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**Transportation Asset Management: A Vehicle For Mainstreaming ITS?**

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## **Transportation Asset Management: A Vehicle For Mainstreaming ITS?**

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### **ABSTRACT**

This paper examines the use of transportation asset management (TAM) as a mechanism for “mainstreaming” intelligent transportation systems (ITS) into the transportation decision-making process. TAM is an emerging set of tools and techniques that comprise “... a comprehensive and structured approach to the long-term management of assets as tools for the efficient and effective delivery of community benefits” (1). Support for TAM as a guiding approach for managing publicly owned transportation facilities such as highway and transit systems has been increasing, although it is still in its early stages.

ITS is an emergent set of transportation “user services” that are enabled by the deployment and integration of advanced computing and communication technologies. A central concern of the ITS community has been how to incorporate or “mainstream” ITS into decisions about transportation investments. The traditional decision-making process is largely oriented towards large-scale investment projects, like highway expansions, bridges and transit systems, and is arguably ill suited for evaluating ITS investments.

Recent regulatory proposals have sought to modify the traditional planning process as a mechanism for mainstreaming ITS. This paper examines an alternative, which is to utilize the growing adoption of TAM by state departments of transportation as the springboard for mainstreaming.

### **INTRODUCTION**

A major challenge to the success of ITS is how it is to be “mainstreamed” (i.e., integrated) into overall transportation decision making. This paper proposes, for three reasons, that the use of a concept known as Transportation Assets Management (TAM) may be appropriate for meeting this challenge. First, TAM and ITS appear to be quite compatible initiatives. Second, TAM-ITS integration appears to offer significant benefits. And third, both TAM and ITS are relatively new initiatives, with institutional structures that are not yet fully fixed and are therefore capable of adapting to take advantage of each other.

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The paper begins with a background to the relevance of mainstreaming ITS. An introduction to TAM follows. It then examines the “fit” between TAM and ITS mainstreaming. The next section addresses caveats. Concluding remarks follow.

## **BACKGROUND**

A number of developments, including great advances in computer and communications technologies, increased concerns of environmental damages caused by transportation systems, and reduced urban travel mobility have, over the past decade, contributed to an explosive growth in new ITS technologies and applications. In retrospect, this decade may be described as the experimental phase of ITS.

More recently, however, the focus on ITS has shifted towards the challenge of deploying these technologies, propelling ITS into a second phase of development. A key challenge of this phase is the institutional challenges that arise as a result of attempts to deploy ITS.

ITS technologies and applications do not operate in isolation, but rather, as part of the overall transportation system. To have full effect, ITS technologies and applications must therefore be given consideration as part of overall transportation planning and operations practices. A core challenge facing the transportation community, as part of this phase, is therefore how to best “mainstream” (integrate) ITS into these practices.

## **THE CHALLENGE OF MAINSTREAMING ITS**

Perhaps the most significant challenge of mainstreaming ITS derives from the fact that the deployment of ITS puts numerous new demands on traditional transportation planning and operations practices. Traditionally, transportation services have been provided through a rather stable framework characterized by slow technological change, well-defined organizational and jurisdictional responsibilities, and long-term planning horizons (2). In addition, the traditional framework has also relied heavily on engineering principles for solving transportation problems. In principle, these contend that the answer to transportation problems is the provision of more infrastructure (i.e., a supply driven approach) (3).

The characteristics of ITS, however, are entirely different from those of traditional planning and operations practices. ITS is characterized by short technological life cycles, and a heavy dependency on cross-organizational and cross-jurisdictional cooperation (the latter is primarily a result of the great economies that may be achieved from integrating ITS technologies over multiple jurisdictions, and the extensive involvement by the private sector in the area of ITS). In addition, many ITS technologies serve purposes of traffic management and are therefore focused on operations and management, in contrast to traditional engineering-based practices emphasizing the construction or reconstruction of facilities. Considering these differences, the main challenge of mainstreaming ITS may be defined as that of finding a mechanism that is capable of integrating the new demands put forward by ITS with those of transportation planning and operations practices.

