitan area, even ones that have been consumed by rivalry for decades, need to bend over backwards to stick together, sharing and cooperating to save precious dollars and to avoid wasting tax money.... Every metropolitan area has adjoining suburbs that waste money duplicating services because they are too proud and turf-conscious to consolidate them... The 1990s are a decade in which communities are being torn by powerful centrifugal forces; they are also a time when communities need to fight the disorder and work together. It is a thankless job, and it seems inevitable that some, perhaps most, are going to fail. On the other hand, it also seems certain that the future belongs to those who learn how to do it."

—Alan Ehrenhalt¹²

cations capabilities (reducing costs), and serves multiple purposes (better traffic management, improved public information dissemination, and better media relations.)

Another strategy is for a single agency to act as the purchasing agent for several agencies for a specific type of equipment. With this approach, all members of the group can use a single contract (or purchase order) to buy a given item. This eliminates the need for multiple purchasing efforts and allows the group to

- obtain a better price for that equipment
- integrate their equipment (from the same vendor) more easily
- obtain training less expensively (because a single training class can meet multiple agencies' needs)
- fall back on expertise in neighboring jurisdictions when problems occur.

WHAT MAKES COORDINATION DIFFICULT?

Despite the acknowledged benefits that coordination can provide, it can be very difficult to achieve. Coordination is needed among all participants in the ATIS. That includes all of the jurisdictions, agencies, and private companies that provide information to the system, as well as those that manipulate the data or deliver the information to end users.

Interestingly, whereas the perceptions of the public and private sectors are often the most radically different, coordination is often most difficult among public sector participants. In fact, representatives of the Partners in Motion effort in Washington, D.C., have said that "to establish a public-private partnership, one must realize that a public-public partnership is necessary and

often harder to achieve."¹³

Why is coordination so difficult among public sector agencies and jurisdictions, and why does it constitute an obstacle to ATIS in so many areas? One reason for tension between agencies is that, to some extent, local jurisdictions compete in a "zero sum" environment, pitted against one another for the same scarce funding resources. "To a certain extent, relations among local units of government in metropolitan areas or regions resemble those between nations. Each local government pursues its self-interest, as it sees that interest. Each government seeks to maintain its autonomy and territorial integrity and competes with other units for scarce resources.... Thus, relations between local governments may be characterized by conflict."¹⁴

Hyman¹⁵ suggests other reasons for local jurisdictions' reluctance to cooperate:

- differences in perception regarding the goals and results that are important to achieve
- institutional inertia combined with different organizational and jurisdictional cultures
- some organizations' unwillingness to contribute to the cost of ATIS development (despite their willingness to benefit from ATIS resources)
- real or perceived requirements for data confidentiality
- data specification, accuracy, and structural incompatibility
- a desire to maintain control over the use and dissemination of data
- different perceptions of the value of sharing data
- issues of equity, leadership, and ego
- lack of the staff time and resources required to actively participate, resulting in inertia.

HOW DO YOU BUILD COORDINATION FUNCTIONS?

Given all of the factors that hinder coordination, what mechanisms are available to achieve coordination? The answer is not a single “grand” solution but a long-term commitment to work together, as well as the creation of mechanisms and plans that encourage and foster coordinated activities. Christine Johnson¹⁶, of the ITS Joint Program Office of U.S. DOT, emphasized the need for a long-term outlook:

“Each region must share a vision of an integrated “end state” that has “buy in” from a majority of the region’s public and private players. The final integrated system will not be purchased or acquired all at one time; it will be pieced together bit by bit, with each agency or company contributing components, data, and infrastructure. To avoid building a hodgepodge, everyone must work with roughly the same end vision in mind and think total travel options—not just highway travel, not just transit travel.”

Toward this end, the ATIS must be coordinated with other ITS activities taking place in the region, as well as with other regional public transportation efforts. Ideally, ATIS components should be included in the region’s transportation plan.

One highly recommended option for fostering coordination is the creation of “management teams.” This technique is one that has been used successfully in the implementation of incident management systems (an area that has coordination problems similar to those of ATIS).

The American Trucking Association Foundation and Cambridge Systematics described this technique as follows¹⁷: “[ATIS] teams represent formal, continuing mechanisms for program planning, oversight,

support, and evaluation. Often, a team can evolve from an early working group or partnership into a permanent institutional entity, perhaps with its own staff and funding.”

There may be two types of teams:

- a technical team, which focuses on equipment, training, software, and infrastructure and whose purpose is to coordinate and build staff expertise and to develop standard plans for procedures
- a policy team, which focuses on definitions of responsibilities, coordination of agency roles, and overall program design and direction.

These teams provide a forum for program development without directly challenging traditional agency roles and responsibilities. They are especially effective in the early stages of program development because they are informal, problem-oriented, and do not require participating agencies to commit to a formal reorganization. An issue with these teams is that they require strong leadership or they will meet for years without reaching any decisions.

Technical teams normally consist of mid-level managers and skilled technical staff. Their mission is to ensure that the day-to-day issues that cause friction are resolved to all parties’ satisfaction. Technical teams normally meet routinely (monthly or quarterly, depending on need). They are usually formed to resolve specific problems, but their existence often continues long after the initial problem has been resolved because they are so effective at working through institutional and technical problems.

Some of the primary benefits of effective technical teams are the

¹⁶ ITE Journal, December 1995. “Accelerating ITS Deployment: A Report from the USDOT.” Christine Johnson.

¹⁷ Final Report: Incident Management, by Cambridge Systematics and the ATA Foundation, Inc., prepared for the National Incident Management Coalition, July 1996, pages 4-6

following:

- They convert agencies from being “one of them” to being “one of us” because technical staff with similar professional needs and interests become familiar with each other and work toward common goals.
- By getting to know each other and working together, agency staff can develop trust between agencies.
- They provide an effective means through which emerging problems can be raised and solutions found, before those problems become serious.
- They create a means of communication between agencies that often do not communicate effectively.

Policy teams tend to consist of upper management. They meet less often, but they set the framework and provide the direction under which the technical teams work. In addition, like technical teams, policy teams provide a forum through which agencies can voice concerns. This is particularly important when a large agency (e.g., a state department of transportation) is working with several smaller jurisdictions (e.g., suburban cities).

Working together within the team structure can give cities a considerably more important role in policy decisions than if each jurisdiction deals with the state transportation department individually. At the same time, the state transportation department has the opportunity to generate support for plans that help the region, even if those plans have modest impacts on one of the region’s jurisdictions.

All regions have a formal process for identifying and prioritizing transportation system improvements that have regional impacts. The ATIS implementation compo-

nents must be included within that overall planning framework if the ATIS involves significant public sector participation.

As part of the business plan, it is important to define the management structure of the system. Management teams (often built around functional requirements) are one effective way of providing this structure.

INFRASTRUCTURE

Understanding the availability of transportation system monitoring infrastructure¹⁸ and the value of the data that are produced or can be shared by those systems is an important part of selecting appropriate business relationships. Infrastructure (or the lack of it) not only determines the types of ATIS services that can be provided but affects the relationship that can be expected between the ATIS and the region’s transportation management systems.

In most areas of the country where substantial travel monitoring infrastructure is in place, that infrastructure exists primarily to support management of the transportation system. The ATIS benefits that can be gained from those same data are secondary to the primary purpose of the advanced traffic management system (ATMS) or advanced public transportation system (APTS). From this basic position, two approaches to ATIS business relationships are possible.

The first approach is to treat the ATIS as a direct extension of the ATMS/APTS. To that end, the public sector wants to provide opportunities for the public to obtain traveler information because such information will help travelers choose wisely among the available options. To accomplish this, the public sector gives the private sector access to the data so that more consumers can get

¹⁸ For this discussion, “Infrastructure” is defined as the sensors used for monitoring transportation system performance, the communications systems needed to return the data to a central location, and the ability of an external source to obtain the data.



In most areas where substantial travel monitoring infrastructure is in place, it exists primarily to support management of the transportation system. The ATIS benefits that can be gained from those same data are secondary.

and use the information. The business model for this type of approach is to provide the private sector with access to ATMS/APTS data at low marginal costs, while the public sector retains control of the data for ATMS/APTS purposes.

The second common approach is to treat ATIS as almost extraneous to the ATMS/APTS process. That is, the public sector concentrates almost exclusively on the direct operation of the transportation system and allows the private sector to control the ATIS function. In this scenario, the public sector selects one or more private sector firms to operate the ATIS (using the ATMS and APTS data). The selection is based on which firm can provide the most benefit to the region, at the least cost to the public sector, while maintaining the ATMS/APTS services important to the public sector.

In addition to the relationship between ATIS and regional transportation management efforts, the availability of traffic monitoring infrastructure generally affects

- how much and what type of interest private partners have in

participating in an ATIS

- the types of ATIS services that can be provided in the foreseeable future
- the cost of creating an ATIS with sufficient geographic coverage
- the cost of operating an ATIS, regardless of the capabilities of that system
- the need for revenue to construct or operate that system.

The availability (or lack) of infrastructure is a major factor in the attractiveness of that region to private service providers. The more infrastructure and geographic coverage a region has, the more attractive a region is to private interests; and the more private interest there is, the more likely that private resources can be found to help with the construction and operation of the ATIS. Conversely, the less infrastructure a region has, the less “desirable” that location is as an ATIS market for the private sector because it will have more difficulty developing the information it needs to provide to its customers. This means that fewer private resources will be available for ATIS efforts.

The "level of interest" of the private sector in a given ATIS will not be uniform. Some private partners will only be willing to participate in an ATIS if the data are already available to support their application or device. This is particularly true for those services whose primary business is to tailor existing information to meet the specific needs of their customers, by delivering it in useful ways, by filtering it so that the customer receives only desired information, or by computing new information from existing data (e.g., forecasting travel conditions).

Other private partners may actually be attracted to areas that lack infrastructure. These private sector companies will look for a business opportunity to provide data for ATIS (and perhaps APTS and ATMS) purposes. For example, if a region lacks infrastructure and the expertise to develop it but has the political support and resources for that infrastructure, some companies will want to help develop it. In such a situation, the appropriate ATIS business plan may be a turn-key approach in which the private sector designs and constructs the infrastructure.

If the region lacks both infrastructure and the resources necessary to construct it, contracting with private sector partners to provide information rather than the infrastructure itself may be most appropriate (assuming that the public sector wishes to obtain the data). This would create a very different public/private relationship in which the private sector would be able to select its own monitoring techniques to meet the needs of its customers, one of which would be the public sector. Such a relationship might not be the one initially intended by the public sector, but it might be the

necessary (or best) option if few resources are available to pay for public sector oriented services.

The lack of significant public sector monitoring capabilities and the resources to pay for their construction may preclude or eliminate the goal of having a public center oriented, ATMS/APTS-based, ATIS. (See The Role of the ATIS.) Instead, the public sector may accept an entirely different attitude toward ATIS. Several private firms operate businesses that collect "traffic performance data" from multiple sources (police reports, airplanes, spotters, and others) and generate traveler information. These information services have very different consumer markets than data intensive systems such as externally linked route guidance devices. If congestion is bad enough, the market for these services may easily be large enough to entice this type of company to enter an ATIS market, even without significant public sector monitoring resources. Consequently, the public sector may decide to play little or no role in the ATIS and rely on these firms to create their own systems and markets. That is, the public sector can turn the entire ATIS function over to the private sector.

A lack of public sector resources can also significantly affect which business relationships are appropriate for an ATIS, even when a substantial amount of infrastructure is in place. For example, in several regions around the country, the public sector does not have the resources to continue operation and maintenance of the existing system. As a consequence, the public sector approaches the ATIS as a means of generating revenue needed to support the infrastructure and the traffic management benefits it provides. (See What Data Are

Important?) The goal of the ATIS (not the monitoring effort) then becomes one of providing the resources (staffing, expertise, and funding) necessary to operate the public infrastructure for the traffic management system. Therefore, ATIS functions are given entirely to a private sector firm or firms in return for the best possible terms for infrastructure operation and maintenance. These resources may be in the form of cash or in-kind services, whichever is most beneficial to the public sector.

Because most ATIS efforts in the U.S. will be under construction for several years, several efforts have selected a combination of public and private infrastructure. One technique has been to contract with the private sector to provide monitoring infrastructure in areas that do not already contain sufficient public sector infrastructure. As public sector infrastructure is built at those locations, the private sector infrastructure will then be moved to new locations to expand the system's coverage. This will allow the public sector to obtain more coverage at less immediate cost, while ensuring that the needs of the private sector are met. (The private sector provides input regarding sensor placement.)

REVENUE

The subject of revenue is covered extensively under the sections Perspectives of Participants, and Infrastructure. Two major points are highlighted here:

- The availability of revenue from the private sector is controlled by the size of the ATIS market, which is highly uncertain at this time.
- The need for revenue must be balanced against the other needs for the ATIS.

THE AVAILABILITY OF REVENUE

At the San Diego Conference on Business Models for ATIS Deployment,¹⁹ attendees came to the nearly unanimous conclusion that the ATIS market is so immature that significant revenue is unlikely to be generated for public sector use anytime soon. Reasons for this include the following:

- Many devices that can receive and display traveler information and that should generate customers on a fee for service basis are only now beginning to reach the market and are not expected to be deployed in large numbers for several years.
- Most urban areas do not collect data over a large enough geographic area to warrant significant interest from private sector vendors.
- The value of publicly supplied data is less to private ATIS services that are already producing revenue supported by other existing (private) data sources.
- Consumers must first be convinced to buy the devices that are only now becoming available. Because of the geographic coverage, frequency, availability, and quality of currently available free information (radio, TV), the number of people willing to pay for ATIS devices will be limited until enough of the public see a commercial traveler information service or device that is sufficiently better than those they already use.

The maturity of the ATIS market (and consequently the potential for growth in revenue) is also affected by a number of factors that are outside the control of any given ATIS region. One factor is a lack of national standards to ensure interoperability. The other is that many private sector



¹⁹ Business Models for Advanced Traveler Information Systems Deployment, Proceedings of the ATIS Business Models Workshop, October 6-8, 1997, San Diego

The ATIS market is so immature that significant revenue is unlikely to be generated for public sector use anytime soon.

vendors view the primary market for commercial traveler information services as part of a larger "information services" industry that is, in itself, just starting to grow.

Currently, truly regional ATIS services are supplied only as part of federally sponsored demonstration programs, four model deployment sites, and a variety of regionally sponsored tests. Many of these ATIS services require consumers to own specific electronic devices, but these devices are neither widely available nor heavily marketed because they can not operate in most areas of the country. Ironically, this lack of national data availability limits the desire of electronics manufacturers to produce and market the systems.

In addition, the various regional efforts have not, to date, developed consistent data transfer mechanisms that will allow a single device to routinely display data from different regions if that device is moved from one region to another. This lack of national interoperability further delays the development and manufacture of consumer devices that could supply revenue for ATIS operation.

Part of the solution to this first problem will be resolution of the second problem. Many ATIS participants view the market for "traveler information" as quite limited. Instead they envision an "information services" market in which the consumers could purchase a device to access many types of information (much like the way consumers purchase cable TV for a range of programming, even if a single type of programming is used to justify the purchase). Device owners would subscribe to a service that provided a variety of information in a convenient fashion. This information might include stock reports, news, sports, and other

information, as well as paging and other services. The device would operate all over the country and would serve many purposes, thus making it more attractive to consumers. A national market would also make the device more attractive to the electronics industry.

Although such a marketing approach will significantly increase market size, it also means that consumer oriented traffic and transit applications will have to wait for these devices to become commonly available (perhaps delaying the availability of these services) and that the traveler information will have to be formatted to meet the limitations of these multi-user devices. Another drawback is that these types of shared services will add one more layer of service provider to the ATIS business plan, further reducing the revenue available to the public sector and increasing the complexity of the business relationships needed to operate the ATIS.

One advantage of the "multi-service" information market is that such a device will facilitate national roll-out of information delivery devices. Because most regions are not prepared to provide traffic information, the electronics industry has little incentive to build, market, and promote traveler information devices. The information to support them simply is not available in most of the country. However, if a number of services were offered via the same device, its cost would be justified by the wide range of service it performed, and the benefit of improved traveler information alone would not have to justify the entire cost of the device. If that device operated all over the country, then the availability of traffic and transit information in only a few regions would not significantly hinder its roll-out and sale around the country. Then, with the

devices already in the hands of consumers, when traffic information did become available in a region, a market for that information would already exist.

FORMS OF REVENUE

Revenue does not have to be generated in the form of cash payments. Many public agencies are not able to accept cash payments for services rendered or may face restrictions on where those payments may be deposited. For example, in many states, revenue generated by state agencies is deposited in the general fund for the state, not in an account for the agency. This limits the desire of an agency to expend resources on activities that might generate those payments because the agency's balance sheet would gain little direct benefit.

To circumvent these limitations on cash payments, many public/private partnerships participate in barter arrangements. In barter agreements, the public agency supplies specific goods or services in return for other specific goods or services. These agreements are often structured as if the public agency were procuring the goods and services from the private sector and paying for those goods and services with public goods and services.

Barter may convey more value to each recipient than it costs either provider (a win-win situation), thus benefiting both partners, but barter is advantageous only to the degree that one participant needs what the other participant can give. In-kind compensation may also limit the value received to meeting a particular current need, rather than future needs, if the arrangement does not consider the broad range of possibilities that technological advances may offer. A more general disadvantage of in-kind compensation is that

the public sector may settle for less than the private partner would be willing to pay.²⁰

Some public agencies have garnered more by combining cash and needs-based compensation. One method is to base cash compensation on a proportion of the revenue the private partner receives. Such an agreement assures the public partner of compensation above in-kind needs yet accommodates private partners' aversion to a fixed cash commitment unrelated to success. However, private partners may resist sharing revenue with the public sector unless that agency shoulders some financial risk.

A final revenue-related issue is the cost of the administrative or managerial burden required to monitor the revenue generation process. Shared resource arrangements do not provide "free" goods or a cost-free revenue stream because the participants must spend money for administration, coordination, and oversight. These costs should be incorporated into the estimation of the value of those goods and services.

It is important to note that private participants will make these same types of calculations and determinations when they negotiate public/private business relationships. One of the best examples of the effect of the cost or difficulty of monitoring revenue generation comes from the Cincinnati ATIS. In Cincinnati, the original public/private ATIS concept was that the public sector would be entitled to a specific share of the net profit of the private partner. However, the difficulties of calculating "net profit" resulted in the substitution of a different calculation, and the final agreement specified that the public sector would receive a share of "revenue generated." Although the intent of

²⁰ Shared Resources: Sharing Right-of-Way for Telecommunications. Guidance on Legal and Institutional Issues, Jakubiak, Susan and Adam Relin, USDOT. 1996

the public sector was to share in revenues only if the private sector realized a profit, the problems associated with making such a calculation caused a different, less “theoretically” pure procedure to be accepted.

REVENUE VERSUS OTHER REQUIREMENTS

Generation of revenue is only one of many potential benefits from an ATIS, and many of those benefits contradict the need to generate revenue. For example, from the perspective of traffic management, the more people who have access to traffic congestion information, the more effectively that congestion can be addressed. To get that information to the most people, its cost to the user must be as low as possible. However, the lower the cost, the less revenue that will be produced.

Similarly, the public sector is often concerned about ensuring that all members of society, all social and economic groups in the region, benefit from data collected with public funds. Reaching lower income groups means making the data available at relatively low cost. However, if the data are available for little or no cost, people who can afford to pay for that information will obtain it in the same fashion.

In the end, the ATIS operator must prioritize the need to generate revenue with all of the other desired benefits from the ATIS. Only within this greater context can decisions regarding revenue generation be made correctly.

LEGAL AND ADMINISTRATIVE ISSUES

Earlier sections of this chapter have discussed participants’ desired benefits from ATIS, the roles those groups may wish to undertake, how

those roles can be coordinated, and the need to balance differences in perspective, goals, and objectives. Before various business relationships and contracting mechanisms are considered, it is also important to understand the legal aspects of the public/private relationships that may be created.

At this point in the business planning process, the public sector should have a relatively clear idea of the role it would like to undertake, the role(s) it would like the private sector to undertake, and consequently, the relationship(s) it would like to have with the private sector. Some work may already have taken place to select types of business relationships and contracts (see Chapter 3). Therefore, the time is right to ask a very basic legal question: “Are we allowed to do this?” This question refers both to the action(s) taken by the public sector and to the mechanism(s) used to perform that action.

LEGAL AUTHORITY

To answer this question requires analysis of several issues. The first of these is whether the public sector (usually the lead public agency) has the authority to undertake the desired actions. Unlike private companies, which may enter any market they are not expressly forbidden by law or regulation from entering, public agencies must have legal authority to undertake new responsibilities. For a public entity to legally undertake a given function, that agency must have either “express authority” or “implied authority.” Express authority means that a given act or function is granted to an agency or jurisdiction by legal statute. Implied authority means that the act in question is necessary to achieve the express purpose or objective of a statute.

Does the lead public agency have the legal authority to undertake the desired actions?



In Washington state, the legislature approved a specific procedure to allow state and private companies to enter into partnerships for joint transportation projects.

State transportation departments generally have broad express authority to contract for construction, operation, and maintenance of state highways and to plan, develop, and improve the state highway system. Implied authority may exist to the extent necessary to carry out these express purposes. It is not always clear how far that implied authority extends.²¹

To date, most ATIS functions have been assumed to fall under this umbrella of "implied authority" for state transportation departments (meaning that most state transportation departments can legally perform these functions because they contribute to safe operation of the highway system). However, this is not the case for all public agencies and jurisdictions, and it may not be the case for all state departments of transportation. Without this authority, public agencies should not undertake these responsibilities. This may require adjusting public sector roles if the lead agency does not have the necessary authority while another public sector partici-

pant does.

Once it is clear that a public sector agency can legally undertake the lead in the ATIS process, the next step is to determine whether the preferred approach (i.e., the desired public/private relationship) is permissible. Are the mixture of public and private actions and the relationship between the intended participants legal?

This issue is particularly complex if the public and private sectors are contemplating a true "partnership." Experience with this type of hybrid organization in the U.S. is meager. To whom is the organization accountable: voters or shareholders? As opportunities for entering into these types of arrangements increase and the arrangements themselves become increasingly complex and sophisticated, the lines between appropriate governmental activity and private activity may blur. Answering this question may require assistance from the state's attorney general.

Some state legislatures have written laws directed specifically at

²¹ "Shared Resources: Sharing Right-of-Way for Telecommunications. Identification, Review, and Analysis of Legal and Institutional Issues, Final Report," Jakubiak, Susan and Adam Relin, USDOT, 1996

Federal tax considerations may effectively preclude a public agency from receiving compensation for participation in an ATIS.

innovative public/private partnerships. For example, in 1993 the Minnesota state legislature provided the state transportation department with unique capabilities to develop partnership agreements. Among other things, the legislation permits agreements with governmental or non-governmental entities to share facilities, equipment, staff, data, or other means of providing transportation-related services. In Washington, the state legislature wrote laws and set up a specific procedure to define how the state and private companies can enter into partnerships for joint transportation projects. Not all states have considered this matter quite as thoroughly.

Little federal legislation exists to define what is acceptable and unacceptable for public/private business relationships, and no such federal legislation is expected. Therefore, the individual states have to define what can and can not be done.

Where legislation does not exist to guide these untraditional relationships, many areas have sought to use a series of more conventional agreements or techniques to allow the participants to obtain the benefits of these "partnerships" without having to create true legal partnerships. In many of these cases, public and private agencies have entered into contractual agreements that allow one partner to own a "shared" resource, while the other partner contributes toward the resource's construction and operation in return for a given level of service.

Many of the examples upon which an ATIS model might be based are related to the telecommunications industry. For example, a private company may obtain access to public right-of-way (e.g., to lay communications cable) in return for

provision of a certain amount of communications capability (e.g., a specific number of fibers).

Much of the concern about setting up these public/private relationship stems from three major issues:

- distribution of money (who pays for what and how?)
- intellectual property rights (who owns what, and who has access to that knowledge?)
- access to information (who can access public information and how?)

IMPLICATIONS OF REVENUE GENERATION

In most cases, public/private relationships in which the public sector obtains goods and services from the private sector in return for cash payments are not problematic. A number of common contracting procedures allow the public sector to obtain products and services from the private sector. However, as noted earlier (under Revenue), difficulty often arises when the private sector must obtain something of value from the public sector, because many public agencies cannot accept payment for services rendered. The reason is often that all payments must be made to a state or local general account rather than to the agency performing the task. This requirement severely limits the benefits a public agency can obtain from a public/private partnership and decreases its interest in participating in such a partnership.

To circumvent these limitations, many public/private partnerships enter barter arrangements. As in the earlier communications example, the communications company pays with services, such as providing access to the communications cable, rather than paying a fee to access right-of-way. Many agencies that are unable

Experiences to date indicate that lawyers are playing a less significant role in ATIS than had been initially anticipated.

to accept cash payments are able to participate in these barter agreements, although they often must be structured as procurements rather than as partnerships. (For example, the department of transportation is purchasing fiber optic cable and paying for that cable with right-of-way.) Nevertheless, before agencies enter into a barter agreement, they need to be aware of the legal limitations that affect their participation.

In addition to determining their legal authority to enter into such an agreement, public agencies must be aware of the potential tax implications of "revenue" generating agreements. Federal tax considerations may effectively preclude a public agency from receiving compensation for participation in an ATIS. Federal tax law may dissuade such participation in at least two ways:

- the threat of income tax liability
- the threat of losing tax-exempt status for bonds issued to finance the project.

Generally speaking, states and municipalities are not subject to federal income taxation; however, the U.S. Supreme Court has held that revenue generated by business that constitutes a departure from usual "governmental functions" is not exempt from the imposition of income tax. In *Iowa State University of Science and Technology v. United States*, the court held that the operation of a commercial TV station by a state university was not an "essential governmental function" and, consequently, that revenues derived from the venture were subject to federal tax. The same conclusion might be reached under various states' income tax laws. Thus, a transportation department may face paying federal income tax on revenues earned from a shared

resource project, depending on how the project is structured and how those revenues are classified.²²

Another situation that involves a public facility but that under the tax law might be deemed to provide a private benefit is the use of a management contract as part of the transaction. For example, a highway agency financing the construction of an electronic toll collection system might want to contract with a private operator for the facility's day-to-day operations. If not carefully structured, this arrangement could jeopardize the tax exempt status of the obligations issued to finance the system or, conversely, could restrict an issuer's ability to employ an independent party to manage and operate the facilities financed with the proceeds of tax exempt obligations. Unlimited use by a private party under a management contract is considered a private business use and can result in bonds being classified as private activity, except in specific situations.²³

INTELLECTUAL PROPERTY

Ownership of intellectual property developed cooperatively by public and private partners is a major source of attention when agreements and contracts for ATIS are developed. A variety of approaches are available to deal with this issue. One common solution when both public and private resources will be used to develop a shared resource (e.g., computer software) is to allow the public sector partner free use of that property and to allow the private sector partner to sell that property to other users. An alternative allows the private sector partner to sell the software but gives the public sector partner a share of the proceeds from those sales. In still other cases, the rights to the jointly developed property belong exclusively to one

²² "Shared Resources: Sharing Right-of-Way for Telecommunications. Identification, Review, and Analysis of Legal and Institutional Issues, Final Report," Jakubiak, Susan and Adam Relin, USDOT, 1996

²³ "Shared Resources: Sharing Right-of-Way for Telecommunications. Identification, Review, and Analysis of Legal and Institutional Issues, Final Report," Jakubiak, Susan and Adam Relin, USDOT, 1996



(either the public or private) partner.

In general, the selection of the appropriate ownership rights is a function of the negotiation process that forms the partnership. In some cases, the value of the intellectual property rights is traded for some other valuable commodity (e.g., a price break on service). In others, a mutually beneficial approach to the ownership of these rights can be found.

Regardless of the intentions of the lead public agency when it enters into partnership negotiations, it is highly recommended that the public sector obtain the services of a lawyer who specializes in this field. This will ensure that decisions made by the public sector are based on a realistic understanding of the available options and resulting conditions.

Finally, if the public agency plans to keep intellectual property rights, it must be prepared to manage those rights in a way that will not squander that valuable resource.²⁴

ACCESS TO INFORMATION (EXCLUSIVITY)

The last legal issue addressed here is whether publicly collected data can be given exclusively to a single private vendor. The advantages and disadvantages of exclusivity are discussed in-depth elsewhere in this report (See Should ATIS Be Competitive or Monopolistic?). The concern here is simply whether such exclusive rights are legal.

Each state has separate legislation to cover data practices. In general, public data are for public access. However, laws vary from state to state, and legislatures often grant conditions under which the private sector can access public data sources.

Also remember that once public data are in private sector hands and

the private sector has added value to those data (by reformatting them, adding multiple public sources together, extracting or calculating conclusions or information from those data), these "value added items" are no longer the property of the public sector.

FINAL COMMENTS

At the San Diego²⁵ Conference on ATIS business models, Don Mueting, an assistant attorney general from Minnesota, voiced reasoned, simplified advice on the often complex legal issues surrounding the emerging ATIS field. In part, he commented as follows:

- Experiences to date indicate that lawyers are playing a less significant role in ATIS than had been initially anticipated. The legal obstacles to ITS deployment are fewer and less onerous than had been perceived.
- In many cases, attorneys general have problems approving particular actions because they have no precedents to review. This means that legal uncertainty is likely.
- Requesting specific authority from the legislature to perform some function is likely to create considerable delay. It may also result in denial of approval. The old saying is that it is often better to ask for forgiveness than to ask for permission.
- Remember that public agencies can "think outside the box," but the government has to operate and contract "within the box."

STRUCTURING THE PUBLIC/PRIVATE RELATIONSHIP

This section presents additional issues that must be considered when ATIS business relationships are selected and structured. These

²⁴ For more information, one useful resource is "The Guide to Intellectual Property Protection." It can be obtained by calling the Minnesota Small Business Assistance Office at 1-800-657-3858.

²⁵ Business Models for Advanced Traveler Information Systems Deployment, Proceedings of the ATIS Business Models Workshop, October 6-8, 1997, San Diego

At this time, no one business plan will work successfully for every region of the country. Each region has unique features that have to be considered.

include the following:

- Does the business structure fit our conditions?
- Does the plan mitigate risks, does it allow for change over time?

FIT THE BUSINESS PLAN TO LOCAL CONDITIONS

One of the primary conclusions drawn by the ATIS Committee that helped develop this document is that, at this time, no one business plan will work successfully for every region of the country. Each region has unique features that have to be considered. These include the obvious, such as

- how much infrastructure is in place
- what funding is available
- how many public jurisdictions and agencies are participating
- the size (population and geographic) of the area to be covered
- the demographics of the region.

It also includes elements less obvious but equally important, such as the following

- What is the attitude of the public and the affected political leaders toward privatization of public services?
- How important to the citizenry and the local political structure is emphasizing public sector goals such as social equity and equal access to public information?
- What is the level of public sector technical expertise in crucial ATIS functional areas?
- What is the level of available staffing for those areas of expertise?
- How important is mitigation of risk to the public sector?

Answering these last five questions (and others like them) is as important as understanding the

infrastructure and funding availability with which the ATIS business plan must operate.

These last questions are important because they yield insight that will help in selecting among possible alternatives. The physical situation (availability of infrastructure and revenue) indicates the possibilities. However, the choice among “realistic” alternatives is often based on the political weight of the benefits and costs associated with those alternatives.

In areas of the country where political sentiment to privatize public sector functions is strong, the business relationships selected for the ATIS should favor private sector over public sector operations, all other things being equal. In areas where there is strong political pressure for the public sector to “fix” congestion problems, maintaining public control over the ATIS becomes more important because it demonstrates the public sector’s commitment to meeting the public’s transportation needs.

These same political realities are likely to affect whether the ATIS emphasizes free or fee-for-service information dissemination. Although providing some free information may “whet the appetite” of some individuals and persuade them to purchase better information, in most cases, the higher the level of free information, the lower the opportunity to generate revenue from “pay for service” devices. The level of “free” service will be primarily determined politically because public funds are required to provide those services. Where it is important to provide free transportation information—because it meets the political, social, and economic goals of the area—business relationships will reflect that priority with a consequent reduction in the potential for private

A mechanism that allows graceful termination or alteration of a business relationship is important.

revenue generation. Conversely, where there is no political desire to pay for these services, the selected business relationships will have to support services that can generate enough funding to operate the ATIS.

The availability of technical expertise often plays a critical role in the degree to which functions are given to the private sector. Where public sector agencies have considerable expertise, keeping that expertise heavily involved in the project tends to result in better, more integrated systems. (Outside consultants face strong learning curves to understand and effectively leverage existing system capabilities.) A good business planning structure will rely heavily on that public sector knowledge and experience.

On the other hand, where important skills and experience are missing or rare, these tasks are best left to private sector firms with that experience. These conditions call for “functional” business relationships in which the private sector is given wide latitude to perform various functions but is held responsible for achieving specific functional outcomes. The public sector is then able to apply its limited staff expertise to other projects, thereby making the best use of its limited resources.

Another issue of local concern is the importance of mitigating risks. That is, what happens if the ATIS fails financially (or by any other criteria)? How important is that result politically to the public sector agencies involved? If the ATIS is a key component of the region’s current public transportation plan, the selected business relationships may have to include extra insurance against the risk of the system failing. Where the ATIS is less important to the public sector participants (either because it is peripheral to the region’s major transportation plans

or because it will require little public sector investment), more risk will be acceptable to the public sector, and the business relationships can reflect that. (For example, in a risk adverse environment, the public sector may need to purchase the rights to operate software developed by a private company to ensure that the software is available even if that company leaves the ATIS. Where the effects of ATIS failure are not as important, this cost can be saved altogether.)

MITIGATING RISKS— PLANNING FOR CHANGE OVER TIME

The reason that risk is such an important issue is that the ATIS market is so immature. There is general consensus that the situation will change considerably over the next few years. These changes will include, but are certainly not limited to, the following:

- new information delivery systems (most of which are expected to include a variety of information, not just traffic and transit information)
- the development of new data sources
- an expansion from primarily “event” based information (an accident at a specific spot) to more “link” based information (travel times and speeds within a corridor)
- new participants (both public and private sector)
- the loss of some early participants in the ATIS field
- the public sector’s attitude toward traveler information systems.

Although change will obviously occur, it is not clear exactly what will change and how those changes will affect the ATIS business.

Although it is not possible to



design the ATIS business plan to account for specific, unknown changes, it is important to consider the types of changes that are likely and to ensure that the business plan will allow those types of changes to occur gracefully. Mechanisms such as the following will make changes easier:

- escape clauses, which allow participants to exit business relationships that are unhealthy to their organization
- sunset clauses, which remove exclusivity rights once the benefits of competition have overtaken the benefits of exclusivity (without unduly penalizing the private firm that took major financial risks in return for that right of exclusivity)
- periodic operational reviews, which allow all participants in the ATIS to voice concerns and give the "group" the chance to adopt agreed upon changes that benefit all participants.

To illustrate the need to account for change, consider the issue of ATIS revenue generation. The current consensus is that few, if any, ATIS will soon generate significant revenue beyond existing, advertising-based (i.e., commercial radio) revenue. Therefore, for now the business plan must rely on subsidized operation, whether that subsidy comes from the public sector or from venture capital. Nonetheless, many current plans are being based on the assumption that revenue will be generated in the near future. What happens if that revenue is not successfully produced?

- If the plan relies on the private sector partner for funding, and that funding is not provided, will a mechanism allow the public partner to take over the system (preserving the public sector

investment), or will the private partner retain all rights to the jointly developed system, even if it chooses to exit that market?

- If the plan relies on future private revenue to replace current public sector funding, can the currently available public funding be retained to continue operation of the system? What lead time would be needed to retain that public funding?
- What happens if one of several public agencies that are funding the effort is unable to contribute the required funding? Will the system be capable of operating at a reduced level of funding (i.e., with fewer services or with less information)? Can other sources of revenue be found, and what benefits will the agencies or firms that generate those additional funds receive?

Risk mitigation is important to both the public and private sectors. In ATIS partnerships, both sectors often have to make large investments that are dependent on the performance of another agency or company. One key consideration when business relationships are selected and finalized is to mitigate the risks associated with this reliance on others. Various safeguards in the contractual language may be appropriate to protect the primary interests of the individual participants.

However, these safeguards may not be "free." That is, a step necessary to mitigate one participant's risk may cost another participant money. (For example, as noted above, allowing the public sector to obtain the rights to jointly developed software mitigates the risk of the private sector leaving the system and taking the software. However, giving up those rights is a business cost to the private sector.)

Therefore, when alternative

The business plan should describe the decision making process that the public sector will follow to determine its response to any given initiative.

business relationships are considered, it is important for both the public and private sectors to weigh the various risks, the costs of mitigating those risks, the benefits that can be gained from mitigating those risks, and the costs of not mitigating those risks. Only then can appropriate decisions be made and appropriate conditions be incorporated into the business relationships.

In public/private partnerships, safeguards might be included to address the following:

- What happens if the private sector partner pulls out of the partnership? What happens to the public sector's investment?
 - Does the public sector get to keep the jointly developed hardware or software?
 - Is the public sector free to choose a new private sector partner to operate that jointly developed system?
 - Does the public sector have financial recourse?
 - Do the public sector's rights change depending on the cause for the private sector's actions?
- What happens if public sector funding disappears?
 - Is the private sector partner entitled to "take over" the operations previously performed by the public sector?
 - Is the private sector entitled to some type of monetary compensation if the lack of public funding precludes the operation of the joint public/private venture (into which the private sector has invested time and money)?
- Are there specific decision points at which either the public or private sectors can either renegotiate the business relationship or dissolve the partner-

ship?

- Is a sunset clause needed to indicate when a specific relationship will end unless the agreement is specifically extended?
- Does each party need to have a "graceful out" from the agreement if the results of the ATIS do not meet expectations?
- Will a specific event have to occur to end an existing relationship, or can a "no fault divorce" occur?
- What happens if one of the two partners wants to end or change the business relationship and the other partner does not want that change?

Having a mechanism that allows graceful termination or alteration of a business relationship is important, especially if the changes that occur over time strain that relationship. Events that might require renegotiation include, but are not limited to, the following:

- The original agreement did not correctly anticipate the distribution of benefits and costs between the partners.
- Changing perceptions of priorities require a change in emphasis in ATIS products and services.
- New factors (participants, information delivery mechanisms, data sources, revenue sources, legislation) will change the balance of costs and benefits between the participants.
- New (prospective) participants can provide better services for lower costs than existing participants.
- Expected growth does not meet expectations, invalidating assumptions about revenue generation.

If the business structure allows the public and private sector components to be built separately (that is, each sector's work is complementary, rather than commingled), then public and private sector relationships are easier to change as conditions change. Still, even in these cases, the business plan should describe the decision making process that the

public sector will follow to determine its response to any given initiative.

When the work of the two partners can not be separated, then more definitive contractual safeguards (as opposed to the more general decision making policy statements mentioned above) may be required to describe each participant's rights.

CHAPTER 3 BUSINESS RELATIONSHIPS

The previous chapter discussed the many issues that affect the selection of the public and private business relationships that are necessary to develop, operate, and maintain an effective ATIS. This chapter presents four example business models around which a business plan can be developed and then briefly discusses a variety of contracting mechanisms that will define specific business relationships to implement those models. A more detailed discussion of potential contracting mechanisms is included in the appendix to this report.

BUSINESS MODELS

No one approach to the operation of an ATIS will work effectively in all areas of the United States. Different political structures, levels of geographic coverage, types and amounts of available data, and market sizes are among the many factors that create different business conditions. However, some factors are consistent across the country. Each ATIS must

- collect data (usually through a variety of mechanisms and sources)
- fuse data from different sources
- distribute those data to customers
- allocate these different functions to some combination of public agencies and private sector companies.

This section presents four approaches to operating an ATIS. They are only a handful among a wide range of possibilities. Each of these four “models” provides the same basic services and involves the same basic participants. What differs is the level of control and responsibility each participant has. The four models, which entail increasing levels of “private” control, are

- public centered operations
- contracted operations
- franchise operations
- private, competitive operations.

All four models assume that the primary data collection effort takes place in the public sector as a result of ongoing transportation system management efforts. (In a real ATIS, this does not have to be the case, although it is the most common condition.) However, the private sector collects some data, and the data are available with the main ATIS data fusion process. The public sector also disseminates some data. This information is assumed to be provided to the public free of charge. However, the private sector performs most of the information dissemination. Private sector information dissemination is assumed to generate revenue unless otherwise noted.

The primary differences among these four models involve how the data fusion function is performed, who pays for that function, and who

provides the data feed for information dissemination.

Each of the four models is accompanied by an illustration. Note that in the illustration each interaction between agencies and companies represents a business relationship. When a business plan for an ATIS is developed, each of those business relationships has to be codified, and each can have a separate contractual form. These contractual differences add further to the diversity that exists among ATIS. This means that an almost infinite

number of permutations is possible within the range of business models. The following examples were chosen to illustrate this range of possibilities because they span the spectrum of models and because they illustrate many of the important decisions that regions must make when developing their own business plans.