## **Meeting the Challenge**

Essentially, two different options are available for integrating the new demands put forward by ITS with transportation planning and operations practices. The first is to find

a mechanism that allows the “bridging” between ITS and *traditional* practices without significantly altering the latter. Due to the stark differences between the two, however, this option appears highly problematic. A more promising option may instead be to capitalize on current administrative reform trends that are currently emerging in government settings. Administrative reform trends have given rise to a number of re-engineering efforts that have been driven by demands similar to those needed for the deployment of ITS. The deployment of ITS requires a planning and operations framework that (a) facilitates the use of new technologies; (b) invites cross jurisdictional and cross organizational cooperation; (c) is focused on operations and management; and (d) recognizes the value of flexible planning. Current administrative reform trends are characterized by at least the first three of these (4-6). A more feasible approach for mainstreaming ITS may therefore be to identify current re-engineering efforts occurring in the transportation community and examine if these may provide opportunities for mainstreaming ITS.

## **MAINSTREAMING ITS THROUGH TRANSPORTATION ASSET MANAGEMENT**

The remainder of the paper examines one possible re-engineering effort for mainstreaming ITS - Transportation Asset Management (TAM). TAM represents a major initiative in the U.S. transportation community, which if proven successful is likely to serve as a norm for overall state transportation planning and operations practices in the U.S. The section is divided into two parts. The first part introduces TAM, and the second part provides an introductory assessment to whether TAM may serve as an appropriate vehicle for mainstreaming ITS.

### **Transportation Asset Management (TAM)**

TAM is an approach to the management of transportation facilities and services that has generated considerable attention in the last decade. The term has been interpreted broadly. In some instances, TAM is primarily seen to be largely an information systems problem of how to integrate various new and existing systems for maximizing the physical performance of capital assets, such as pavement management systems, bridge management systems, maintenance management systems, and so forth.

A more ambitious view of asset management is that it is a set of techniques and approaches for integrating decision making using financial and economic analysis tools widely used in private sector companies. The latter view often represents a more complete view of asset management. In addition to maximizing the physical performance of capital assets, it also incorporates considerations of the operational performance of capital assets. The authors tend towards the latter view, although what TAM will turn out exactly to be is still an open question in the U.S. Currently, the main focus of TAM in the U.S. appears to be on the physical aspects of capital assets, as a growing number of states and municipalities are developing or expanding their infrastructure inventory systems. As will be discussed below, this is important for its utility as an ITS mainstreaming vehicle. Good examples of infrastructure inventory systems under development include:

- Virginia Department of Transportation's (VDOT) development of an Inventory and Condition Assessment System (ICAS). This ICAS is intended to provide inventory and condition information for all of VDOT's infrastructure capital asset groups (e.g., bridges, pavements, traffic items, drainage, roadsides, and special facilities). When developed, it will serve as a facilitator for the integration of VDOT's pre-existing Pavement and Bridge Management Systems (currently, ICAS is being developed as a pilot project in Fauquier County, and will be followed by additional developments in Fairfax and Augusta Counties).
- The city of Hopkins', Minnesota, implementation and use of GASB's Statement No. 34 as a source of information for managing its roads (7). GASB's Statement No. 34 was adopted in 1999 and requires transportation agencies to establish an inventory of their existing infrastructure facilities, based on generally accepted accounting principles (GAAP). Currently, the City of Hopkins's inventory is limited to data on its pavement, but steps are to reach a more complete inventory on road assets that includes alleyways, sidewalks, and street signs.
- The City of Indianapolis', Indiana, efforts to develop *infrastructure balance sheets* and *infrastructure income statements* to be used for managing infrastructures assets (8). These efforts are closely related to the requirements set out by GASB's Statement No. 34. The city is also taking efforts, in cooperation with Purdue University, to include the benefit side of infrastructure allocation decisions in the above infrastructure financial statements.

Interest in TAM has its roots in numerous efforts, both within and outside the U.S., growing out of three major developments (1). The first is changes in the transportation environment. Over the past decade, transportation agencies have been faced with budgetary cutbacks at the same time as travel demands have increased. As a result transportation agencies are being forced to do more with less. (For a good discussion on these issues, see (2).)

The second development is a shift in the public's attitude towards public service provision. A number of surveys have indicated significantly decreased public confidence in the ability of public agencies to efficiently maintain and allocate public resources (2). If public agencies are to regain this confidence it is necessary to develop effective tools for communicating performance.

And finally, extraordinary advances in communication and computer technologies have provided new opportunities for more effectively evaluating the quality and the cost effectiveness by which public services are provided (TAM represents one such prospective tool).