PUBLIC CENTERED OPERATIONS

In this business approach (see Figure 3-1) the majority of the ATIS process is left in the public sector's

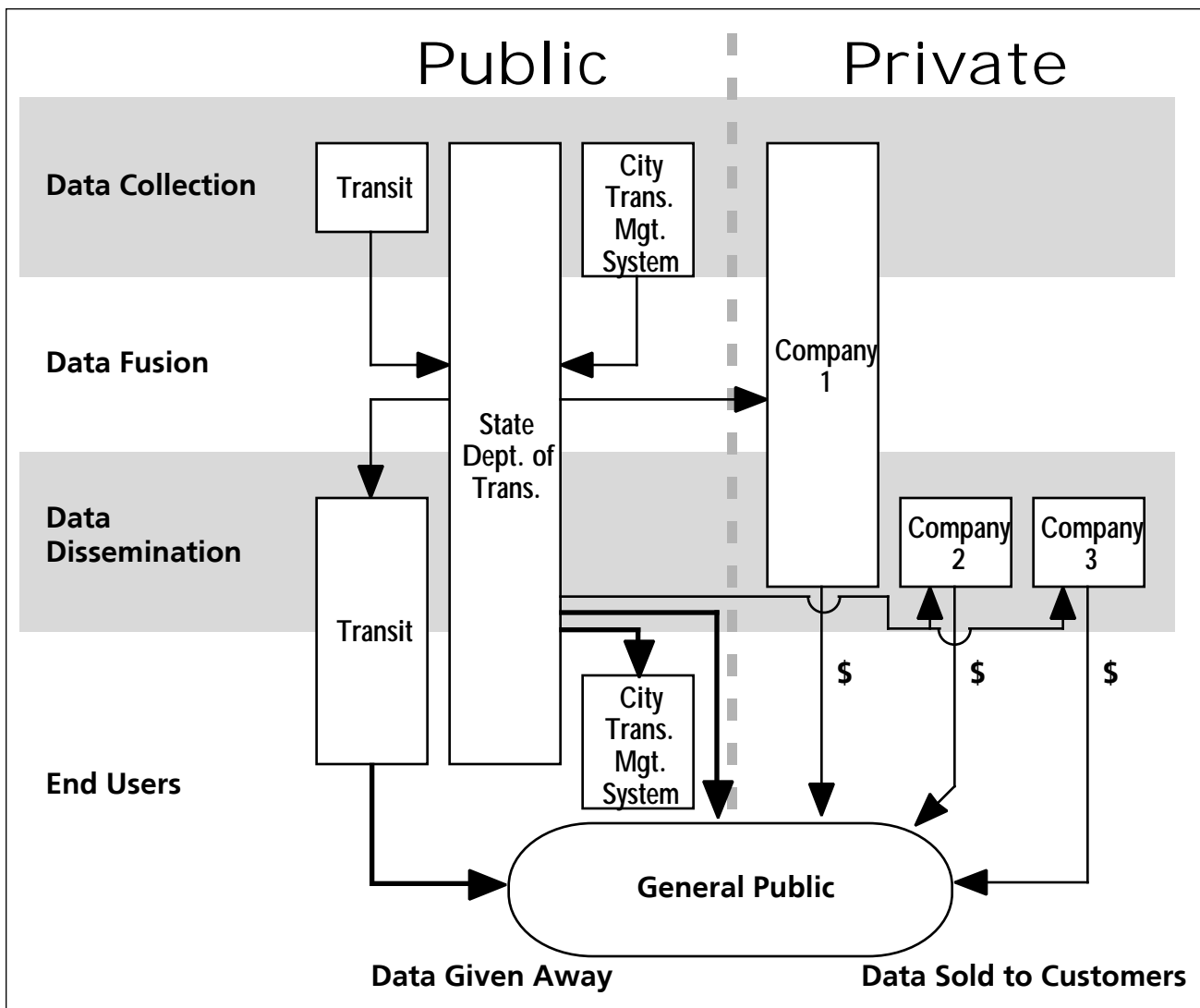


Figure 3-1. Public centered operations. The public centered approach to data fusion gives the public sector the greatest measure of control over ATIS operations, helping direct its benefits towards meeting public policy goals.

An agency that wants to control the ATIS but that has no money and little infrastructure should not pursue the Public Centered business approach.

control. This type of business approach best fits situations in which the ultimate purpose of the ATIS is to meet the public policy goals of the region. To meet those goals the local political structure has allocated sufficient resources to allow the public sector to control a significant portion of the ATIS operation. (This particular example assumes that the state department of transportation has the expertise and interest to perform these functions, although any public agency could potentially perform these roles.)

In addition to the monitoring functions that each public agency performs for system management, Figure 3-1 shows that the data fusion process (i.e., the process by which the data from the transit authority and local city-owned transportation management systems are stored, integrated, and made available for use) is operated by the department of transportation. To accomplish this task, the department of transportation must have some type of inter-agency agreement with the other public jurisdictions to obtain their data. In return, the department of transportation supplies the public agencies with the fused data so that each agency has access to all other agencies' information.

As a public function, the department of transportation also makes these data available to all interested parties and to the general public. As illustrated, three private companies have opted to obtain these data, repackage them, and sell them to customers. In addition, Company 1 (a private firm) collects additional data to supplement the department of transportation data. These data provide Company 1's customers with "better" information than is available through companies 2 and 3. In this particular example, Company 1 does not share these data

with the public sector.

This business approach

- generates the least amount of revenue of the four examples
- provides the greatest level of public sector control over traveler information and the data used for transportation system management functions
- requires the greatest public expenditure
- requires a considerable level of technical expertise within the public sector agency that performs the fusion process
- allows business relationships between the public and private sectors to be very simple. (Basically all that is required is a letter of agreement stating that the department of transportation authorizes the private sector to access the data and that the public sector bears no responsibility for keeping the system operating to meet private sector needs.)

The advantage of this approach is that the public sector is directly responsible for the systems that affect its operations. This gives it the greatest measure of control in making changes to directly meet its needs. The primary disadvantages of this approach are that most public sector agencies lack the technical skills and staffing to efficiently perform many of the fusion related tasks. In addition, in this example large quantities of data are given freely to the public. This limits much of the revenue potential of the ATIS, which discourages the private sector from contributing funding to expand the market. An agency that wants to control the ATIS but that has no money and little infrastructure should not pursue this type of model.

CONTRACTED OPERATIONS

The second example (Figure 3-2) illustrates a model in which the public sector still maintains some control over the data fusion process to ensure that public sector agencies have access to each others' data. The primary difference between this and the previous model is that the data fusion process is contracted to the private sector. The data are still assumed to be freely given to all interested private sector companies; they simply come from a private

company acting as the public sector's representative. The public sector still provides large quantities of traveler information to the general public. Therefore, with the exception of the data fusion contract, the revenue potential for the private sector in this scenario is limited.

The public agency can use any number of conventional contracting mechanisms for the data fusion contract. For example, with a turn-key contract, a department of transportation could competitively

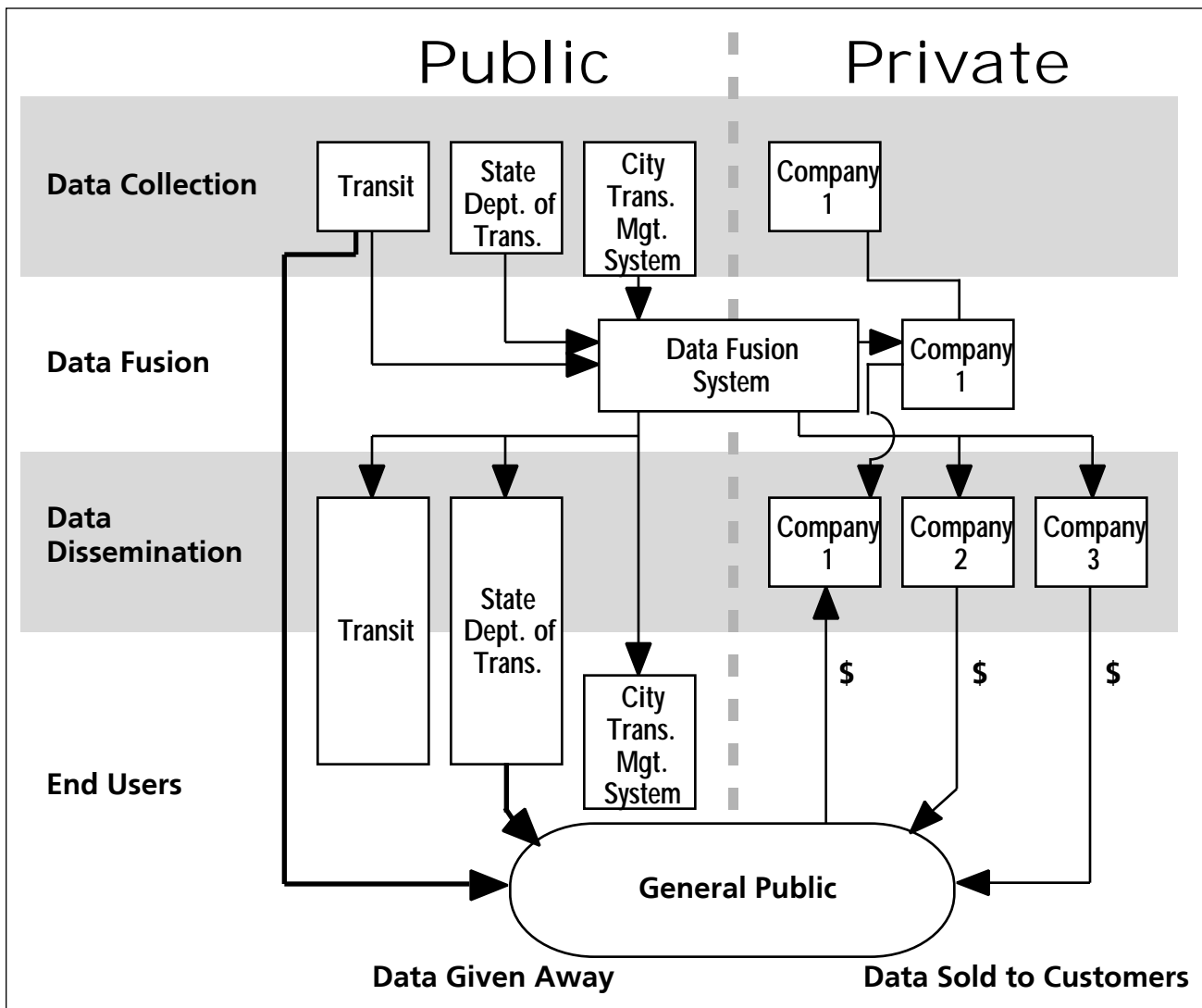


Figure 3-2. Contracted operations. The contracted approach to data fusion allows the public sector to maintain overall control of the ATIS but gives it improved access to the private sector's technical expertise and staffing.

select a bidder, with the winner supplying a data fusion process that met department of transportation functional specifications. The department of transportation would then own that process. The winning bidder might also be expected to operate the system for a given number of years, at which time the department of transportation would be able to reopen the competition to again select a private firm to operate the system. Another option would allow the private sector to own the data fusion software. This would likely lower the initial cost to the department of transportation. However, it would put the department of transportation in a poor bargaining position at the end of the contract period because the entire system could be shut down if the existing contractor was not awarded the follow-on contract.¹

The advantage of this business approach over the Public Centered approach is that it allows the public sector to access the technical skills of the private sector while still maintaining control over the data fusion process. When writing the data fusion contract, the department of transportation has the freedom to specify the constraints it believes are important for operation of the system. The primary drawbacks of this business approach are that like the Public Centered approach, this mechanism is costly to the public sector (which must still fund the data fusion contract), and, at least in this example, the opportunity for private sector revenue generation is still limited because of the high level of free information.

However, the public sector can use this same basic business structure to try to generate revenue from its data collection activities if different emphases are incorporated within the structure. Figure 3-3

illustrates these changes. The first is a significant reduction in the amount of free information given to the public. This increases the size of the market for privately supported traveler information services (either through user fees or advertising), which in turn increases the revenue generating potential of the public sector's data.

The second change is the inclusion of an "asset manager" function in addition to the data fusion function. (Asset management is a combination of what are traditionally known as product development, marketing, and sales functions.) The asset manager has two main responsibilities:

- work with the data fusion provider to create data products that meet user requirements (and thus provide value to the potential purchaser)
- work with clients and potential clients to sell those public sector data products, create new services to use these data products, and maximize the revenue generated (and thus shared) from these products.

In addition, the asset manager may work with the lead public sector agency to bring new public sector participants and new data collection devices into the ATIS data feed in order to increase the value of (and consequently the revenue from) the public sector data.

These management functions are key to generating revenue from the data. Private sector firms perform these functions as part of their normal business process to maximize the value of their assets. In this business model, the "asset manager" undertakes these roles with the perspective of optimizing public sector revenue generation. These functions are treated separately because they are not normally

¹ A variety of clauses could be inserted into the initial contract to decrease the risk associated with choosing a new contractor. For example, a transition period might be required to allow a new system to be implemented, tested, and start running before the original system was shut down. However, such a transition would increase the cost of bringing in a new data fusion provider.

undertaken by public agencies and may easily be contracted out to the private sector. Note that under this model, the private sector is still responsible for actually developing and delivering products and information to the public.

FRANCHISE OPERATIONS

The third example (see Figure 3-4) illustrates the first of two business approaches that lean more heavily on the private sector for the resources to build and operate the ATIS. In this example, the public sector essentially removes itself from the

data fusion process. The selected contract mechanism allows a single private sector firm to take over the data fusion process from the public sector. In return for exclusive access to the public sector's data, the private sector data fusion provider agrees to give the fused data to the public sector free of charge. The private sector can then sell those data to other private sector providers.

In this example, the private sector (Company 1) includes the data it collects in the primary data fusion process. It has incentive to do this

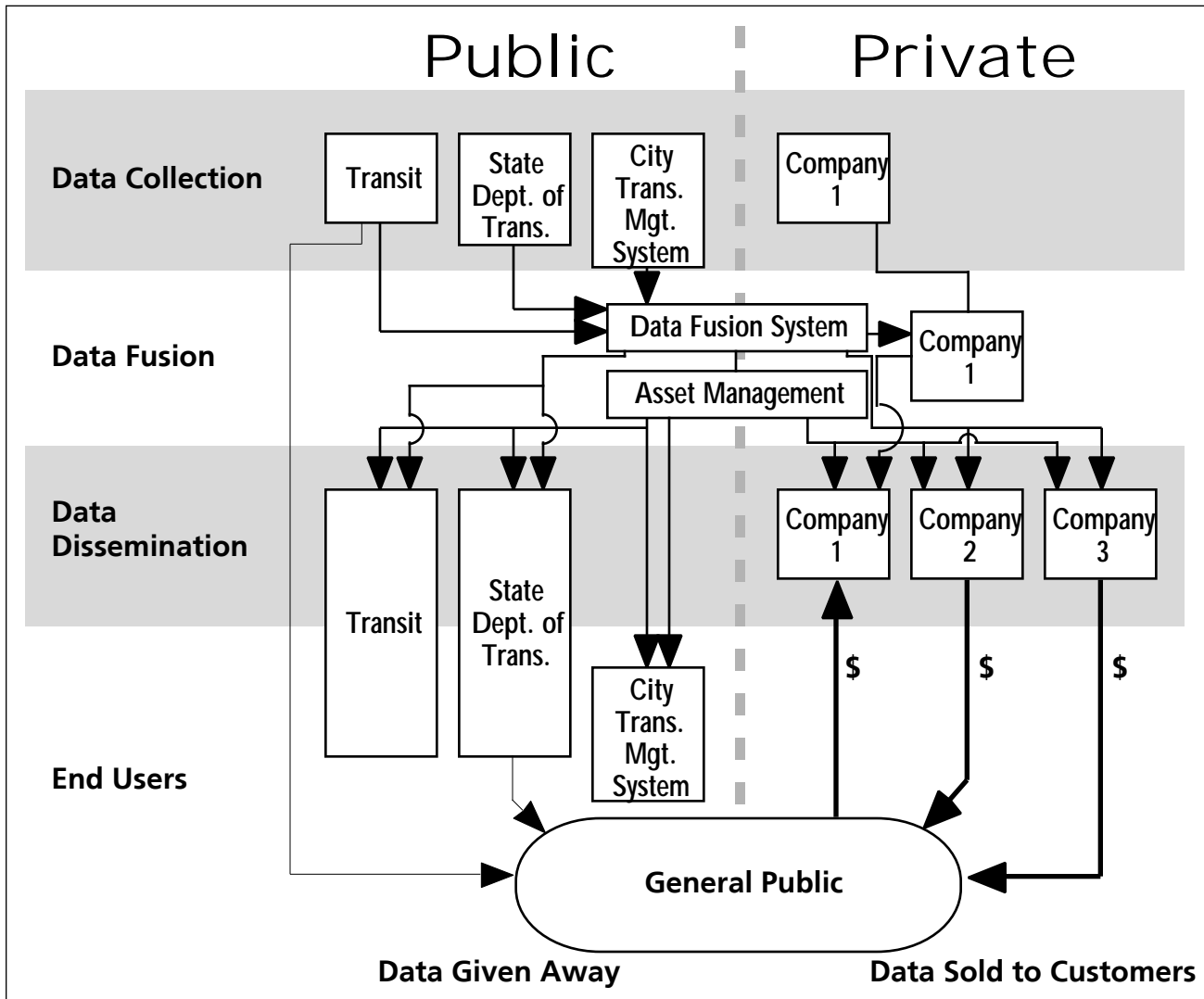


Figure 3-3. Contract fusion with asset management.

because it sells the data to customers (both the general public and other information providers), and the better the data are, the more likely they are to generate happy customers and thus revenue. To assist the private sector in creating a revenue stream, the public sector also cuts back on the availability of free information. (For example, the department of transportation may not support a toll-free telephone line to provide traffic information. Instead, the private company may provide the

telephone line but sell advertising to support its operation.)

One advantage of this approach to ATIS is that it reduces the cost to the public sector considerably. It also provides incentives for the private sector to provide services that generate revenue, which can then be used to expand the system. In addition, it takes maximum advantage of the private sector's ability to implement innovative technologies to expand the ATIS market. If the private sector can

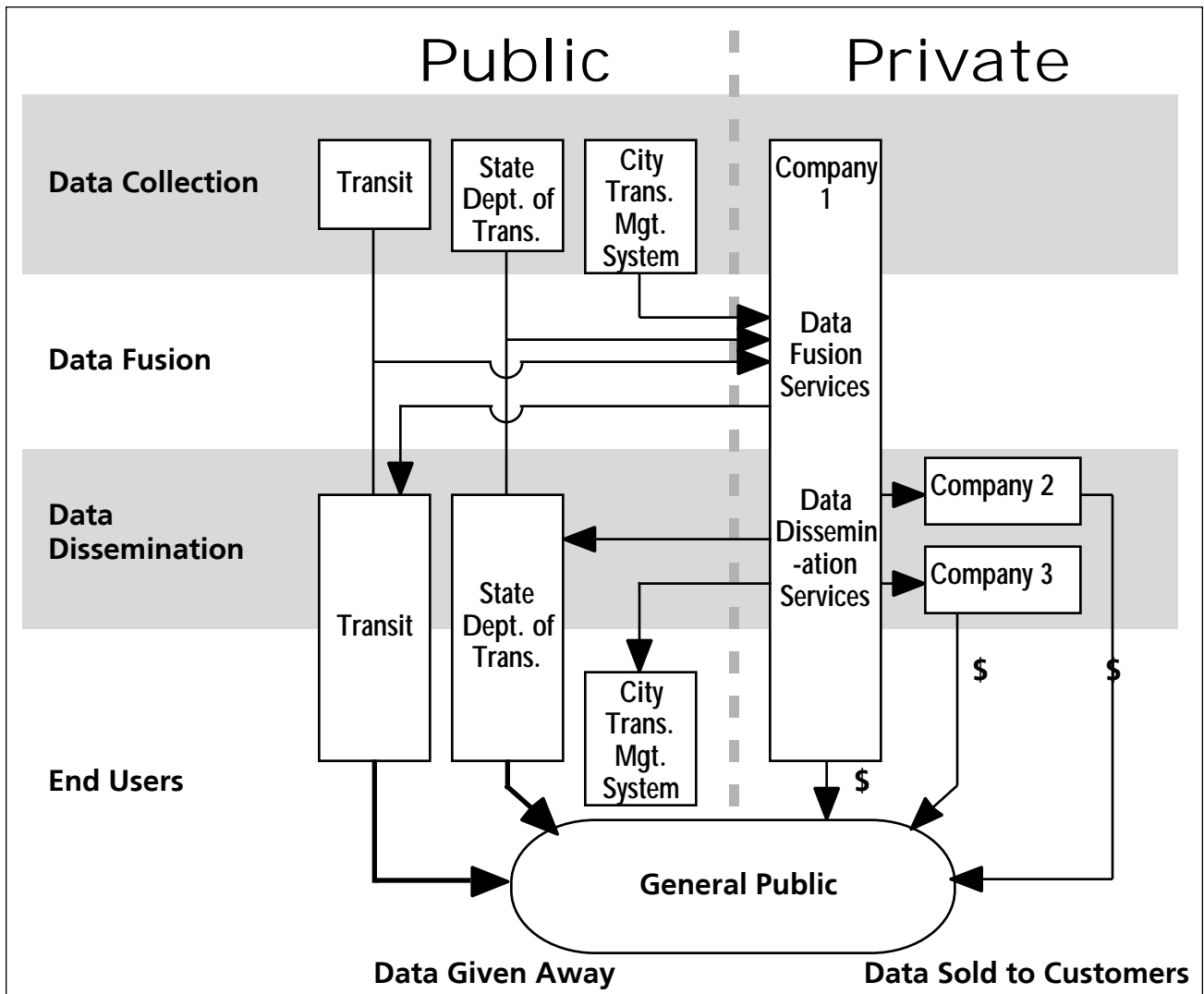


Figure 3-4. Franchise operations. The franchise approach maximum use of the private sector's technical skills and marketing capabilities, while including some market protection for the franchise holder, in return for private sector investment in the ATIS.

make a substantial profit (and this approach maximizes that likelihood), this approach also provides the best opportunity for generation of revenue that can be applied toward public sector data collection costs. (Revenue sharing would have to be incorporated into the business arrangement between the public sector and the private data fusion company.)

A disadvantage of this approach is that the general public has to pay (sometimes indirectly, such as by listening to advertising) for much of the information that it would get for free under either of the first two business approaches. Another disadvantage is that the public sector must rely on the private sector for the fused data that it needs to enhance transportation system management. A third disadvantage is the risk of creating a monopoly if the ATIS turns out to be lucrative. This would increase costs to consumers and decrease the private sector's incentive to innovate. Finally, the public sector assumes somewhat more risk because if the private sector company abandons this market (because it can not generate sufficient revenue), the data fusion and ATIS functions will cease to exist.

PRIVATE, COMPETITIVE OPERATIONS

The final business illustrated approach (Figure 3-5) assumes that the public sector makes its data available to more than one company willing to provide data fusion services. The data may initially be provided free of charge and later, as the market grows, for a fee. The competing data fusion companies then add value to the public data according to their own business approaches and resell the data to both the general public and other

information service providers.

This model is based on how the national weather service provides access to publicly collected weather information. The weather service competitively selects several companies to receive access to the available data. These companies then compete against each other to meet the needs of various customers of weather information. In some cases, these companies perform their own weather forecasting (a value added service); in other cases they sell "raw" data to other companies that perform (and sell) the weather forecasts.

In Figure 3-5, different public sector agencies purchase data from competing private sector firms. This is meant to show that the public sector could pay for these services (it may or may not obtain sufficient revenue from selling data to these companies in the first place to pay for these services). It also shows that the services provided by the competing companies meet different needs (that is, the services from Company 1 meet the department of transportation needs most cost effectively, whereas the transit authority has selected Company 3's products).

The advantage of this business approach is that the competition it fosters among private sector companies should intensify these companies' incentives to provide better, lower cost services. This should result in higher levels of consumer satisfaction, information dissemination, and public access to information.

The disadvantage of this approach is that if the market is not large enough to sustain multiple companies, the revenue stream may be too small to achieve the necessary market growth and to support the design and deployment of new and

better information services. Another result could be a loss of competition as one or more companies leave the ATIS marketplace for more profitable endeavors, resulting in a de facto monopoly.

A separate contract or agreement is needed for each relationship within the ATIS.

CONTRACTING METHODOLOGIES

Once the public sector has determined, on the basis of the factors discussed in Chapter 2, which roles it wishes to perform within the ATIS and which tasks it wishes to

either leave to or perform jointly with the private sector—that is, which business model is most appropriate to the region—the details of the business relationships and contracting mechanisms that constitute the individual pieces of that business model can be selected. Note that a separate contract or agreement is needed for each relationship within the ATIS. That is, each public agency will have its own contractual relationship with the ATIS. Each participating private company must

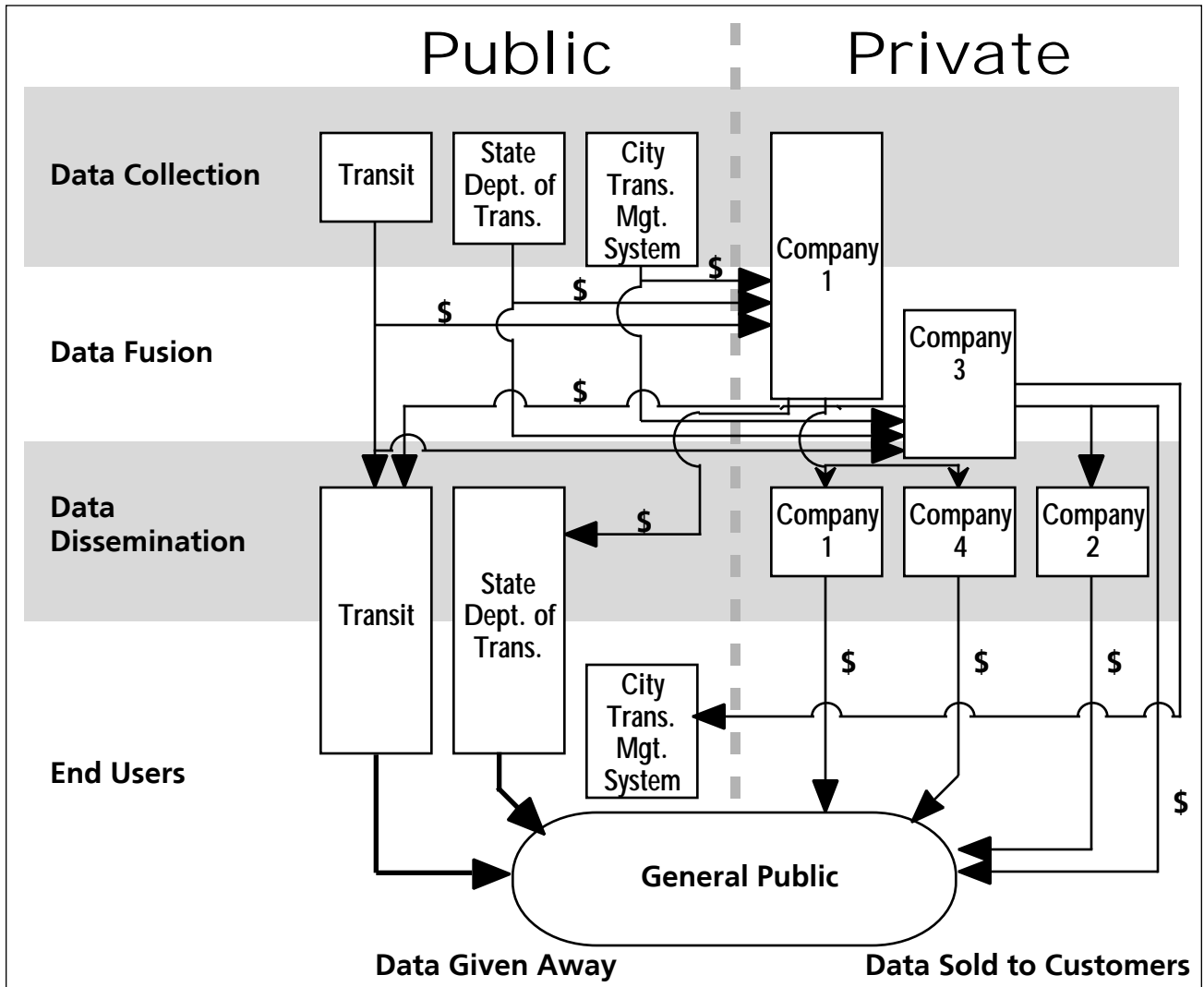


Figure 3-5. Private, competitive operations. The private, competitive approach maximizes the competition within the ATIS market, with the intention of lowering consumer costs and maximizing private sector innovation.

also have its own business relationship with the ATIS. In general, each agency or firm has a business agreement that defines its relationship with the "system."² Items covered by these agreements include the following:

- how participants interact with the system
- what data they will and will not provide
- how those data can and can not be used
- who else can have access to the data provided
- what data they can obtain
- what restrictions are placed on the use of those data
- the costs for participating in the system
- how revenue generated by the system is shared
- any other constraints and responsibilities that must be identified for each partner in the system when a business relationship is defined.

Fortunately, a variety of contracting options is available. Depending on the needs of the participants, different contracting options can give different levels of control and incentives to both the public and private sectors. With careful selection of a contracting mechanism, the ATIS business plan will ensure that the relationships between the public and private sectors are appropriate and are supported.

To provide detailed information on the contracting options that support these relationships, this report has summarized a large number of contracting options. Much of this discussion is taken from the report *Overcoming Barriers To ITS—Lessons Learned From Other Technologies* by the Urban Institute, Cambridge Systematics, Canfield Paddock and Stone PLC, and MTA-EMCI, for the Federal Highway

Administration (1995). A variety of other resources on public/private relationships are also useful for investigating this subject.³

A tabular summary of contracting options is shown in Table 3-1. The table lists a variety of contract methodologies and describes the nature of the business relationships that each supports. The table can be used either to identify the contracting mechanisms that will work with a given set of desired relationships, or to identify the characteristics of the business relationships that are determined by a specific contracting mechanism. More detailed descriptions of each of the contracting mechanisms listed in the table are in the appendix.

In general, the contracting mechanisms at the beginning of this multi-page table provide the most public control over the good or service to be produced. The contracting mechanisms toward the bottom of the table provide the private sector with the greatest flexibility to serve the market.

The contracting mechanisms shown in Table 3-1 are broken into six basic categories:

- public agency relationships
- contracting for services
- innovative public/private partnering
- joint ownership
- transferal of public responsibility to the private sector
- private business relationships.

Within each of these categories are two or more types of agreements.

Public Agency Relationships are mostly used when one public agency is working with another agency. This is most commonly done either when one agency contracts for services from a second agency or when two agencies work cooperatively to perform a set of tasks that benefit both.

² The "system" is normally either the lead public agency or the ATIS operator, which undertakes as one of its roles, the contracting responsibilities for the ATIS.

³ "Improving Local Services Through Intergovernmental and Intersectoral Cooperation, Report #5, for the Coalition to Improve Management in State and Local governments, by Pittsburgh, PA School of Urban and Governmental Affairs, Carnegie Mellon University, January 1992

Shared Resources: Sharing Rights-of-way For Telecommunications: Identification, Review, and Analysis of Legal and Institutional Issues, Final Report, by Susan Jakubiak and Adam Relin, for FHWA, April 1996

Privatization: The Key to Better Government, by E.S. Savas, 1987, Chatham House Publishers

The mechanisms listed under Contracting for Services are normally applied when the public sector hires the private sector to perform tasks that the public sector cannot. These contract mechanisms include many of the types of agreements commonly used when public agencies contract with private firms (e.g., consulting contracts, purchase agreements).

The business relationships listed under Innovative Public/Private Partnering include a variety of newer techniques intended to encourage closer, more cooperative working arrangements between the public and private sectors. These techniques are often used when public agencies and the industries they serve or regulate need to cooperatively develop new products and services. These innovative partnering techniques are particularly useful for creating systems that provide benefits to both private sector companies and public sector regulators because they incorporate management mechanisms that address the wide differences in perspective and priorities that these groups bring to a project.

Business relationships included within the Joint Ownership category are also used to forge more "equal"

public/private business relationships. These joint ownership techniques are most often applicable when public agencies and private companies jointly develop and/or operate facilities and/or infrastructure that benefit both.

The sixth category of business relationships, Transfer of Public Responsibility to the Private Sector, includes mechanisms commonly used when government services are "privatized." That is, these techniques are often used when the government believes the private sector can more effectively serve a market. These agreements often include some type of regulatory oversight intended to ensure that public sector interests in those markets are not lost as a result of the private sector's approach.

The last category of business options, Private Company Relationships, covers contractual mechanisms that allow interaction between private sector business partners. These would be used in ATIS operations if the public sector was promoting high levels of private sector involvement but would provide little input into the actual development or operation of those systems.

CHAPTER 4 A PROCESS FOR DEVELOPING AN ATIS BUSINESS PLAN

Just as there is no single business model that applies to all ATIS efforts, there is no single, linear process that a region can step through to produce a successful business plan for an ATIS. Instead, the ATIS business planning process is iterative, involving a series of ongoing, parallel efforts. Conclusions drawn in one area have ramifications for other areas, and each new decision or new piece of information can necessitate revisiting previous decisions.

The remainder of this chapter overviews the general decision making process that results in an ATIS business plan. This discussion is meant to highlight the iterative/parallel decision making process. It is important to note that although each ATIS business planning effort may follow a slightly different decision making sequence, the same basic decisions will have to be made, and most of these will be based on the inputs mentioned in this chapter and detailed in Chapters 2 and 3.

MARKET POTENTIAL

The first step an area should take when considering the creation of an ATIS is to gain a solid understanding of the regional market for travel information, including personal travel, business travel, and commercial goods movement. The factors that affect market potential are shown in Figure 4-1. Among the

key factors necessary to understand the market for travel information services are

- the geographic size of the market
- the level of congestion
- the availability of information (traffic congestion, transit rider assistance, other)
- the availability of both public and private infrastructure (existing and planned) that can be used to collect and disseminate traveler information
- existing expressions of private sector interest in exploiting that market.

The primary goal of this first step is to understand whether there is small, medium, or large market potential for this region. Market size should be considered both in general (Is there really a demand for this type of information?) and in comparison to other parts of the country (Are we likely to attract private sector interest, or are such companies more interested in larger markets?).

Market potential drives the level of private sector interest, the types of ATIS services that can be provided, and the time frame in which these services can be introduced. These factors determine the type of ATIS services the region can hope to soon provide and which agencies and companies are likely to consider participating. The process of determining market potential opens

Just as there is no single business model that applies to all ATIS efforts, there is no single, linear process that a region can follow to produce a successful business plan for an ATIS. Rather, the ATIS business planning process is iterative, involving a series of ongoing, parallel efforts.

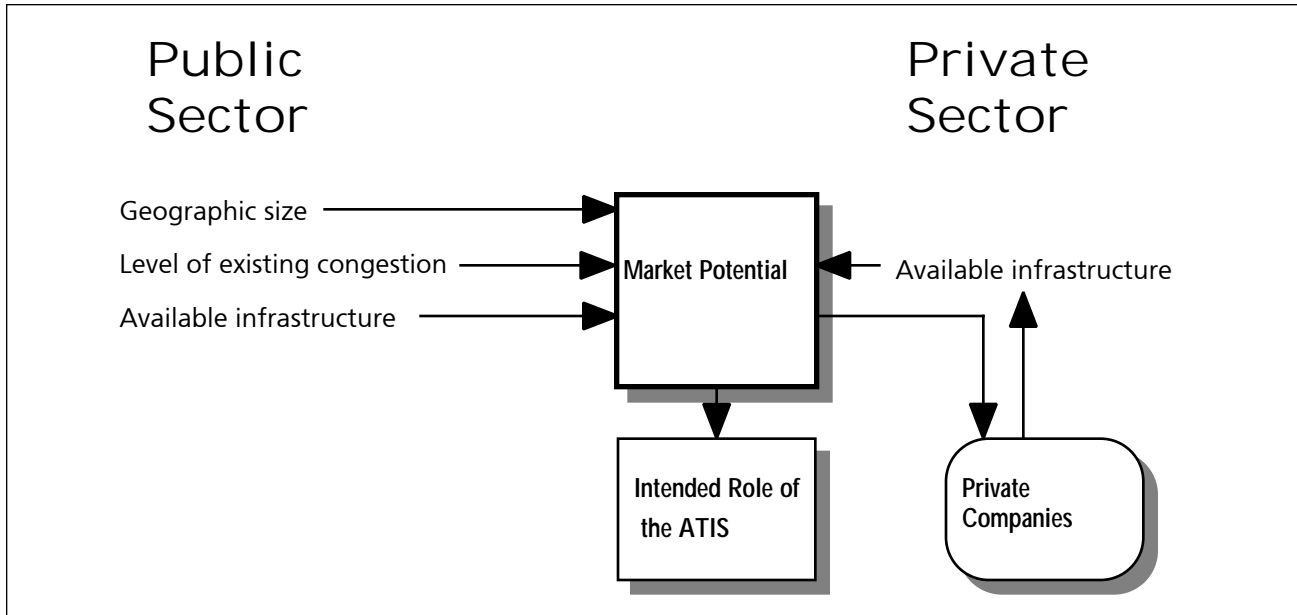


Figure 4-1. Market potential.

the door to discussions with these agencies and companies, which leads to continued development of both the ATIS and its business plan.

INTENDED ROLE OF THE ATIS

With an initial understanding of the ATIS market, it is possible and necessary to make preliminary decisions about the role the ATIS will play and the public and private efforts required to supply those services. (See Figure 4-2.) Although it is not always possible to achieve, ATIS efforts work best when participants can agree on what the system is meant to accomplish. At a minimum, they should agree on the goals and intentions of both the public and private sectors. This becomes an “empowering vision” that eliminates many institutional obstacles.

For example, the ATIS may be a major part of an advanced traffic management system, or it may be primarily external to the transportation management process. (See Roles of the ATIS in Chapter 2.) In general, the more closely aligned the ATIS is to the traffic management

process, the more public control the business plan will try to retain. The less integral the ATIS is to traffic management, the more private control and initiative that are possible.

A secondary outcome of this step is an understanding of the resources (both public and private) that will be needed to operate the ATIS. The availability of these resources and their sources have a significant impact on the business structure adopted for the ATIS. That is, although the public sector may want to use the ATIS for traffic management purposes, it may simply not have the resources necessary to direct the system’s operation as it desires.

An additional outcome of this decision making process is normally the identification or selection of a lead public sector agency. This agency tends to be the organization that sees the ATIS as most central to its core mission and thus accepts the task of directing the creation of the system. This agency also usually provides financial support to the effort.

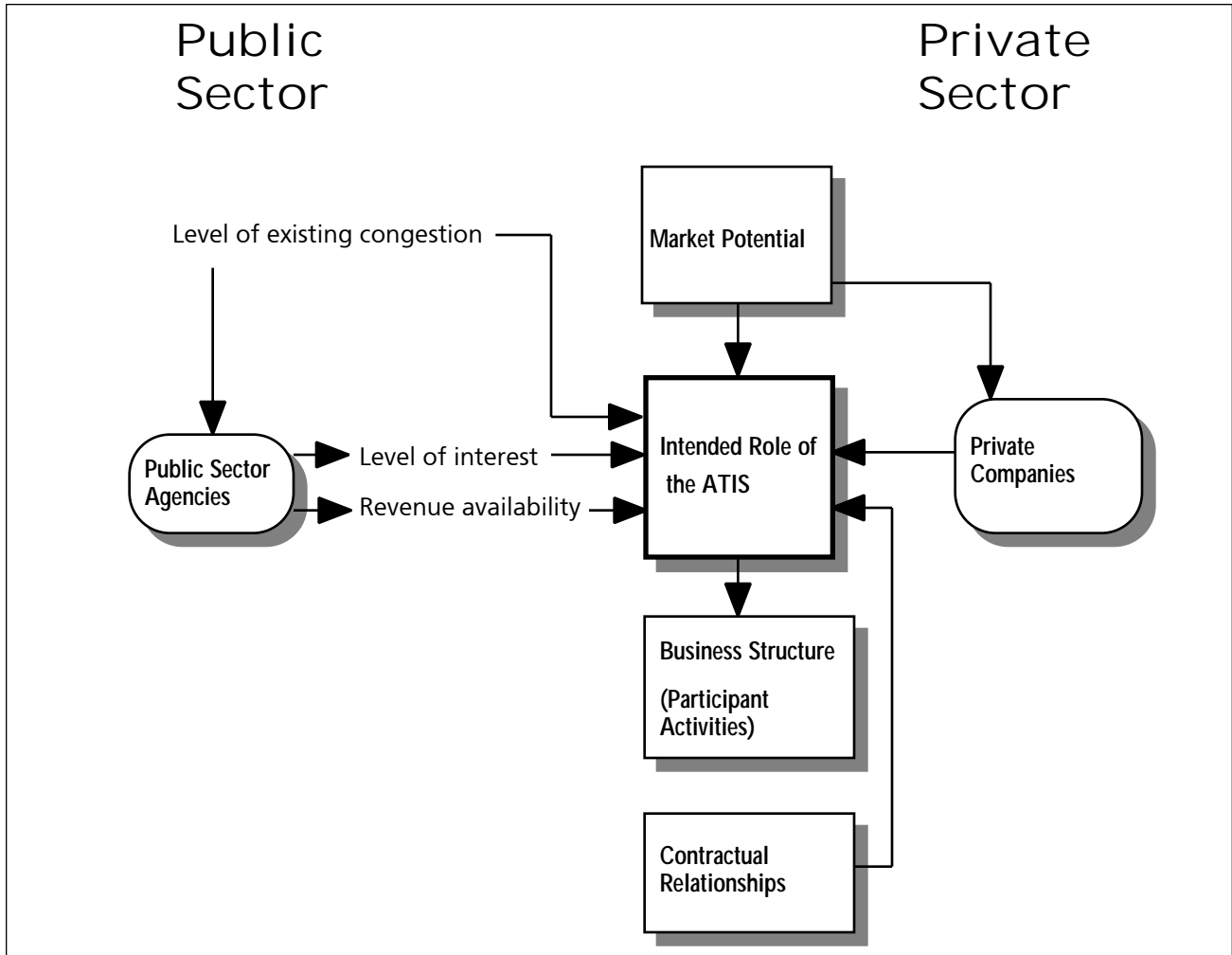


Figure 4-2. Intended role of the ATIS.