At this time, the most advanced TAM efforts have been realized in Australia and the U.K., where TAM and other efforts to improve the way governments do "business" have been massive. Significant efforts have also emerged in many European countries, as well as in the Canadian provinces. In the U.S. transportation community, however, TAM efforts are still only in their infancy. This paper is primarily concerned with the mainstreaming of ITS in the U.S., so the remaining description of TAM focuses on the U.S.

## U.S. Transportation Asset Management (TAM)

In the U.S. TAM efforts are primarily driven by the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA) (the latter recently instituted an Office of Asset Management). These two bodies have both separately and jointly instituted a number of efforts to advance TAM in the U.S. These include three workshops dedicated to the discussion of TAM (9-11), a scanning tour to learn from national and international experiences (12); and the creation of an Asset Management task force (created by AASHTO) composed of nine experts drawn from 9 state DOTs (1). AASHTO has taken a leading position as a coordinator for the advancement of TAM. FHWA aims to provide technical assistance, research and development, and training the states as they implement asset management practices through its Office of Asset Management (13).

The most significant advancement of TAM in the U.S. is expected to occur in the beginning of 2001 when a U.S. TAM manual is expected to be released. This manual is funded by AASHTO and is currently being developed by an external contractor in close connection with AASHTO (14). When released, this manual is expected to provide the U.S. transportation community with a generic set of principles (these principles will hereon forth be referred to as a “TAM architecture”) to guide the individual development of State TAM Systems.

Already at this time, however, it is possible to surmise at least one set of prospective TAM principles by reviewing (1) previous TAM experiences, (2) preferences expressed by key players in the development of the TAM architecture; and (3) the potential uses of commercial financial accounting information in TAM. These three sources of information provide strong indications that what may be referred to as “Enterprise Based” Financial Accounting practices are likely to be a significant influence in the design of a prospective TAM architecture. Support for this claim is provided below.

### **Previous TAM Experiences**

Both public and private sector experience with prior implementations of TAM has relied heavily on enterprise-based financial accounting practices. In the public sector, a good example is Australia, which as indicated earlier, is one of the countries that has come the furthest in its TAM efforts. In Australia, TAM emerged out of a nationwide financial accounting reform that culminated in 1993, with the release of two Australian accounting standards: Australian Accounting Standard 27 - Financial Reporting for Local Governments (AAS 27), and Australian Accounting Standard AAS 29 - Financial Reporting for Government Departments. These standards represented a significant move towards the adoption enterprise-based financial accounting practices by Australian governments.

AAS 27 and AAS 29 significantly extended the perceived use of public financial accounting information in public management. Traditionally, the use of governmental financial accounting information had been viewed useful only in its capacity to prevent financial abuse and to assure that appropriated financial resources had been spent in accordance with their assigned purposes (i.e., regulatory and budgetary compliance) (4). With the adoption of enterprise-based financial reporting models, however, governmental financial accounting information was also viewed useful as a means to enhance the productivity, cost effectiveness and quality of public services (15).

The perceived public management benefits that arose from AAS27 and AAS29 were made explicit in the development of a TAM manual, which was released as soon as the new accounting standards had been proposed (16,17). The development of this manual was lead by the Institute of Public Works Engineering Australia (IPWEA). IPWEA released this manual was released in 1995 and it relies heavily on the information made available by enterprise-based financial accounting reports (17).

A second example of a country that capitalizes heavily on the information provided through external financial reports, as a means of improving asset management is the U.K. In the U.K., asset management of public resources has been utilized since the mid 1980's. The major driver behind its implementation was Prime Minister Thatcher's aggressive cutbacks in the public sector. These cutbacks provided a justification for drastic changes in the public sector, and thus an opportunity to implement asset management systems. Similar to Australia, the development of asset management efforts in the U.K. occurred in conjunction with a reform of governmental accounting practices.

The importance of enterprise-based financial accounting practices in asset management is further underscored by their widespread use in the private sector, where financial accounting data has a long track record of being used in matters of performance evaluation, finance, investment analysis, and for organizational control.

#### **Preferences of Key Players in the Development of the TAM Architecture**

AASHTO and FHWA, key players in the development of the U.S. TAM "architecture," have also shown a great interest in the use of enterprise based financial accounting practices in TAM. This interest derives from the recent adoption by the Governmental Accounting Standards Board (GASB) of GASB Concept Statement 34 (GASB 34) (1,18,19).