THE BUSINESS STRUCTURE (PARTICIPANT ACTIVITIES)

The next phase of ATIS business plan development requires that the potential participants explore the roles that each wishes to undertake. (See Figure 4-3.) Any of the primary functions (data collection, fusion, and dissemination) can be performed by multiple participants. In many cases, several agencies/companies will perform each of these functions. Therefore, it is necessary to understand

The primary functions of data collection, fusion, and dissemination can be performed by multiple participants. In many cases, several agencies or companies will perform each of these functions.

- which participants are interested in performing which functions
- what benefits can be gained by their performing those tasks

- whether those participants have the resources needed to perform those functions
- whether they require additional resources contributed from other participants to perform those tasks
- whether participants have the internal commitment from agency and company leaders to commit those resources
- whether they have the political will or permission to undertake those roles.

In addition, it is necessary to understand which roles will not be willingly undertaken by current participants and, consequently, require the recruitment of new partners or resources.

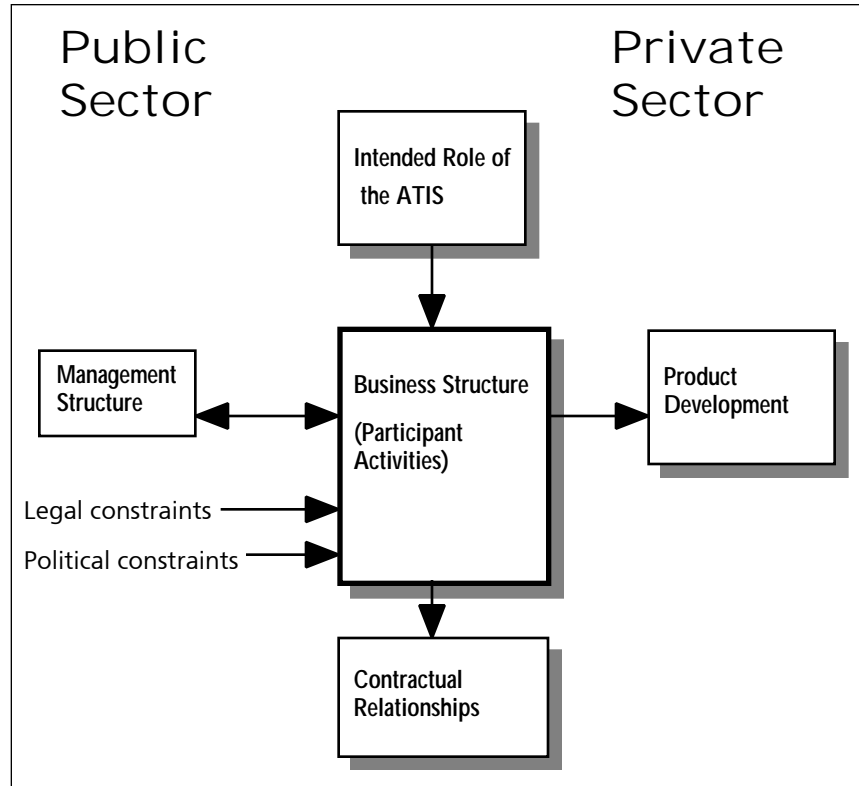


Figure 4-3. Business structure.

The lead public agency will facilitate the selection of participants to fulfill many of these roles. This will, in turn, determine the general business structure (the “business model”) around which the ATIS is based (see Chapter 3: Business Models.) Much of this decision making process is based on negotiation among the primary ATIS participants and an understanding of the incentives that will entice partners to undertake those roles. These negotiations will help shape (and in turn be shaped by) a management structure that must be developed to coordinate the activities of the participants.

Once a preliminary business structure has been developed, participants must confirm that this structure operates within legal and political boundaries. This means investigating legal questions about intended business relationships with private companies and obtaining

political buy-in for desired business relationships. These investigations also help confirm the availability of the resources needed to implement the intended business structure.

The conclusions from these efforts may necessitate changes in the initially intended business structure. At the same time, this process may create the need for changes in the role intended for the ATIS. For example, once the time has arrived to commit resources to a project, political decisions may direct those resources elsewhere, thereby invalidating business plan decisions based on the availability of resources. Conversely, when the time comes to sign off on a prospective business relationship, such arrangements may be determined to not be in the best interests of the community.

Basic questions to be asked about the business structure include the following:

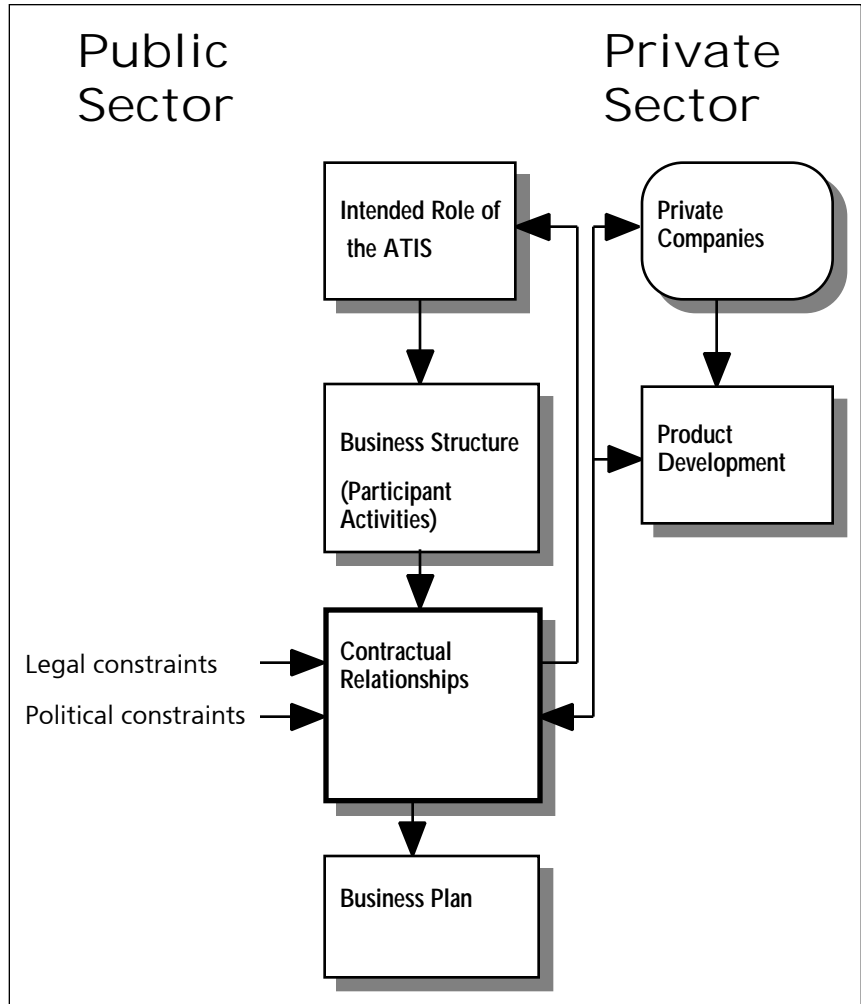


Figure 4-4. Contractual relationships.

Business relationships have to account for the different needs of the participants.

- Can it be legally implemented?
- Will it be politically supported?
- Will it produce the necessary level of private sector involvement?

If the answer to any of these questions is negative (e.g., the private sector will not participate to the degree necessary because the proposed business structure will not allow it to generate sufficient revenue), the business structure will have to be redesigned and adjusted. This may also require that the role or emphasis of the ATIS be altered.

CONTRACTUAL RELATIONSHIPS

After the general business structure has been developed, the

details of the contractual relationships between ATIS participants can be determined. (See Figure 4-4.) These relationships have to account for the different needs of the participants, with specific emphasis paid to the following issues:

- how those arrangements meet the overall goals of the ATIS
- the access or rights to collected data or developed assets
- the level of control the respective partners have over the intended outcome of the contractual arrangement
- the risks inherent in the contractual arrangements
- the costs (monetary and otherwise) associated with the contractual arrangements

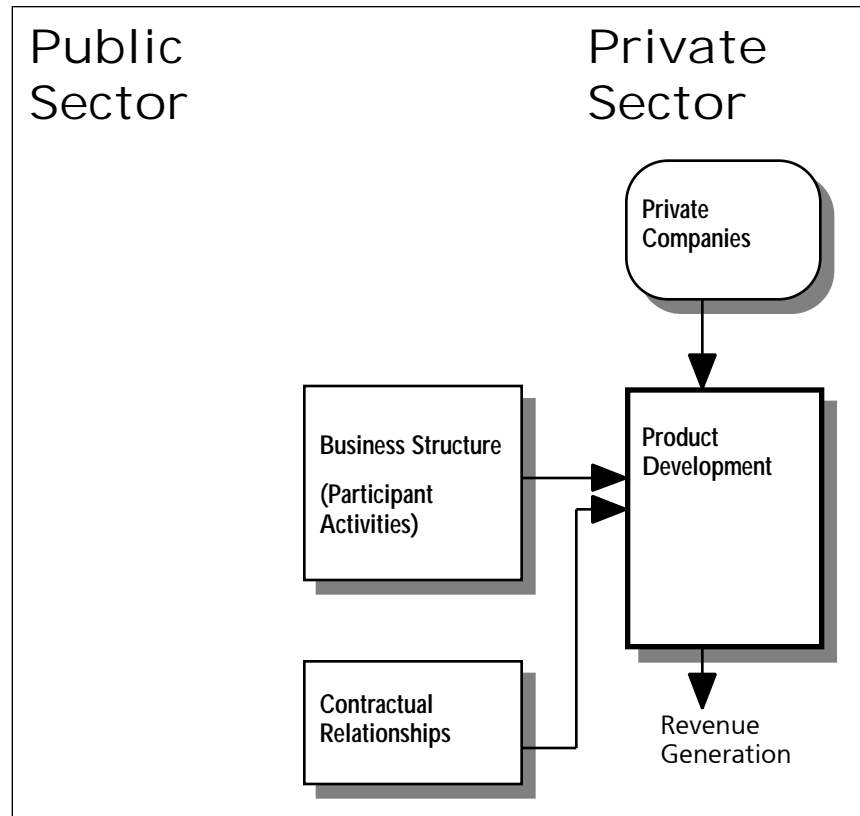


Figure 4-5. Product development.

- the responsibilities and commitments allocated to each participant in the arrangement
- how the contractual arrangements fit within the business structure of the ATIS
- how those business relationships depend on the other contractual arrangements in the ATIS.

The final contractual agreements may be heavily influenced by both legal and political constraints. That is, a specific initiative may be thwarted when partners attempt to work out the details of a business relationship. If this occurs, it may be possible to select a different contractual relationship. However, the problem may also require more substantial changes to the overall ATIS business structure or ATIS role if a suitable contractual alternative can not be found.

PRODUCT DEVELOPMENT

The development of revenue generating products (see Figure 4-5) can be significantly affected by the selected business structure and contractual arrangements. More specifically, the business structure of the ATIS will determine the extent to which the private sector must compete against government-supported information services. This, in turn, will substantially affect the amount of revenue that the private sector can be expected to contribute toward construction or operation of the ATIS. This may significantly affect the design of the ATIS business structure and, ultimately, the role of the ATIS.

MANAGEMENT STRUCTURE

The management structure is primarily an outgrowth of the mix of

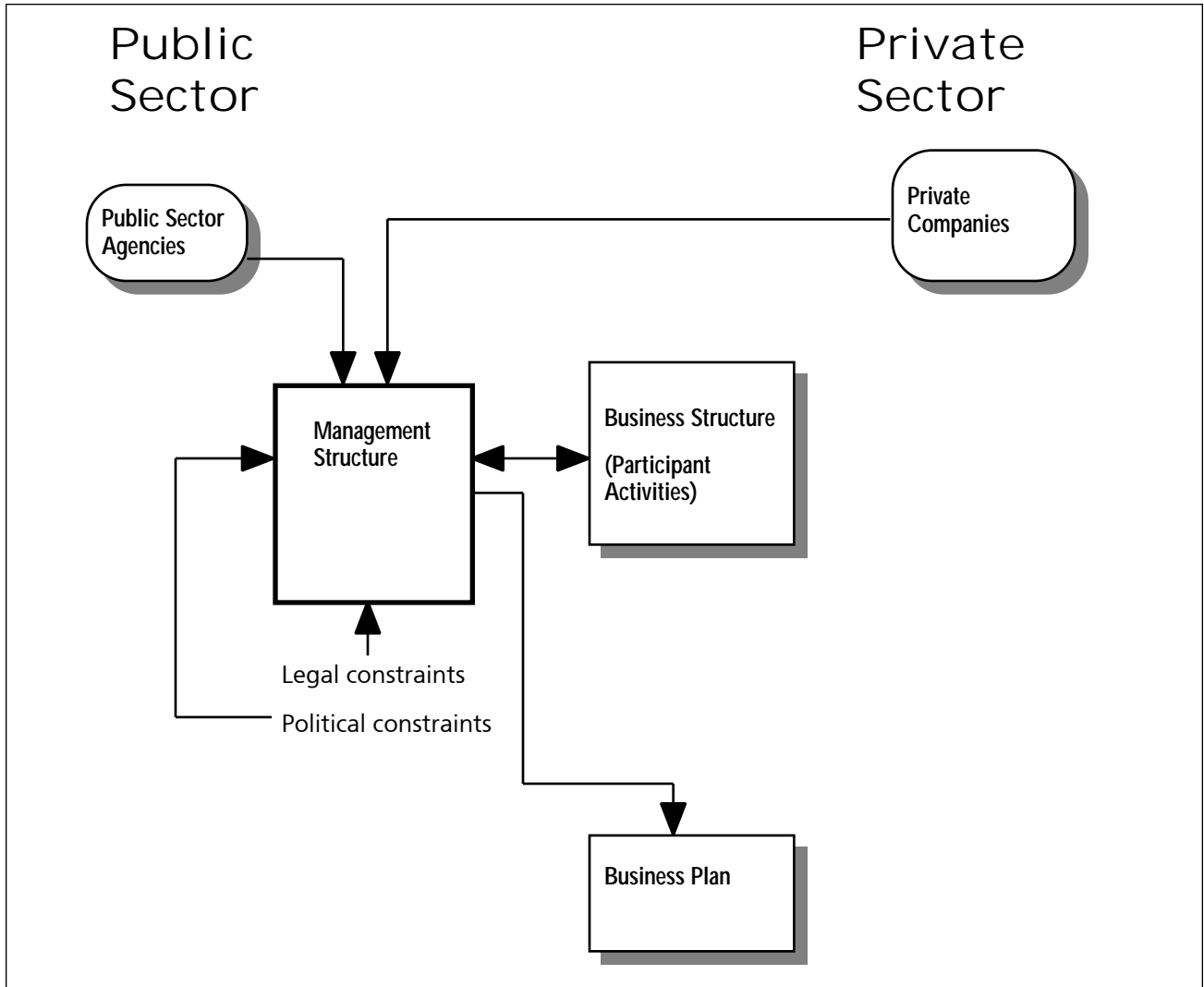


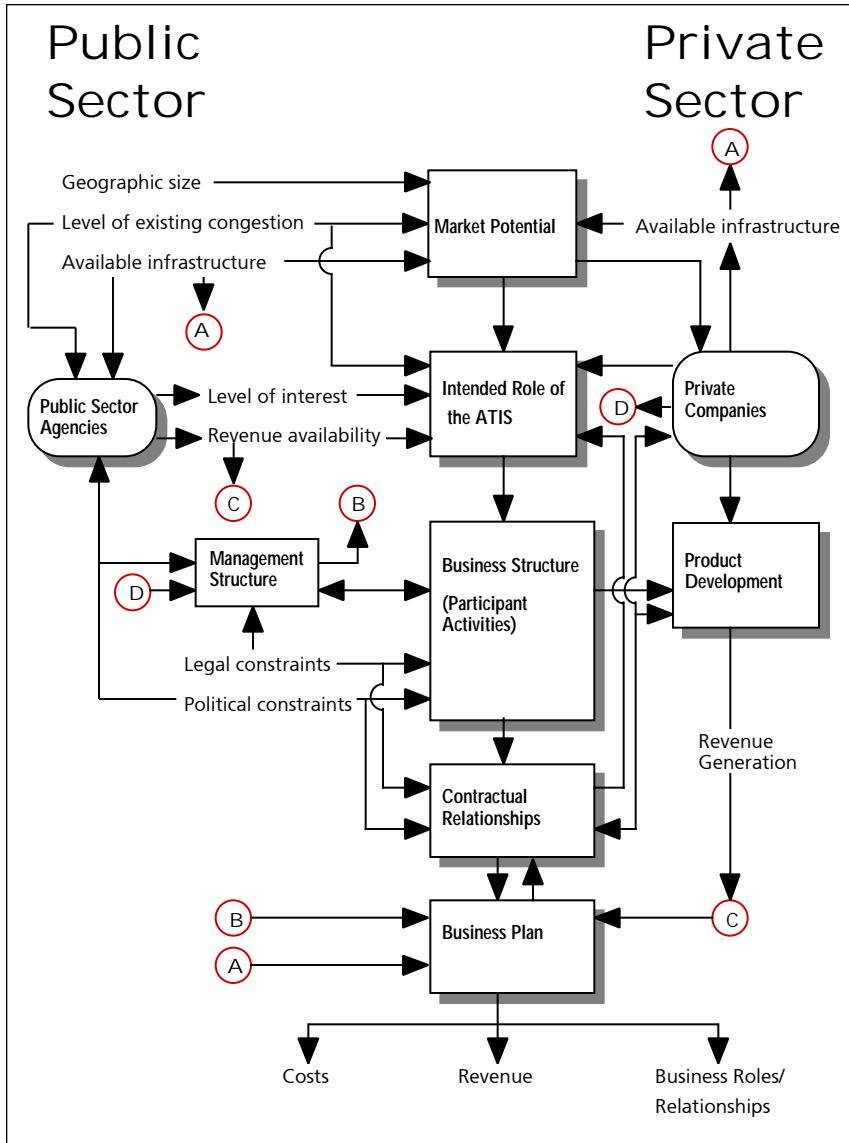
Figure 4-6. Management structure.

public agencies and private companies participating in the ATIS and their respective roles. (See Figure 4-6.) As noted above, the management structure has a significant impact on the business structure of the ATIS because it helps resolve (or magnifies) many of the concerns that must be handled before participants sign contractual agreements. (In other words, the adoption of specific management conditions may alleviate the need for particular clauses in contractual agreements, giving participants more freedom to operate while ensuring that the system continues to operate as intended.)

The management structure will

provide mechanisms for handling issues such as the following:

- achievement of consensus on technical issues
- problem resolution among ATIS participants
- changes in participants (e.g., the addition of new partners or the replacement of existing partners)
- changes in the operating environment for the ATIS
- the expenditure of resources that are owned by "the ATIS" as opposed to being owned by any one ATIS participant
- assurance of the operational reliability of the system.



A region should not expect the business plan to be a static document. The dynamic, iterative nature of the business planning process and the immature condition of the ATIS industry mean that changes should be expected in the ATIS business structure over the next few years. Therefore, the entire business planning process (the pieces of which are shown above and have been combined in Figure 4-7) will be repeated over time. As new developments take place, changes will necessarily occur in the business relationships that support the system. As revenue streams appear or disappear, the ATIS structure will have to change to account for them. As the market matures, these changes will occur less frequently, but in the near future, changes in the business structure should be expected.

Figure 4-7. A process for developing ATIS business plans¹.

A region should not expect the business plan to be a static document.

THE BUSINESS PLAN

The end product of all of this work is the business plan itself. Ideally, the business plan describes what the ATIS is intended to accomplish and how the business relationships that support the ATIS help it do so. The plan should describe all of the business relationships of the participants, as well as the mechanisms that will be used to select new participants as conditions change. Finally, the business plan will describe the costs associated with operating the ATIS and the source of revenue to meet those costs.

¹ The circles (A), (B), (C), and (D) indicate places where information from one area of this flow chart transfers from or to another area.

CONTACT INFORMATION

FURTHER INFORMATION

ATIS is a quickly evolving industry. This report describes the decisions that must be made and the options available for developing an ATIS, but it does not describe the effectiveness of different ATIS alternatives. Which solutions work the best and under what conditions will only be answered by the experiences of various ATIS efforts. We will have to continue to learn from ongoing experiences.