GASB Statement No. 34 requires U.S. transportation agencies to adopt new rules ("recommendations") for the financial reporting of infrastructure capital assets (19). Traditionally, these assets have been reported at the discretion of the individual transportation or government agency. More specifically, the new rules requires transportation agencies to:

- Establish an inventory of their existing infrastructure facilities;
- Assign values to the facilities that make up this inventory, based on historical or estimated historical cost; and
- Assign yearly depreciation charges to these values.

In lieu of assigning depreciation charges based on historical costs, the agency may elect to report their infrastructure assets using a "modified approach." To be eligible for this approach agencies need to adopt an asset management system that is capable of documenting and providing information on the estimated annual amounts needed to maintain and preserve its infrastructure assets at or above a prescribed level (18).

In many respects, GASB Statement No. 34 is very similar to the financial accounting reforms that occurred in Australia and the U.K. That is, it represents a shift towards enterprise based financial accounting practices. FHWA and AASHTO interest in GASB Statement No. 34 may therefore, similar to the U.K. and the Australian case, be attributed

to the potential held by enterprise based financial accounting practices to provide for information that improves public management (and accountability).

### **Descriptions of TAM**

While quite diverse, most descriptions of TAM also suggest that enterprise-based financial accounting will be an important element of the U.S. TAM architecture. Table 1 illustrates that financial accounting information may fulfill 8 identified requirements of TAM, in at least some capacity (these requirements and objectives have been derived from an analysis of 15 different descriptions of TAM).

The first requirement in Table 1 – that a prospective TAM ought to be operations and management oriented – has been regarded as one of the most important requirements, despite the fact that current U.S. TAM efforts appear to primarily be focused on the physical aspects of transportation assets. Nevertheless, emphasis on operations and management is particularly relevant in the U.S. due to the near completion of the construction of the interstate highway system, which is shifting state and federal highway agencies’ attention from construction to preservation and operation (20).

The relevance of operations and management in TAM is further underscored by a number of developments that have made the traditional approach to solving transportation problems (i.e., increase the supply of transportation facilities) a less attractive option. These developments include increased resistance to the expansion of the current infrastructure system for environmental reasons; increased land costs, due to the past two decades significant urban and suburbanization trends, which have contributed to problems of “sprawl” (urban periphery development); and reduced public funding.

Enterprise-based financial accounting practices have been considered to facilitate management and operation of transportation facilities through their ability to provide information relevant for measuring performance, and as a tool that facilitates “management by results” (15).

The second requirement presented in Table 1 relates to the recognition that great synergies may be achieved between different but related information systems (e.g., bridge and pavement management systems) when the planning and operations of transportation assets are carried out at an enterprise wide level (systems supporting this approach are often referred to as enterprise based systems (for a description, see (21))). The enterprise-based financial accounting system facilitates such an approach, by providing standardized information across functional boundaries.

The third, fourth and fifth requirements in Table 1 relate to the emphasis put on cost analysis in TAM. An enterprise-based financial accounting system facilitates cost analysis across time, across products and services, and of particular products and services. It does so by (a) providing standardized financial cost information (allows cost analysis across products/services); and (b) by utilizing the concept of “going concern” (i.e., operations are assumed to go on indefinitely); and (c) by providing information at various levels of aggregation, including the product level (allows cost analysis of a particular product/service).

The sixth requirement – that a prospective TAM ought to be customer oriented – derives from the more general trend that the provision of public services has not been responsive

enough to changes in customer demands. In the context of transportation services enterprise-based financial accounting information may partially provide information relevant for assessing an appropriate level of customer responsiveness, through its ability to provide cost information to customer driven/sensitive benefit-cost analyses.

The seventh requirement – that TAM ought to be interdisciplinary – relates to the recognition that many of the problems facing transportation systems are more complex than what may be reflected by a framework of a single discipline. Enterprise-based financial accounting practices may be integrated with at least one other discipline, economics. A case in point is benefit-cost analysis in which financial accounting information may be used to complement economic principles, both on the cost and the benefit side.

The final requirement, that TAM should generate easily understandable information is important due to the wide variety of groups that are involved in the construction, operations, and management of transportation facilities (e.g., public and private managers and financiers, the citizenry, and oversight bodies). Enterprise-based financial accounting practices fulfill this requirement, due the large availability of financial reports that attempts to serve the needs not only of financial and accounting professionals, but also those of laymen.