Later in this report, "The ATIS Experience: 15 Metropolitan Areas" lists the existing and planned activities of 15 of the most advanced U.S. ATIS efforts, as of October 1997. However, even as this document is published, plans within these regions are changing. In the next few years many of these regions (and several others) will have gained considerable experience in the "business" of ATIS. This experience includes

- the development of business relationships between public and private entities
- the creation and use of various public/public and public/private contracts, agreements, and requests for assistance
- the installation, testing, and application of user services and consumer oriented information delivery devices
- the installation, testing, and use

of various data collection systems

- the construction, refinement, and use of data fusion services.

Participation in the ITS America ATIS Committee is necessary to stay up-to-date on developing ATIS activities, but readers interested in particular subjects can gain considerable insight from talking directly with specific public agency or private sector participants.

CONTACT INFORMATION

The ATIS Committee has developed and maintains a Web site that supplies up-to-date contact information for both public and private sector ATIS participants. The information on this site includes names, phone numbers, and e-mail addresses for both public and private sector participants in ongoing regional ATIS efforts.

To access this information, call up the following Web address:

<http://www.itsa.org/subject.nsf/Urls/committee.html>

This is the "Committee" site within the ITS America home page (located at <http://www.itsa.org/>). From this location, select "Complete List of Committees" and then "Advanced Traveler Information Systems Committee." From this location you will be able to choose the contact list for active ATIS efforts.

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GLOSSARY

APTS	Advanced public transportation systems. Groups and systems of technologies that support the use of public transportation systems and shared ride transportation modes.
ATIS	Advanced traveler information systems. Groups and systems of technologies that aid in the collection, collation, and dissemination of traveler information before and during trips.
ATMS	Advanced traffic management systems. An array of institutional, human, hardware, and software components designed to monitor, control, and manage traffic on streets and highways.
AZTech	The title of the Model Deployment Initiative (see MDI) project in Phoenix, Arizona
Backbone, ITS	A set of protocols designed to tie ITS applications together. These applications extract ITS data from various agencies, modify those data, and redistribute them. This term can also include the physical connections that tie distributed ITS systems together.
CCTV	Closed-circuit television. Cameras that give traffic management personnel real-time views of traffic conditions around the region.
CMS	Changeable message sign (also VMS or DMS). Large signs often operated by state transportation departments, that display changeable text messages and are used to inform motorists of traffic conditions and roadway safety issues.
Core mission	The specific purpose(s) for which a government agency exists.
CVO	Commercial vehicle operations.

Data fusion server	The computer or computer network that performs the fusion function for either an ATIS or ATMS.
DMS	Dynamic Message Sign (also VMS or DMS). Large signs often operated by state transportation departments, that display changeable text messages and are used to inform motorists of traffic conditions and roadway safety issues
Dynamic route guidance	Turn-by-turn route information and directions that includes consideration of current traffic conditions.
FHWA	Federal Highway Administration.
FTA	Federal Transit Administration
Fusion, data	The process of combining traffic information collected from numerous sources, analyzing the data to check for errors, and formatting the data into a standard format for users.
HAR	Highway advisory radio. A low power, public, AM radio station usually operated by state transportation departments and other public agencies to inform travelers of road conditions and provide other types of traffic information.
Interoperability	A phrase used to indicate that two or more independent systems can work together in some fashion. Different levels of interoperability exist, ranging from two systems that can exchange data using a proscribed format to two systems whose functionality is dependent on interaction with each other. This term is often used to indicate that a device built to operate in one region will also work seamlessly in other regions.
ISP	Information service provider. A company or agency that obtains data, adds value to the data through customization or packaging, and then provides that data to customers.
ITS	Intelligent Transportation Systems. ITS involves integrated applications of advanced surveillance, communications, computer, display, and control process technologies on the roadway network, in the vehicle, and for transit.
MDI	Model Deployment Initiative. A federally funded transportation program under which four metropolitan areas—Phoenix, Seattle, San Antonio, and The New York city metropolitan area—were chosen to showcase the deployment of ATIS technologies.
MPO	Metropolitan planning organization. An agency designated to administer the federally required transportation planning process in a metropolitan area.

- Raw data (traffic)** Data provided by various surveillance devices that can be used to create specific traffic performance measurements (vehicle speeds, volumes, incident reports). Raw data have not been verified, combined with other related information, or modified (e.g., recorded for use by individuals or firms).

- Smart Trek** The title of the Model Deployment Initiative (seeMDI) project in Seattle, Washington.

- TransGuide** The title of the Model Deployment Initiative (seeMDI)project in San Antonio, Texas.

- VMS** Variable message sign (also CMS or DMS). Large signs often operated by state transportation departments, that display changeable text messages and are used to inform motorists of traffic conditions and roadway safety issues

CONTRACTING MECHANISMS

Once the public sector has determined which business model is most appropriate to the region, the details of the business relationships and contracting mechanisms that constitute the individual pieces of that business model can be selected. In general, each agency or firm has a business agreement that defines its relationship with the ATIS. Items covered by these agreements include the following:

- how participants interact with the system
- what data they will and will not provide
- how those data can and can not be used
- who else can have access to the data provided
- what data they can obtain
- what restrictions are placed on the use of those data
- the costs for participating in the system
- how revenue generated by the system is shared
- any other constraints and responsibilities that must be identified for each partner in the system when a business relationship is defined.

Fortunately, a variety of contracting options is available. Different contracting options can give different levels of control and incentives to both the public and private sectors.

To provide detailed information on contracting options, this appendix

summarizes a large number of them. Much of this material is taken from the report *Overcoming Barriers To ITS—Lessons Learned From Other Technologies* by the Urban Institute, Cambridge Systematics, Canfield Paddock and Stone PLC, and MTA-EMCI, for the Federal Highway Administration (1995). For other relevant resources, see Chapter 3.

SUMMARY OF CONTRACT OPTIONS—TABLE A-1

A summary of the potential contract options is shown in Table A-1, a duplicate of Table 3-1. The table lists a variety of contract methodologies and describes the nature of the business relationships that each supports. The table can be used either to identify the contracting mechanisms that will work with a given set of desired relationships, or to identify the characteristics of the business relationships that are dictated by a specific contracting mechanism.

CONTRACT PARTICIPANTS

The businesses in the contract agreement are either “service arrangers” or “service producers.” The service arranger is the agent or agency that wants a good to be produced or a service to be provided. For most ATIS, the service arranger is a government agency. The service producers are the public

agencies or a private companies that physically perform a service or create a good. For an ATIS, this means that the producers are the agencies that collect, fuse, and disseminate data.

Ultimately, the service arranger has the task of selecting the appropriate contracting mechanism. However, the service producer (usually the private sector) will only agree to participate if it foresees an advantageous business position, and just because an arranger prefers a specific contracting arrangement does not mean that a producer will be willing to accept it. This is particularly true when the arranger is the public sector and the producer is from the private sector. (In several experiences across the country, private sector vendors have responded to public sector requests for proposals by suggesting different contracting mechanisms. These alternative contracting mechanisms have allowed the private sector participants to offer greater financial incentives to the public sector arranger than the original contract mechanism could have provided.) In other cases the private sector may accept the initial terms, but the public sector might be better served by an alternative contracting mechanism.

A third “player” that helps determine the proper contracting mechanism is the consumer. For an ATIS, the consumer is usually either the traveler, business, or commercial carrier receiving the traffic or transit information or a public agency using that same information for traffic management purposes. Who the consumer is intended to be can affect which contracting mechanism is best for a given service or function.

Table A-1 shows the relationships among the contracting mecha-

nisms and these three types of participants.

TABLE STRUCTURE AND DEFINITIONS

Table A-1 lists the types of contracting relationships down the left side, with the attributes of the arranger, producer, and consumer listed for each type. The table is structured so that contracting mechanisms that are strongly influenced by the public sector are near the top. Contracting mechanisms that give the private sector the most influence are located toward the bottom.

The table is broken into six basic types of business relationships:

- public agency relationships
- contracting for services
- innovative public/private partnering
- joint ownership
- transferal of public responsibility to the private sector
- private company to private company relationships.

Within each of these categories of business relationships are two or more types of agreements. Each of these agreements is characterized by whether the public sector or private sector is best positioned to play the role of arranger, producer, and/or consumer. (In Table A-1, the consumer is assumed to be either an individual, business, or commercial carrier willing to pay for a service, or the taxpayer, which means that a government agency would pay for that function to provide that service to the general public.)

Nature of Good Provided

Related to the issue of who will consume the good are two other columns in the table, the nature of the good provided and the price paid by the end user for that service. The “Nature of the Good Provided” may

refer to goods and services provided to the general public by the public sector for the good of the community (e.g., variable message signs for warning motorists), which are described as a "Public Good." Items listed as a "Private Good" are consumer or commercial oriented goods and services to be purchased by individuals or companies. Services include those that are paid for through advertising revenues and other indirect (non-public) sources. The term "Mixed Public and Private" means that a variety of services are provided, some of which are intended for individual and commercial users, others to be paid for by public agencies as part of their normal tax supported duties.

- controlling both the design of the goods or services and the method by which they are provided
 - physically constructing the goods or services and determining the procedures for building them
 - operating the process of providing the goods or services
 - maintaining the process of providing the goods or services.
- Each of these tasks can be undertaken by either the public or private sectors. However, in many cases, a specific group may best perform a task for a specific business relationship. This is indicated in Table A-1 by a circle in the appropriate column.

Price to End User

The "Price to End User" describes the pricing structure for the goods produced or the service provided. "Free/Low" means that the services are primarily intended for general public consumption at little or no cost to the consumer (e.g., bus schedules given out for free). "Competitive Price" means that the cost of the goods or services is determined by the market (e.g., the price of gasoline). "Regulatory" pricing means that the government determines the price that can be charged for a good or service, given a review of the costs of providing that service (e.g., utility or cable TV rates).

EXAMPLE FROM TABLE A-1

The fifth row of Table A-1 describes the Public Turnkey contracting mechanism. This mechanism works best when a public sector agency wants to own the system that will produce a good or service but also wants the private sector to design and build the system. (The public sector may not have the expertise to do so.) Most commonly, the public sector arranges for these services while the private sector produces them. Either the public or private sector could operate and maintain the system once it has been built. In most cases, the goods or services produced are meant for the public good and are paid for by the taxpayers.

Public and Private Sector Roles

The final columns in Table A-1 show the appropriate roles of both public and private sector participants for a selected business relationship. These roles are divided into five basic tasks:

- owning the means of producing the goods or services

An example of when such a contracting mechanism might be used is the construction of an advanced traffic management system. Public agencies often do not have the computer programming staff needed to design and build these systems. However, the systems are built for use by the public sector and are paid for with taxpayer funds.

They are operated to benefit the general public.

21 CONTRACT OPTIONS

The following subsections discuss each of the 21 business relationships listed in Table A-1, along with the conditions under which each relationship is appropriate. Examples of situations in which such relationships are currently successful (not necessarily in the transportation community) are also presented.

PUBLIC AGENCY RELATIONSHIPS

Although they may be applicable between public and private partners, the business relationships in this section are most appropriate for two or more public agencies. For example, they may be established between a transit agency and a highway agency so that staff from one of those agencies can provide services for both.

The purely public approaches are often employed when a public agency is performing a task that is central to its core mission. This means that

- it will have the staff and staff expertise to perform the necessary work
- it is providing the public with results that the public expects from that organization.

Therefore, in most cases the output from publicly operated systems is free to the users and is considered a public good. Examples of such services include variable message signs, highway advisory radio, and other traditional, mass-market information delivery media.

The advantage of this contracting mechanism is that it makes government services less costly because 1) it can take advantage of

existing public assets, 2) overhead charges tend to be smaller in the public sector, and 3) profit is not added to the cost of providing these services.

Purely Public Provision

In a purely public business model, one or more public agencies owns, designs, builds, operates, and maintains the system. Staff from a public sector agency create the mechanism that produces the good or service, operate that system once it has been created, and maintain it over time. An example of this might be a traffic signal system, for which agency personnel both design the system and install the equipment, as well as operate and maintain the equipment.

For this kind of contract, the public sector is both the arranger and producer, while funding is obtained from the taxpayer. Pure public provision of ATIS can occur through a single agency (usually for an ATIS that covers only a single, large jurisdiction) where working with a second agency is not necessary. However, a more likely form of this contracting mechanism for ATIS is a consortium of public agencies working together. These multi-agency agreements are discussed below.

For ATIS purposes, most "pure public" business arrangements involve some type of interagency agreement. These agreements can involve different levels of resource sharing and different roles and responsibilities among the partners. In the simplest case, an agreement simply allows one agency to perform a task for another agency. In other cases, one agency can purchase services from another agency. (For example, jurisdictions often contract for police and fire protection from neighboring jurisdictions because it

is less expensive to contract for those services than to create their own police and fire departments.) "Payment" from one jurisdiction to another can range from cash payments to barter arrangements to a simple swapping of duties. (For example, if two cities share two intersections, city "A" may agree to maintain one of those intersections while city "B" maintains the other.)

The type and extent of documentation needed to achieve the required cooperation and resource sharing depends on the nature of the tasks performed. Four common forms of public agency agreements are

- inter-local service agreements (ISAs)
- interagency agreements (IAGs)
- memorandums of understanding (MOUs)
- memorandums of agreement (MOAs).

These four mechanisms differ only slightly. In addition, the nomenclature agencies use can vary, so that what one agency calls a memorandum of agreement another may call an interagency agreement. These four types of agreements are discussed briefly below.

Inter-local Service Agreements and Interagency Agreements

These contracting mechanisms involve one public agency providing services to another public agency, typically for a fee. In addition to the police/fire service example, a classic example of this type of agreement is the situation in which one transit authority provides service that crosses the borders of its service area into another transit agency's service area. Because most transit service is subsidized in the United States, one agency will help pay for the other agency's provision of this service. The inter-local agreement

defines the service to be provided, the money to be paid from one agency to another, and how revenue collected from this service will be shared between the two agencies.

As shown by these examples, with this type of contract the public sector acts as the arranger and the producer, and the taxpayer funds the efforts. The public agencies perform the required service because the service is one of the main tasks for which they were created. The inter-local agreement helps to resolve difficulties that arise when this service (by public demand) crosses the jurisdictional boundaries created by legislation that defines, say, a transit operating authority.

These types of agreements allow the public sector to provide services that would not otherwise be available or allows it to provide those services at a lower cost to the taxpayer. They are routinely used by small jurisdictions that wish to purchase specific services from larger, more capable jurisdictions and by jurisdictions that wish to pool their resources to obtain a particular capability that is too expensive for any one of the participants to afford alone.

A common means of establishing interagency agreements is the use of memoranda of understanding or agreement.

Memorandum of Understanding and Memorandum of Agreement.

This type of document defines how a specific work task (or set of work tasks) will be split between two cooperating agencies, or how two agencies will cooperate to achieve a common goal. It defines the intention of the two agencies and spells out how the agencies will work together to reach their common goals. One traditional use of these types of memoranda between cities has been to operate, control, and maintain traffic signals. Often, parts

of a given intersection fall within two or more jurisdictions. These jurisdictions must then agree on which agency will control the signal at that intersection and which will be responsible for maintaining that traffic signal hardware. The memorandum defines these relationships, the roles of each of the jurisdictions, and the agreed upon operating conditions and constraints.

For ATIS, a memorandum of understanding is commonly used to define the relationships between different participants for issues such as

- what data will be available
- who can access those data
- what purposes those data can be used for
- the tasks that a given agency will perform
- whether financial contributions will be made to the other participating agencies
- constraints that may affect the performance of the tasks defined in the memorandum.

A key distinction between a memorandum of understanding and a memorandum of agreement is the specificity of the tasks agreed to. In general, a memorandum of understanding makes a promise of coordinated action, given a list of constraints (e.g., we will perform these tasks given available funding), whereas a memorandum of agreement spells out a more defined set of responsibilities. Basically, the memorandum of agreement removes the uncertainty of the memorandum of understanding (e.g., we will perform these tasks).

These types of agreement (commonly called “letter agreements”) are also used between public agencies and the private sector when the value of the services or information being exchanged is negligible or uncertain. In these cases, the letter

agreement states

- what actions will take place
- what responsibilities each party will assume (or which responsibilities a party specifically declines to assume)
- the conditions under which the two parties agree to cooperate
- the conditions under which either party can withdraw from the arrangement.

These types of agreements are used in ATIS efforts when the public sector agency is willing to provide data to the private sector (usually free of charge) but wishes to limit its responsibility in providing the data. They are also used where the provision of the defined service is uncertain. (For example, the private sector can have the data free of charge, but the public sector will not guarantee that the data will always be available because the system providing the data is not fail safe.) The Washington State Department of Transportation currently uses this type of letter agreement to allow commercial TV stations to access its live closed circuit TV images.

CONTRACTING FOR SERVICES

This second class of business relationships involves one organization hiring another. Public sector agencies commonly use this type of arrangement when they need to acquire technical expertise or staff to perform a task. In most cases of a public/private relationship, the tasks are defined and then presented to interested parties (in a request for proposal process). Bids for those services are then accepted, reviewed, and evaluated. The winning bidder enters into a specific type of contractual arrangement to supply the desired services.

Three types of contracting relationships are defined under this

general category of business relationships. These are

- contracts
- public turnkey systems
- public/private competition.

All of these mechanisms share similarities. In all cases, the public sector arranges the service, the private sector produces the service, and the taxpayer finances it. However, these three contracting mechanisms differ in how much of the design, build, operation, and maintenance functions are contracted to the private sector. In general, these business relationships are used when the public sector wishes to obtain outside assistance with the development or operation of a system that it will control.

Contracts

Several types of public/private contracts exist. Three variations of the basic "contract" mechanism are briefly discussed below. In all three mechanisms, the arranger (the public agency, in most cases) defines the tasks and the products. The private vendor then submits bids that indicate their cost for performing those tasks and providing the required products. Essentially, the "arranger" (the public agency) contracts out whichever design, construction, operation, and maintenance functions it believes are necessary to balance work force needs and resources. The contract normally contains specific desired outcomes. That is, these business relationships give ultimate control of the product to the arranger. The producer's role is to build or operate the proscribed service in the manner specified.

The first category of contract is low-bid contracting. This mechanism is used for most highway construction contracting efforts. In most instances, the contract process

itself involves a combination of determining and certifying the technical capabilities of the various competitors and then determining the low bid from those who can prove that they are capable of performing the required tasks.

A second category is life cycle contracting. Under this type of contract the public agency includes the long-term costs of operating the system in a design-build contract.

A third contracting mechanism, performance contracting, is a method of providing goods and services through a contract based on the ability of a contractor to satisfy performance specifications.

Adding further diversity to this category of contracts are the mechanisms for controlling costs and fees paid to contractors. Over time, various mechanisms have been developed to control total contract costs and provide incentives for good project performance. These options, which apply to all three of the contract types discussed above, include structuring the contract as fixed price, cost plus fixed fee, cost plus award fee, and other alternatives.

All three of basic contracting mechanisms described above have advantages and disadvantages. The largest advantage of this general type of "contracted assistance" is that the government is able to obtain specialized skills that it may lack in its own work force while simultaneously retaining a high level of control over the work performed. Another advantage is that market discipline is imposed on public sector operations; that is, costs are held down because of the competitive bidding process.

The primary disadvantage is that these three contracting mechanisms require governmental oversight to monitor the contracting process and the performance of the contractor. A

secondary problem is that the “arranger” must have a good understanding of the desired finished product to both write an effective request for proposal and efficiently manage the resulting contract. Finally, the conventional cost-plus fixed fee contracting mechanism offers little incentive to the private sector to provide more efficient services to the public once the contract has been awarded.

Public Turnkey

In public turnkey projects, the public sector contracts with the private sector for any combination of the design, construction, operation, and maintenance functions. These contracts differ from the contracting mechanisms discussed above because the arranger cedes a greater level of control to the private sector. This is accomplished by defining only the end products to be produced, not the steps necessary to create the desired end product. The turnkey approach has gained some favor in the construction of advanced traffic management systems.

The turnkey system can entail one of three scenarios:

- design and build (with public operation and maintenance)
- design, build, and maintain (again with public operation)
- design, build, operate, and maintain.

The selection among these three types of operating strategies depends on the availability of staff and the arranger’s interest in taking on the operations and maintenance tasks.

Under the turnkey type of contract the public sector may use private financing to fund the initial creation and operation of the system. This is particularly true for the last option. Under the design, build, operate, and maintain type of contract, if the potential for revenue

is high (e.g., for a toll road in a congested urban area), the potential to attract private financing is also high. Private financing allows the arranger to pay for the system over time, either through periodic payments or by selling services to the public.

Where private companies operate “public facilities” for a profit, public agencies normally must decide between establishing guaranteed rates of return—in return for control over the fees that the system operator can charge—or giving the operator the opportunity to make considerably larger profits while risking the potential for losses if facility use does not meet expectations.

The primary advantages of turnkey contracting are the following:

- Where significant revenue can be generated, private capital can be attracted to help design, build, operate, and maintain the system.
- Private firms may be in a better position to work across jurisdictional lines because they tend to be less constrained by related and unrelated political disputes.
- Private firms that opt to build turnkey systems tend to have a much better understanding of the problems and constraints these systems face (they are often more experienced with the issues) than the public sector agency that they work for.

A disadvantage of the turnkey process is that the services provided tend to become monopolistic because of the “public” nature of the goods being developed (few toll roads have true competitors.)

Public/Private Competition

This contracting mechanism, which involves a bidding process, allows public and private agencies to

compete with one another to provide a product or service. Normally, the public sector is the service arranger, using taxpayer funds to provide a generally available public service. However, the service producer can be either the public or private sector, which provides competitively priced public goods.

This system requires that the public and private sector costs be established and comparative analyses be performed. One example of this methodology can be found in England, where maintenance staff are required to compete with the private sector for maintenance contracts. Other examples can also be found in the United States, where public transit agencies often compete with private bus companies to provide specific types of bus service (such as school bus service).

Federal, state, and local laws must be carefully observed when public sector agencies compete with the private sector. Most private sector companies are concerned that in such competitions the public sector agencies can gain an unfair advantage by being able to price service at marginal rates (by letting other public revenues pick up the overhead costs that should be associated with a given task), rather than charging the full rates that the private sector must charge.

However, if the legal issues can be worked out (and the bidding system can be designed to ensure fair competition), allowing public-private competition can produce lower costs to the taxpayer because the increased competition should result in more efficient, cost-effective services. The disadvantage of this method normally comes from the difficulties associated with creating fair competition between the public and private sectors.

INNOVATIVE PUBLIC/ PRIVATE PARTNERING

This group includes three innovative approaches to business relationships that may help solve specific problems of the ATIS business plan. They are referred to here as "functional division of responsibility, public-private consortia, and cost sharing." Each of these business mechanisms involves a cooperative structure developed jointly by the public and private sectors to accomplish both mutual and individual goals. Most of these business relationships require the negotiation of specialized agreements that balance the needs of the participants and provide the necessary checks. At the same time, they ensure the cooperation of partners who often have differing perspectives and objectives. Each of these mechanisms attempts to take advantage of the strengths of the various ATIS partners to create a well run "total" entity.

Functional Division of Responsibility

This first method attempts to optimize system development and operation by partitioning the functional components of the ATIS among different partners, depending on their interests and capabilities. Both public and private participants may be assigned functional components. This assignment can occur through a combination of both competitive bid and negotiated settlement, depending on the nature of the function and the number of partners and their level of interest in performing a given function. The result of this contracting arrangement is that the public and private sectors share responsibility for the ownership, design, construction, operation, and maintenance functions. Similarly, because both public

and private groups are involved, the end products from this type of business relationship tend to meet a combination of general public (i.e., taxpayer) and consumer needs.

Functional responsibilities are usually connected to ownership of property, equipment, software, or other system components. For example, a communication company that owns the equipment needed to provide the communications for a system may be assigned responsibility for the entire ATIS communications function.

In most cases the public sector is the “arranger” of these functional relationships, meaning that the public sector facilitates the bidding/negotiation process to select partners and their roles. (See Public Sector Leader in Chapter 2.) However, private sector partners who will fulfill major functional roles normally will also have significant input into the decision making process.

The specific business arrangements (contracts, costs, revenue sharing) that support these functional roles will vary according to the function and group. In some cases (such as the communications services function), conventional contracting arrangements may apply. In other cases (e.g., provision of data to the ATIS), MOUs describing roles, mechanisms, and constraints may be all that are needed to ensure that functional responsibilities are effectively undertaken.

The primary advantage of the “functional division of responsibility” approach is that the ATIS participants can focus on their respective strengths, letting other participants focus on the remaining tasks. The disadvantages of this contracting mechanism are the legal issues involved with selecting partners and designing the documentation to allow these functional relationships

to take place. These issues include ensuring that the revenue generated by participants is effectively disseminated to pay for the participants’ costs. One major aspect of these difficulties stems from problems inherent with state services that are contracted to the private sector generating revenue. (For example, when public sector data collection costs are passed on to the private sector.) See the section on revenue in Chapter 2 for more information.

Public-Private Consortium

The second method involves the creation of a public/private company or organization designed specifically to perform the ATIS functions. This company is usually directed by a board comprising representatives from both the public and private sectors, and it is normally managed as a non-profit agency or corporation.

The board and the non-profit agency can contract for services. The company can also accept revenue, and because it is a corporation, it is normally free from the contracting constraints that apply to the public sector. This allows it to resolve many of the revenue and partnership problems that can affect public sector organizations and also allows it to react more quickly to changing economic circumstances and technology.

Within the public-private consortium, the government normally acts as the arranger (overseeing the creation of the non-profit company) of services, with either the public or private sector acting as service providers. (The non-profit company is free to select whatever service providers it deems best, given direction offered by the board.)

The services provided by these non-profit groups generally meet a combination of public and private

needs. Thus, revenue for the non-profit company is generated by a combination of consumer fees and taxpayer support (for goods provided to public sector partners). While ownership of most of the system components remains with the public sector, responsibility for the design, construction, operation, and maintenance functions is generally shared between the public and private sectors (through the non-profit company).

The public/private consortium approach tends to foster interagency cooperation because of the board structure. With both public and private sector personnel sitting on the company board, the perspectives and concerns of the affected partners are heard for all important decisions. This can be an advantage when agencies are trying to deploy ATIS services quickly and efficiently because it significantly reduces the potential for vocal opposition to the implementation of planned services. The disadvantage of this business approach is that if the private and public sector members of the board disagree on the direction of the non-profit company, the dissension can adversely affect the performance of the company.

An excellent example of a public/private consortium is HELP, Inc. This non-profit company is an outgrowth of the Crescent Demonstration project and the Heavy Vehicle Electronic License Plate Field Operational Tests. The HELP Inc. board comprises representatives of several states, a variety of trucking associations, and other trucking industry members. The non-profit company serves as a data clearinghouse for information needed by states (who regulate and enforce trucking activities) and trucking companies (who must supply data to state agencies to prove their compli-

ance with state and federal laws). Consequently, HELP Inc. derives revenue both from services provided to the states and from services provided to individual trucking companies. At the same time, the board ensures that the needs of all participants are met.

Cost Sharing

The third method of innovative public/private partnership arrangements is cost sharing, a contracting arrangement whereby the public and private sectors share the financial burden of supplying services to the consumer. This type of contracting mechanism may take the form of direct or indirect payments in cash or in-kind services. Costs are shared because the joint efforts of the public and private sectors meet the needs of both partners. Depending on the specific arrangements, payments made by the participants can be applied to capital costs, operating costs, or both. The money can come from any source.

Each of the various cost sharing arrangements normally stems from a situation in which the public sector is the arranger, with both the public and private sectors acting as producers. In addition, the goods provided by the system are for both public and private consumption, and thus revenue comes from both consumers (i.e., from fees) and taxpayers (i.e., through public sector funding). Responsibility for the ownership, design, construction, operation, and maintenance functions is typically shared between sectors.

Cost sharing is a common contracting practice when both the public and private sectors stand to benefit from a given system. A simple example of cost sharing is when the private developer of a new subdivision pays for a portion of the transportation infrastructure needed

to support the subdivision.

The primary advantage of cost sharing is that the public and private sectors can leverage one another to make risky business undertakings feasible. The disadvantage of cost sharing is that intellectual property rights can become an issue, particularly when private and public investments are combined to develop system operating components. When these funds are commingled, ownership of the rights to the final product becomes unclear. Therefore, participants must ensure that the legal documents that define the cost sharing relationship guard their interests. For example, for the public sector, this often means that legal clauses are inserted to ensure that a private firm receiving low (or no) profit margins does not exit the system, taking crucial software with it and leaving the system inoperable. These safeguards can be built in by providing participants with legal "sole use" rights to jointly developed software, by specifying "escape clause" procedures for all participants to ensure that minimal harm is done to remaining partners if one participant leaves the group, and by a variety of other methods.

There are many methods of cost sharing. A brief description of five of these methods, along with their respective advantages and disadvantages, is provided below.

Direct Payments. Each participant in the group agrees to pay a certain share of the total cost in dollars. These revenues can be generated through any source, including user fees, taxes, and public borrowing. The size and timing of these payments tend to be either negotiated or based on usage (and the cost) of a given system component. Payments are made from these pooled funds to the producer of the specific goods or services (i.e., that

system component). Thus, payments may flow from the private to the public sector, as well as from the public to the private sector.

The advantage of this method of cost sharing is that participants are given clear ownership of individual components. In addition, the availability of funding provides incentives for cooperation among participants. The disadvantages of this method are the following:

- Reasonable cost rates for specific system components can be difficult to compute (e.g., how much is data worth?) (See Perspectives of Participants in Chapter 2.)
- Many start-up ventures (and ATIS is primarily a "start-up" venture at the moment) lack the cash needed to make cash payments, particularly during the early stages of deployment when funding is needed the most.
- Many public sector agencies have difficulty accepting revenue or can not apply that revenue to the cost of operating the system components that generate the cost.

Indirect Payments. In this business mechanism, various units of government contribute to meet their share of costs through indirect payments such as subsidies to users or the private sector. The public sector may provide vouchers to the end user, for equity reasons or to stimulate interest in a particular application. Governments may also forego tax revenues, affording private firms favorable tax treatment. An example of this method is the way that vouchers may be provided to disabled transit riders to allow them to use private transit services. This provides full funding to the private transit provider while limiting the cost to the individual user.

The primary advantage of this

cost sharing method is that it can encourage and aid the private sector in establishing a market for ATIS services while not requiring a cash payment from the public sector. This is important, not only because paying cash can be difficult (fiscal restraints can hinder many public agencies in finding the cash to make such payments), but because these indirect payments can help shift the costs to a more “palatable” cost center. (It may even be shifted entirely out of the public agency.) For example, the use of tax incentives rather than a cash payment is likely to shift a cost from being paid by the public transportation agency to being paid from the state’s general fund (where tax receipts will decline slightly as a result of the tax break given the private sector).

Indirect payments can also be combined with other contractual arrangements. This can provide significant flexibility to meet both the monetary needs of the recipient and the funding limitations of the revenue provider.

One disadvantage of this method is that subsidies and tax incentives can be costly and labor intensive for government agencies. They also require considerably more work to design and implement than cash payments, and they can be particularly difficult to arrange in multi-state, multi-agency areas.

In-Kind Contributions: In-kind contributions of staff time, equipment, and other resources in place of cash contributions are quite common in public/private relationships. These in-kind contributions can flow in either direction, public to private or private to public. The services provided can range from “free” or reduced cost access to proprietary software and systems to the assignment of staff working on “overhead” accounts to specific projects.

The use of in-kind services allows participants to contribute items that have high marginal value to the project at low marginal cost to themselves. That is, a company that has already paid for the development of a software system experiences no net cost by allowing its use in a multi-partner project (as long as it retains the ownership of that system). However, use of that system saves the partnership the retail cost of purchasing a similar system. Thus, the in-kind service has far greater value to the group than it costs the provider. In return for the system’s use, the provider obtains other benefits (e.g., being able to participate in the project, perhaps receiving development funding for extension and refinement of the system, thus increasing its value for other potential paying customers).

Several examples illustrating the range of in-kind services that can be used include the following.

- In the North Seattle Advanced Traffic Management System (NSATMS) project, PB Faradyne contributed the core code for its MIST traffic signal software to serve as the basis for the traffic management system software. This significantly reduced the out-of-pocket cost of NSATMS system development. In return, PB Faradyne received funding (and the opportunity) to extend the MIST system’s capabilities, which it can then sell to other clients.
- In the AZ Tech model deployment project in Phoenix, Arizona, Metro Networks has contributed data on incident occurrences and locations to the project. Metro Networks already gathers these data as part of its existing traffic reporting business. AZ Tech benefits by obtaining early incident reports,

confirmation of other incident reports, and better information on incidents at essentially no cost. In return, Metro Networks obtains access to other AZ Tech information, which can then be broadcast by Metro Network's customers.

- In the ADVANCE Demonstration project in the Chicago, Illinois suburbs, Motorola contributed in-vehicle electronics to the project at reduced cost to the project. This significantly reduced the cost of the project, while giving Motorola the opportunity to refine and test equipment in a manner that would otherwise have been impossible.

Disadvantages to in-kind services stem from two basic problems. The first is that ATIS that rely on key components that are contributed as "in-kind" services become dependent on the participation of that partner. This can allow that company to hold the entire system hostage to demands for additional funding or services in return for continued use of that component. In addition, the system can fail if a key partner ends its participation in the project and takes those key services with it.

Second, the use of a specific private partner's services or equipment can lead to legal concerns about the use of public funds to develop proprietary systems for the private sector. (Private sector competitors of the private partner may object to the use of public funds to support the development of systems that then enhance the competitive position of their rivals.)

Revenue Sharing. Rather than making an up-front contribution to overall costs, the partners (usually the private sector) agree to meet cost sharing obligations over time by

sharing revenue generated by the various end products. This is accomplished either by contributing a fraction of future revenues earned from the sale of goods and services to cover the overall costs of the project, or by contributing a fraction of net profits from those sales.

There are two primary advantages to this approach. First, it limits the amount of up-front expenditure required by companies trying to build a new product or service. This is particularly beneficial to start-up ventures testing new and uncertain markets. Second, it spreads the risks and rewards of the system among the participants. If revenues are high, everyone benefits. If revenues are low, everyone suffers. This provides incentives to all participants to make the system work as well as possible.

Disadvantages to this type of business relationship revolve around two things: the accounting practices that are needed to compute revenue or profit, and the fact that providers of services that do not directly sell end products must depend on partners that do sell end products to generate the revenue needed to pay for the upstream goods and services that make those sales possible. Thus this mechanism increases the risks of "upstream partners," particularly in the early stages of the ATIS effort, when the success of the system is uncertain.

From an intellectual standpoint, sharing "net profit" makes sense when the private sector is asked to help support public efforts. In this case, the public is supporting private enterprise's efforts to create a system that 1) pays for itself and 2) provides benefit to the traveling public. Once that system pays for itself, the private sector can contribute a "fair share" to the public sector's cost of providing that information. These funds can then be used to either enhance the

system or reduce the taxpayer's cost of providing those services. The problem is that accounting practices can be easily manipulated to show no net profit, regardless of the "true" revenue and costs associated with the services. Thus, revenue sharing agreements to date (for example, the agreement between SmartRoutes and the Cincinnati-Northern Kentucky Telephone Travel Information System) tend to rely not on "net profit" but "total revenue" for this computation. This is not as intellectually pleasing, but it is much easier to handle from an accounting perspective.

Cessation of Future Property Rights. This final category of cost sharing is a variation of the in-kind services model discussed above. This cost sharing mechanism requires that government cede rights to property (either intellectual or physical property) that has potential future value, where that value will result from ATIS deployment. These ceded rights can include the intellectual property rights for future software patents. The public agency may also have to relinquish ownership rights to hardware developed as a part of the deployment efforts. The value of these rights is used in place of other kinds of payments to the participants that obtain these rights. This shifts actual costs from the public sector to the private sector, and in return, the private sector gains an increased potential for future profits.

An example of this method of cost sharing is the inter-jurisdictional toll collection program EZPass in the New York-New Jersey area. Under this program, the public sector does not retain a license to the intellectual technology of the project if that technology is developed at the private company's expense, even though that technology is being

tested and used as part of a system being constructed with public funding.

The primary advantage of this contracting arrangement is that the private sector becomes more willing to invest in research and development activities, both because its research funds are leveraged by other participants' funds and because it does not run the risk of competitors obtaining access to research results that were paid for (in part) with its funds. The use of these public funds to benefit private companies can also have legal implications, depending on how the funds are used and the specifics of the agreements between the public and private partners.

JOINT OWNERSHIP

The next category of business relationships takes the idea of shared costs another step. In the following two business relationships, not only the cost of the system's operation is shared, but so is its ownership.

The shared ownership of the components orients these types of business arrangements much more toward the private sector than the previously described business mechanisms. In fact, as can be seen in Table A-1, the private sector may now become the instigator or "arranger" of these services. In the following two business relationships, the arranger can be either the public or private sector, whichever group initially sees (and pursues) the opportunity to benefit from such a business relationship.

Conventional Joint Ownership

Joint ownership is a contractual arrangement in which the public and private sectors share in the responsibilities and benefits of ownership. Joint ownership may entail legal partnerships or for-profit or non-

profit organizations. Ownership confers certain rights that are not granted through traditional contracting procedures. These rights include the ability to sell or lease the jointly owned property (or the rights to that property); to grant access to use that property; and to earn a share of the profits from the operation, sale of services, or proprietary spin-off technologies and applications related to that property.

Under this contractual arrangement, the public and private sectors can be both service arrangers and service producers. Similarly, revenue can be obtained from both consumer and taxpayer sources, depending on the goods that are produced. The mixed nature of the public and private sector goods results in a variety of costs to the end user. The publicly provided goods are typically obtained at little or no direct cost, while the privately produced goods are obtained at market prices. This type of contract results in the public and private sectors sharing in the ownership, design, construction, and maintenance functions.

The best example of these types of arrangements is joint ownership of right-of-way that is used for multiple purposes. For example, a single stretch of right-of-way may be jointly owned by an electric utility and a pipeline company. The cost of the right-of-way is divided appropriately, as is the cost of constructing access to the right-of-way and any right-of-way maintenance costs. (Maintenance of individual improvements, such as the pipeline itself, are the responsibility of the individual company.) Such an arrangement reduces the cost of right-of-way to both companies without affecting the services needed by either company. These rights can be then be sold or transferred to other, similar companies.

These types of agreements offer significant possibilities for cost savings and revenue generation from both access to highway right-of-way and joint development or ownership of communications cable. (A number of state departments of transportation are entering into agreements for joint ownership of fiber optic cable placed on state owned right-of-way.)

The advantage of joint ownership is that both partners can realize significant savings. The disadvantage is that the legal and policy issues that result from these arrangements can overshadow the potential cost savings. In addition, once an agency has entered into a joint ownership arrangement, getting out can be difficult. Therefore, these arrangements should only be undertaken after considerable care and research.

Competitive Joint Ownership

The second example of joint ownership is the competitive joint venture. This is an innovative arrangement in which joint ownership of a facility includes a provision for competition between the partners. Any combination of public and private sector parties may be involved in the facility, and each may compete against the other in one form or another.

The best example of this arrangement is two newspapers (usually morning and evening papers) jointly owning a printing plant. Joint ownership of the plant decreases both paper's production costs by decreasing the amount of time that the facility is idle, thus reducing both partners' fixed costs. Because both partners benefit from these savings, the fundamental competitive balance between the papers is not altered, only their

overall level of profitability. Similar arrangements might be possible for the ownership and operation of data fusion servers and various communications services needed for ATIS.

Under this type of business arrangement, either the public or private sector can act as the service arranger and provider. Similarly, revenue can be generated either from consumers who paying market prices for goods produced by a private sector participant or from taxpayers who pay for public sector services produced for the public good. Functionally, ownership, design, construction, operation, and maintenance functions can be assigned to either the public or private sector, depending on the nature of the jointly owned good.

As with conventional joint ownership, the primary disadvantage of this type of business relationship stems from the legal difficulties of creating the appropriate contract documents that will allow public and private organizations to enter into such a relationship.

TRANSFERAL OF PUBLIC RESPONSIBILITY TO THE PRIVATE SECTOR

This next category of public/private business relationships includes many of the business models that are conventionally considered "privatization" of public functions. It also includes services such as cable TV and various utilities, for which a combination of large infrastructure costs and the need for publicly available facilities means that the most beneficial public/private relationship is some type of either publicly managed competition or publicly regulated, private service.

These business relationships involve the transfer of public services to the private sector, or the creation

of monopoly or near monopoly business conditions for private firms that undertake specific tasks to benefit the public good. Four different methods to transfer these "public interests" to the private sector are presented below. Each is intended to obtain the benefits available from the private sector (investment capital, innovative and better services, more efficient systems) for publicly desired goods and services. Additional variations on these basic concepts are also possible.

Licensing

The first is when a government that grants a license to a company to conduct business or perform a certain activity allows that company to perform a function that would otherwise be illegal without that license. The government normally retains ownership of the task being licensed, but the private sector producer shares the responsibility for designing, building, operating, and maintaining the facilities or services that it has licensed. Licensing does not grant the right to occupy public property. A good example of a licensing arrangement is the cellular phone company that is licensed to transmit on a selected frequency that it does not own.

Normally with licensing, the public sector is the service arranger and the private sector is the service provider. Revenue is generated from the sale of competitively priced goods and services. These prices are often controlled by regulation. In addition, the conditions under which the license is granted may include the provision of some public services.