### **Is Transportation Asset Management an Appropriate Vehicle for Mainstreaming ITS?**

Having introduced TAM, the core task of the paper still remains: To assess whether TAM may serve as a vehicle for mainstreaming ITS? This assessment is obviously contingent upon on a variety of factors. Three of the most important, however, are (1) the compatibility of ITS and TAM; (2) the prospective benefits of their integration; and (3) their relative adaptability. A preliminary assessment of these factors is provided below.

#### ITS and TAM Compatibility

The fact that the U.S. has yet to lock in on a generally accepted TAM architecture obviously prevents a complete examination of this issue. However, an initial assessment is possible using knowledge of the role played by enterprise-based financial accounting practices in a prospective TAM architecture. The previous section suggested that this role is likely to become significant. An initial assessment of the potential “fit” between ITS and TAM may therefore be obtained by exploring how the uses of enterprise-based financial accounting information may also serve the requirements for deploying ITS.

As was indicated earlier in the paper, the primary requirements of mainstreaming ITS are met by a framework that (a) facilitates the use of new technologies; (b) focuses on operations and management; (c) invites cross jurisdictional and cross organizational cooperation; and (d) recognizes the value of flexible planning. The use of enterprise-based financial accounting practices may in some capacity serve at least (b) and (c).

Of these two requirements, (b) is by far the most important. After all, operations and management of existing transportation infrastructure is one of the core contributions of ITS. It is also the timeliest requirement due to the earlier indicated shift in ITS programmatic efforts from experimentation to deployment.

The primary contribution of an enterprise-based financial accounting system for issues related to operation and management is gained through its ability to systematically provide cost information for particular ITS investments. This information is essential in assessing the value that may be attributed to funds dedicated to ITS investments. As was illustrated in Table 1, an enterprise-based financial accounting system allows for cost analysis across time, across products/services, and of particular products/services. Accurate cost information for a particular investment is *not sufficient* for assessing the value that may be attributed to funds dedicated to ITS. However, it is still *necessary* for an assessment to be made, due to the fact that costs needs to be related to measures of outcomes or outputs

While issues of operations and management are critical in mainstreaming ITS, the third requirement (c) mentioned above is also of importance. As indicated earlier, the development of ITS technologies and applications has primarily occurred in the private sector. Furthermore, operations for a significant share of these are being contracted out to the private sector. Since assessments of the cost and benefits attributed to a particular ITS investment operated by a private firm are not easily separated from those elements of the transportation facility that are operated by public agencies, a mechanism for collaborative evaluation is necessary. The adoption of enterprise-based financial accounting practices among public transportation agencies is likely to facilitate this type of collaboration, by providing more transparent cost information between the public and the private sector.

An additional contribution of an enterprise-based financial accounting system that relates to issues of operation and management is derived from the *enhanced* uniformity that may be achieved across entities at an industry-wide level with regards to cost information, once GASB 34 has been implemented. GASB 34 does not require consistency from enterprise to enterprise, although it does require a single enterprise to report consistently over time. Nonetheless, GASB 34 is likely to increase the comparability across units from current practice. Such uniformity is important for several reasons, most importantly is that it is likely to facilitate the use of benchmarking for ITS investments. Benchmarking enables the performance of public entities to be evaluated not only in relation regards to previous years' performance, but also in relation to their neighboring public entities.

#### Prospective Benefits of Integrating ITS and TAM

At least three benefits may be identified that are likely to provide significant incentives for integrating TAM and ITS. The first benefit derives from the fact that prospective TAM systems are likely to be “data hungry.” After all, TAM is ultimately about providing relevant information to serve a number of different groups to assess the contribution of funds spent on transportation infrastructure. Examples are information relevant for serving the public works manager in making monetary allocation decisions between various transportation projects/investments, or information made available to the citizenry or various oversight bodies as a means of assuring accountability. In either case, however, data needs to be collected to support these ends. ITS may serve TAM in this regard through its strong data collecting and storing capabilities.

The second benefit concerns a need that has arisen out of the shift in ITS efforts towards deployment: the need to be good “stewards” of ITS investments, or more specifically, to

assure that ITS investments are being utilized at full capacity. As has been emphasized throughout the paper, ITS does not operate in isolation, but rather, is part of the overall transportation system. A prerequisite for achieving the best returns on ITS investments is that they are given fair consideration as a part of overall transportation investment decisions. TAM's capabilities for integration and decision support may help satisfy this need.