The advantage of licensing is that, through the contracting process, the private sector can be encouraged to participate. In

general, licensing agreements limit the number of competitors in a given market, which increases the opportunity for a private company to make a profit. This becomes increasingly important if large investments and a fairly large lead time are necessary before profits can be expected. Thus the licensing process can set the stage for the market to attract significant amounts of private capital and consequently speed deployment of service. However, this only occurs when the market for those services is viewed as large.

The disadvantage of licensing is that the licensing process can itself be long and difficult. For emerging technologies (such as ATIS), defining the appropriate terms for the license is difficult, and if the contract is written poorly, the licensing process can result in poorly regulated monopolies that stunt innovation and efficiency.

Leasing

The second is leasing, which is essentially the sale or franchise of the right to use a piece of public property for a specified length of time. For ATIS, a lease agreement might allow a private sector partner to control facilities and equipment built by the public sector. In return for the lease payment—which could be used to expand the system and improve access to data produced by the existing facilities—the private sector could lease the entire system from the public sector and then use those facilities to provide ATIS services.

The advantage of the lease to the private company is control over the public facilities it needs for ATIS operations. The advantage to the public sector is that the care and operation of those facilities resides with the private sector, while the public sector continues to obtain the

data (or services) it requires, as well as obtaining lease payments that it can use for a variety of purposes.

Either the public or private sector could arrange such a service, but the private sector is the service provider. Because this model requires that the private sector generate revenue to pay for the lease, the primary end user must be a consumer willing to pay market prices. Depending on the nature of the property being leased, these prices may or may not be constrained by regulation.

The primary advantage of leasing is that the public sector retains ownership of the property, while the private sector establishes the market. The disadvantage is that the general public may protest at paying for services that are provided from infrastructure initially purchased at taxpayer expense. In addition, public infrastructure will be willingly turned over (even for a price) to private operation in only a limited number of cases.

Franchising (Exclusive or Non-exclusive)

The third is a franchise, which (in the case of ATIS) is the grant of a special privilege that is normally denied as a common right to all citizens by government to a private party. The purpose of granting the privilege is to use a public property to achieve benefits for all citizens. Under the franchising arrangement, the public sector retains partial ownership of the property and is the service arranger. The private sector shares in the ownership of the property and is the service producer. The consumer bears the costs, which are established by regulation. Franchising requires that the public and private sectors share some of the design function, even if that means only public oversight of work done

by the private sector. However, under this contracting arrangement the private sector assumes responsibility for the construction, operation, and maintenance functions.

The best example of a franchise is the cable TV industry. The franchise allows the cable operator to use public right-of-way to place cable. The government still owns the right-of-way, but the cable company owns the cable and associated electronics.

Note that franchises can be exclusive or non-exclusive, and this status tends to determine the amount of regulatory oversight the public sector must perform. In an exclusive franchise (e.g., cable TV), the franchise owner has the sole rights to provide a specific type of service, along with rights to various public resources (e.g., access to right-of-way). However, because of its monopoly position, these rights are often constrained by public regulations that are intended to prevent the franchise owner from abusing those rights.

An alternative is non-exclusive franchises. These franchises tend to provide the same basic rights, but they allow private sector competition and require a lower level of governmental regulation. The intention is to use competition rather than regulation to encourage innovation and limit the potential for exploitation of the public.

The advantage of the franchising contract mechanism is that the monopolies or near monopolies that are created help the private sector to deploy the infrastructure and to develop the market needed to support that infrastructure. The disadvantage of franchising is that monopolies can stunt technological innovation and economic efficiency. Once a monopoly has been established, there are no incentives for the

franchisee to operate competitively until an alternative technology creates competition outside of the monopoly (as in satellite TV challenging cable TV). Another disadvantage is that franchising necessitates governmental oversight, which requires time and money. Finally, the government must ensure that exit strategies and sunset provisions are built into the franchise agreements so that if the parties are not satisfied, the agreement can be efficiently terminated.

Auctions

The fourth is auctions, which are a method of selling public services (or the right to provide those services) through a competitive bidding process. They are often used as a way to select between potential franchise owners. Services can be auctioned to the private sector or to other public sector agencies.

The primary advantage of auctioning is that it can generate large quantities of revenue. However, revenue is only available for services that have large private sector revenue potential. Unfortunately, the revenue potential for ATIS services and infrastructure is uncertain at this time.

PRIVATE COMPANY TO PRIVATE COMPANY RELATIONSHIPS

The final category of ATIS business relationships comprises two types of private-sector led relationships.

Private Turnkey

With the private turnkey contracting mechanism, a private firm contracts with another private firm or public agency to design, build, and/or operate a system. An example of a private turnkey contract is a private

firm that develops digital maps by contracting the design work to another private firm. This mechanism is applicable to ATIS efforts that are highly private-sector oriented.

With this business relationship, revenue is produced from consumer purchases of competitively priced, privately produced goods. The public and private sectors may share responsibility for some aspects of the ATIS, but the government has no ownership rights and is not the service arranger.

The advantage of a private turnkey mechanism is that it allows private companies to purchase necessary systems and components from other, more knowledgeable firms. This helps speed implementation, and, if done correctly, should result in better system components.

Private Competition

The private competition arrangement leaves all aspects of deployment to occur within a competitive private sector environment. The government's role is simply to

enforce antitrust laws and to ensure that competition is sufficient to maintain market economics. Under the private competition arrangement, the public sector has no responsibility for owning, designing, building, operating, or maintaining the system. The private sector assumes all responsibilities for these functions and becomes the service arranger and producer. The consumer pays competitively established costs for the privately produced goods. An example of this contracting arrangement is the cellular telephone industry. The consumer buys a cellular phone at competitively set prices.

The advantage of private competition is that, in most cases, technological innovation and market efficiency are best fostered. The disadvantage of private competition is the lack of government control, which can lead to the formation of uncontrolled monopolies in the industry. In addition, too much competition in an uncertain market can lead to profit margins that are so low that innovation and system enhancements are delayed.

The ATIS Experience: 15 Metropolitan Areas

Metro Area or Corridor	Profile	Data Collection	Fusion	Dissemination	Contractual Relationships	Issues/Concerns Raised
Atlanta	Population of 3 million in the 13-county region	CCTV coverage on all freeways and 40 miles of arterials	NAVIGATOR system Transportation management and traveler information functions completely fused	CMS, HAR, cable TV, kiosks, traveler advisory telephone system; Internet pages, cable TV	Partnership includes GDOT, City of Atlanta, five counties, and MARTA	A common cause ensures cooperation across most barriers
Boston	Located in Suffolk County - Population 3.2 million	325 mobile cellular probes, 100 radio probes, 65 CCTV cameras, two aircraft	SmartRoute System's Windows and Internet Next Generation System (WINGS)	Phone, cellular, Internet map, and TV and radio stations	SmartRoute contract with MassHighway	SmartRoute has learned to understand the accountability of the public sector
Cincinnati-Northern Kentucky	Steadily growing urbanized population of about 1.8 million	ARTIMIS: 88 miles covered, CCTV. SmartRoute: slow-scan CCTV, aircraft surveillance, cell-phone probes, scanners, and UHF repeater network	Data fused by TRW and SmartRoute using TRW-developed software	ARTIMIS: CMS, HAR, Web page, kiosks. SmartRoute: TTIS, TV, radio, Web page, radio, and two TV stations	Core contract is between ODOT and the KYTC OKI (the MPO) is also a participant SmartRoute Systems, operates the control center under contract to TRW	Policy and Technical Committees comprising staff from major public sector players guide ARTIMIS efforts
Detroit	Population 5.2 million, with 8% growth projected	2,300 loops, 10 MVVDS, 60 ramp meters, 157 CCTV, 180 miles of freeway coverage Transit: AVL-equipped. Private: aircraft, roving probes	SmartRoute has been selected to run the Michigan ITS center in Detroit	VMS, 24-hour HAR, Web pages, SmartRoute ITS center	Michigan DOT selected SmartRoute to run the Michigan ITS Center - Public agreements between MDOT, Road Comm. for Oakland County, Univ. Michigan	The only area of private sector interest is exclusive rights to publicly collected data
Gary-Chicago-Milwaukee Corridor (GCM Corridor)	Population over 10 million	Data collected independently by multiple agencies in three states	At Corridor Transportation Information Center in Schaumburg, Ill.	Cable TV, kiosks, and personal communication devices	Illinois, Indiana, and Wisconsin DOTs in partnership with USDOT. A large number of local agencies and private firms participate in various forums.	Public ownership of traffic/transit management systems lends itself to initial public sector leadership
Houston	Population 4 million	160-mile freeway management system	Data fused at the TranStar Traffic Management Center	VMS, lane control signals, HAR, Web page, kiosks, PDAs, transit information, cell phone	TxDOT, Houston METRO, the City of Houston, and Harris County have coalesced to form TranStar	Integration of public transportation and emergency management allows pooling of resources
Minneapolis-St. Paul	Population 2.6 million	3,000 loops, 173 CCTV cameras, and 400 ramp meters	Raw data fused at the , MnDOT Traffic Management Center	Radio, traffic radio signs, VMS, cable/broadcast TV, Web page	Guidestar, Orion, and Trilogy include a total of 10 public agencies, and 10 private partners, as of October 1997	A number of operational field trials have contributed to the deployment of ATIS in Minnesota
New York/New Jersey/Connecticut	Population 19 million, highest population density in the U.S., over	TRANSMIT is determining the feasibility of using AVI for traffic monitoring and incident detection	TRANSCOM fuses data from the region's 14 member agencies	Alphanumeric pager system, phone, fax, VMS, HAR	14 public agencies are coordinated through TRANSCOM. Private partners are not fully determined at this time.	Focus is on coordinated implementation of ATIS throughout this complex, multi-jurisdictional area

As of October, 1997

Source: Proceedings of the Advanced Traveler Information Systems Business Models Workshop, October 6-8, 1997

The ATIS Experience: 15 Metropolitan Areas (cont.)

Metro Area or Corridor	Profile	Data Collection	Fusion	Dissemination	Contractual Relationships	Issues/Concerns Raised
Philadelphia	Population 6 million	30 remote controlled, CCTV cameras; mobile probes; cellular phone; radio monitoring; aircraft surveillance	Fusion at two public TMCs, plus the SmartRoute Systems Traveler Information Center	Phone, TV and radio traffic updates, kiosks, cable TV, pagers	SmartRoute is under a three-year contract with PennDOT	Connection with information lines at the transit authority, the Philadelphia International Airport, the Philadelphia Convention and Visitors Bureau, and AAA Mid-Atlantic
Phoenix	Population of 2.3 million	42-mile freeway coverage, 2,521 loops, 44 CCTV cameras, 36 call boxes, six passive acoustic detectors	Data fused at ADOT Traffic Operations Center	Overhead VMS, pagers, computers	5 public agencies and 14 private firms. Led by ADOT, Maricopa County with the primary private sector players being TRW and ETAK	AZTech's will be among the nation's first privatized traveler information systems
San Antonio	Population 1.3 million,	Loops and CCTV, 400,000 "traffic probes"	Data fused at the TransGuide computer network	TV, in-vehicle route guidance, kiosks, Internet, HAR, video teleconferencing	7 government agencies and 7 private partners, being led by TxDOT, VIA transit and the City of San Antonio	The City of San Antonio, TxDOT, and the FHWA are the driving forces for ATIS business plan deployment
San Francisco Bay Area	Population 6 million	CalTrans: CCTV, roving tow trucks equipped with AVL, aircraft surveillance. Transit route, schedule, and fare information	Data from the CalTrans / TravInfo Traveler Information Center	Web page, cable TV, kiosks, in-vehicle navigation; pagers	The MTC directs operations under a management board including CalTrans, CHP, and FHWA representatives. 50 private firms have registered to participate	Since TravInfo is an operational test, federal funding ceases in September 1997
Seattle Metropolitan Area	Population 3 million	WSDOT: CCTV, loops, ramp meters, and fiber optics. Transit: CAD, AVL, AVI	Data fused as part of ITS "Backbone" developed under SWIFT project, and implemented under Smart Trek	VMS, HAR, phone; cell phone; TV stations; Web traffic map, Riderlink Web page for transit; Microsoft's TrafficView	9 public agencies, and 16 private firms have signed an MOU or contract to participate in Smart Trek	Few coordination problems because the metropolitan area lies within one state under a single regional council
Southern California Priority Corridor	Combined population is about 15 million	Video detection, loops, infrared sensors, incident call boxes, vehicle probes, aerial surveillance	Integration from many separate TMCs	Web pages, transit information, highway reports, TTIS, VMS, HAR	Four coalitions representing CalTrans districts, cities, counties, MPOs, transit agencies, CHP, and air quality management districts	The size of the area covered requires extensive coordination among unusually large numbers of jurisdictions
Washington, DC	Combined population of about 6.8 million	Fiber optic backbones, cellular, coax cable, radio and POTS, CCTV, loops, wide-area radar, and aircraft	SmartRoute Traveler Information Center	Cable TV, personalized paging, in-vehicle devices, PDAs, kiosks, phone, Web page	Built by SmartRoute and Battelle. Operated by SmartRoute. Funding and/or letters of participation from 25 public agencies, and 12 private firms.	Council of Governments prioritizes capital projects over operations; as such, ITS is disadvantaged in regional planning

As of October, 1997

Source: Proceedings of the Advanced Traveler Information Systems Business Models Workshop, October 6-8, 1997

Table A-1: Potential Contracting Options

BUSINESS MODEL FAMILY	BUSINESS MODEL	DESCRIPTION	ARRANGER	PRODUCER	REQUIRES WILLINGNESS TO PAY	NATURE OF GOOD PROVIDED	PRICE TO END USER	PUBLIC SECTOR ROLE					PRIVATE SECTOR ROLE				
								Own	Design	Install	Operate	Maintain	Own	Design	Install	Operate	Maintain
PUBLIC AGENCY RELATIONSHIPS	Pure Public Provision	One or more public agencies owns the property and also designs, builds, operates, and maintains the system	Public Sector	Public Sector	Taxpayer	Public Good	Free / Low						m	m	m	m	m
	Interlocal Service Agreements	A (usually neighboring) jurisdiction provides service for another, often for a fee.	Public Sector	Public Sector	Taxpayer	Public Good	Free / Low						m	m	m	m	m
CONTRACTING FOR SERVICES	Contracting	Competitive procurement involving bids. Contracts may be structured around initial lowest cost, lowest lifecycle cost, or performance specifications.	Public Sector	Private Sector	Taxpayer	Public Good	Free / Low		w	w	w	w	m	w	w	w	w
	Public Turnkey	Public owner contracts for design, construction, and maintenance. May involve private financing with a limit on rates charged and allowable rate of return.	Public Sector	Private Sector	Taxpayer	Public Good	Competitive Price		m	m	w	w	m			w	w
	Public/Private Competition	A bidding process administered by a government agency that allows public and private sector entities to compete with one another to provide a product or service.	Public Sector	Public and/or Private	Taxpayer	Public Good	Competitive Price		w	w	w	w	m	w	w	w	w
INNOVATIVE PUBLIC PRIVATE PARTNERING	Functional Division of Responsibility	Cooperative arrangement among the public and private sectors in which the responsibilities are assigned according to functions, roles, or traditional responsibilities connected to ownership of property equipment, software, etc.	Public Sector	Public and Private	Consumer and Taxpayer	Mixed Public and Private	—	w	w	w	w	w	w	w	w	w	w
	Public/Private Consortium Under a Public Agency	A non-profit agency or corporation managed by a government board comprising representatives of the public and private sectors, both of which can contract for services.	Public Sector	Public and/or Private	Consumer and/or Taxpayer	Mixed Public and Private	Regulatory Competitive Pricing		w	w	w	w	m	w	w	w	w
	Cost Sharing	Any arrangement in which the public and private sectors share costs. May take the form of direct or indirect payments in money or in-kind service, and may apply to capital costs, operating costs, or both. Money can be raised from any source.	Public Sector	Public and/or Private	Consumer and/or Taxpayer	Mixed Public and Private	—	w	w	w	w	w	w	w	w	w	w
	- Direct Payment	Each unit of government agrees to pay a certain share of costs. Public sector payments may be generated through user fees, taxes, or public borrowing. Payment may also flow from the private to the public sectors.	Public Sector	Public and/or Private	Consumer and/or Taxpayer	Mixed Public and Private	—	w	w	w	w	w	w	w	w	w	w

| Yes, wPossible, m No, • Shared roles

Table A-1: Potential Contracting Options

BUSINESS MODEL FAMILY	BUSINESS MODEL	DESCRIPTION	ARRANGER	PRODUCER	REQUIRES WILLINGNESS TO PAY	NATURE OF GOOD PROVIDED	PRICE TO END USER	PUBLIC SECTOR ROLE					PRIVATE SECTOR ROLE					
								Own	Design	Install	Operate	Maintain	Own	Design	Install	Operate	Maintain	
	- Indirect Payment	Two major forms of public subsidization: (1) The public sector may provide vouchers to end users to make the service affordable to end users. (2) The public sector, foregoing tax revenue, may accord private firms favorable tax treatment.	Public Sector	Public and/or Private	Consumer and/or Taxpayer	Mixed Public and Private	—	W	W	W	W	W	W	W	W	W	W	W
	- In-kind Contribution	May flow in either direction: public-to-private or private-to-public, and may consist of non-monetary contributions of property, equipment, rights-of-way, staff time, or other resources.	Public Sector	Public and/or Private	Consumer and/or Taxpayer	Mixed Public and Private	—	W	W	W	W	W	W	W	W	W	W	W
	- Revenue Sharing	Rather than making an up-front contribution, the private sector agrees to contribute some portion of future revenues.	Public Sector	Public and/or Private	Consumer and/or Taxpayer	Mixed Public and Private	—	W	W	W	W	W	W	W	W	W	W	W
	- Cession of Future Property Rights	Government may cede rights to something of value that will be produced as a result of deployment, such as the intellectual property rights to communications software.	Public Sector	Public and/or Private	Consumer and/or Taxpayer	Mixed Public and Private	—	W	W	W	W	W	W	W	W	W	W	W
JOINT OWNERSHIP	Joint Ownership	Any arrangement that involves the public and private sectors sharing the responsibility and benefits of ownership. Joint ownership (JO) may entail legal partnerships and/or for-profit or nonprofit organizations.	Shared Public/Private	Public and /or Private	Consumer and/or Taxpayer	Mixed Public and Private	—	•	W	W	W	W	•	W	W	W	W	
	Competitive Joint Venture	An innovative arrangement in which there is joint ownership of facilities, but competitive provision of output. The facility may be co-owned by any combination of public-public, public-private, private-private parties.	Public/Private	Public and /or Private	Consumer	Mixed Public and Private	Competitive Price	W	W	W	W	W	W	W	W	W	W	W
TRANSFERAL OF PUBLIC RESPONSIBILITY TO THE PRIVATE SECTOR	Licensing	Permission is granted by government to conduct business or perform a certain activity that would otherwise be illegal. Licensing, as opposed to leasing, does not grant the right to occupy public property.	Public Sector	Private	Consumer	Public and/or Private	Regulatory Competitive Pricing		W	W	W	W	m	W	W	W	W	
	Leasing	The sale or franchise of the right to use a piece of property. May produce a revenue stream from which both public and private sector entities can benefit.	Public Sector	Private	Consumer	Public and/or Private	Regulatory Competitive Pricing		W	W	W	W	m	W	W	W	W	

| Yes, wPossible, m No, • Shared roles

Table A-1: Potential Contracting Options

BUSINESS MODEL FAMILY	BUSINESS MODEL	DESCRIPTION	ARRANGER	PRODUCER	REQUIRES WILLINGNESS TO PAY	NATURE OF GOOD PROVIDED	PRICE TO END USER	PUBLIC SECTOR ROLE					PRIVATE SECTOR ROLE				
								Con	Design	Build	Operate	Maintain	Con	Design	Build	Operate	Maintain
	Franchising (Exclusive or Non-exclusive)	The granting by government to a private party of a special privilege denied as a common right to all citizens in order to make use of a public property to achieve benefits for all citizens. Franchises usually have monopoly rights.	Public Sector	Private	Consumer	Public and/or Private	Regulatory Pricing	w	w	m	m	m	w	w	l	l	l
	Auction	The public sector sells the rights to provide a service at an auction. Bidders are generally private firms, but they could also be public agencies.	Public Sector	Private	Consumer	Public and/or Private	-	m	w	w	w	w	l	w	w	w	w
PRIVATE BUSINESS RELATIONSHIPS	Private Turnkey	A private firm contracts with another private firm or public agency to design, build, and operate the system.	Private Sector	Public or Private	Consumer	Public and/or Private	Competitive Price	m	w	w	w	w	l	w	w	w	w
	Private Competition	Provision of a system, product, or service through private market competition.	Private Sector	Private Sector	Consumer	Private	Competitive Price	m	m	m	m	m	l	l	l	l	l

l Yes, wPossible, m No, • Shared roles