A final benefit derives from the recent completion of the interstate highway system. As indicated earlier, this has been a major factor in the shift of focus occurring in the U.S. transportation community from construction to operations and management. As, illustrated in Table 1, sensitivity to this shift is being emphasized in a prospective U.S. TAM (represented by the operations requirement). ITS has introduced a suite of technologies that provide powerful tools for improving operations, and may therefore be regarded as a potential tool for satisfying the requirements of TAM.

### Adaptability

The final factor that ought to influence the prospective success of an integration of ITS into TAM is the degree to which the respective institutional structures of ITS and TAM are capable of evolving together. The appropriate institutional structure for both ITS and TAM are still evolving. Significant opportunities may therefore exist to develop U.S. TAM and ITS in a way that is consonant with their mutual implementation.

### **CAVEATS**

Having provided an introductory assessment of the uses of TAM in mainstreaming ITS, at least two qualifications should be made. First, the paper has put heavy emphasis on the importance of evaluating various ITS technologies and applications, but little has been said about the difficulties of providing accurate benefit estimates of ITS investment. These difficulties are immense in the area of ITS (for a discussion of these, see (22)). And second, this paper assumes that enterprise based financial accounting practices are transferable to the public sector. This issue is still a matter of debate that needs further investigation.

### **CONCLUSIONS**

This paper has provided an introductory assessment of the potential use of TAM as a vehicle for mainstreaming ITS. Three important factors were considered. First was the compatibility of ITS and TAM. The paper illustrated that ITS and TAM were compatible in two important respects – (a) through their mutual focus on operations and management (this is true for a fully developed TAM architecture), and (b) on their respective dependency on cross jurisdictional and cross organizational cooperation. The second factor considered was the mutual reinforcing benefits that result from ITS-TAM integration. The following three benefits were identified in the paper:

- The potential promise of using the strong data collecting and storing capabilities of ITS for serving the often “data hungry” TAM systems

- The ability of TAM to assure that ITS investments are being utilized at full capacity, due to the strong integration and decision support capabilities of TAM; and
- The potential provided of using ITS as a means to “boost” the operations aspects of TAM, by use of its many and powerful tools provided for improving operations.

All of the above factors does in some capacity support the argument that TAM may be an appropriate vehicle for mainstreaming ITS. However, the relative youth of TAM prevents a more complete examination of this issue. Nevertheless, the paper has focused attention to two concepts that are evolving simultaneously and where great opportunities and synergies may be derived from integration. In light of current regulatory efforts to modify the planning process to include rapidly evolving ITS technologies and services in the traditional 20-year planning horizon, TAM would appear to be a much more suitable approach.

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## FIGURES

**Table 1:** *The Potential Uses of Financial Accounting Information in TAM*

Requirements	Objective	Capacity of usefulness
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**Table 1:** *The Potential Uses of Financial Accounting Information in TAM*

<b>Requirements</b>	<b>Objective</b>	<b>Capacity of usefulness</b>
1. Operations and management oriented	Maximize utility of existing infrastructure investments	Enables management by result and performance evaluation, through its Bottom-line focus and use of financial statement ratios (both relevant from a operations and management perspective)
2. Enterprise-Wide	Capitalize on synergies between different information systems (e.g., bridge and pavement management systems)	Provides standardized information across organizational boundaries
3. Cost-effectiveness focus	Minimize wasteful services	Provides standardized cost information across products and services
4. Cost-efficiency focus	Minimize wasteful operations in the provision of a service	Provides cost information on individual operations
5. Considers allocative efficiency across time	To fairly account for the cost bore by current generations	Utilizes “going concern” and accounts for capital depreciation (a key component of accrual accounting)
6. Customer oriented	Become in tune with the demands of the citizenry	Provides financially verifiable cost information for use in [customer driven] C/B-analyses
7. Interdisciplinary	Capitalize on knowledge from a multiple of disciplines	Allows joint usage of accounting and economics through C/B-analysis
8. Understandable	Effective tool of communication to support information requirements from a variety of groups (e.g., various types of public managers, the citizenry, etc)	Surrounded by a well developed/recognized set of user-friendly interfaces