

# **Transportation Asset Management Today: An Evaluation of an Emerging Virtual Community of Practice**

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## **ABSTRACT**

Asset management is defined by the Federal Highway Administration (FHWA) as “a systematic process of maintaining, upgrading, and operating physical assets cost effectively.” As an emerging discipline, asset management means different things to different practitioners, and its practice continues to evolve as researchers develop guides, states implement specific components, and all units of government work to define what asset management means to them.

Recognizing that communication is a key element as different stakeholders tailor asset management to the needs of their organization, the American Association of State Highway and Transportation Officials (AASHTO) and the FHWA have developed a virtual community of practice (COP) via a Web site that facilitates communication among the different stakeholder groups.

The COP itself is a self-defined group of practitioners with an interest in transportation asset management. The Web site provides access to related links and a calendar of events, while individuals can register for topics that match their personal interests, view reference materials and post their thoughts on discussion boards. The site was launched in early 2002, but was not

publicized until late 2002. As of May 2003, the community of practice includes over 250 registered individuals.

This paper evaluates the elements of transportation asset management that make the creation of an Internet COP an appropriate method for advancing its education and practice. In addition, this paper gives an overview of the history, structure and content of the Web site, and offers a preliminary evaluation based on site usage and other observations.

**Key words: asset management—community of practice—internet infrastructure management**

## INTRODUCTION

Asset management is an emerging discipline among those who manage our country's substantial transportation system (1,2). This systematic approach to maintaining system infrastructure and monitoring its performance over time offers a new way of doing business for most transportation agencies, one that promises more efficiency and better accountability to the public.

The American Association of State Highway and Transportation Officials (AASHTO) has taken a leading role in promoting the practice of asset management, and a key part of their efforts is occurring via the Internet. With the support of the Federal Highway Administration (FHWA) and the cooperation of the Transportation Research Board (TRB), AASHTO has created *Transportation Asset Management Today*, a "community of practice" web site that allows anyone in the transportation industry to access asset management reference materials and interact with other professionals about its practice (3).

The first section of this paper will explain asset management from a transportation perspective, and provide a brief look at where its practice now stands. Next, the paper will describe AASHTO's Internet efforts for promoting asset management practice and education, reviewing the initiative to create a site, how the site has been structured, and some of the site's history up to this point.

## ASSET MANAGEMENT IN TRANSPORTATION

As it applies to the transportation industry, asset management is more of an overarching strategy than a set group of well-understood tactics. While there is a general understanding of the goals and theory of transportation asset management, there is no absolute definition of what its practice entails. Put more clearly, asset management can mean different things for different people.

One useful "working definition" has been created by the FHWA. Asset management is "a systematic process of maintaining, upgrading and operating physical assets cost effectively. It combines engineering principles with sound business practices and economic theory, and it provides the tools necessary to facilitate a more organized, logical approach to decision-making." (4)

In reviewing this definition, two things become evident. First is the central idea that by logically and efficiently investing in transportation infrastructure such as roads, bridges, and tunnels, a public agency can more cost effectively operate its assets. Second, for asset management to be effective in practice, a multidisciplinary approach is required that integrates such disciplines as engineering, economics and business. This facet of asset management is an especially important factor for AASHTO's Internet efforts, as will be discussed later.

As an agency approaches the practice of asset management, these goals of cost-effectiveness, efficiency and public accountability will be at the forefront. But as noted above, a number of different strategies can be used to those ends. Some agency activities that would fall under the banner of asset management are listed below, and even within these strategies are a variety of different approaches:

- Creating and consistently updating an inventory of assets operated by the agency, including some measures of condition, use and performance.

- Changing methods of asset valuation to recognize user costs and benefits.
- Fully reporting agency inventory and expenditure decisions.
- Implementing maintenance and capital improvement activities based on evaluation of user costs and benefits, optimization of investments, and/or maintaining a certain level of overall system performance.
- Building an overarching system that allows the comparison of investments across different asset groups.

No matter which actions are undertaken, the reasons why transportation agencies are now approaching asset management are clear. Asset management's growth as a discipline can be seen as the outcome of a larger shift in the transportation field — from creating the transportation system to managing it. This is especially true in for highways, where the network has been built out at a great public cost, new construction is exceedingly rare, and many segments of the existing system need upgrading and repair. Additional reasons for the growth in importance of asset management include greater public demands for government accountability and the developing capabilities of computer systems (5).

## **PRACTICE**

While its need has become apparent, the practice of asset management has lagged behind its theory. Truly, part of the reason for a lack of clarity about the definition of asset management is that its application and benefits are still primarily theoretical.

A number of institutions and agencies — such as the FHWA, AASHTO, TRB, and the American Public Works Association (APWA) — have produced written reference materials and research reports on transportation asset management (4, 5, 6, 7, 8). However, these are generally an introduction to its concepts rather than an instructions manual or step-by-step implementation plan. And while these federal and membership organizations have lead the way in asset management awareness, the ultimate implementation of asset management principles falls to the state and local governments that actually manage the transportation infrastructure.

In this regard, asset management is in its infancy. Leading states have explored and implemented asset management initiatives, most often beginning by creating better inventories and collecting data. But excepting a few cases these efforts are not formalized or mandated by legislation, and actual results are often not yet publicly available (9). This lack of formal, documented asset management practice can be seen as a barrier to the wider adoption of asset management principles. Not only do state and local agencies not have specific asset management blueprints to follow, even examples and case studies can be difficult to come by.

This is not the only obstacle to a wider practice of asset management. Because an effective implementation of asset management could require a major change in institutional philosophy, and the true benefits will be seen over the long term, the advancement of its practice could often depend on the long-term mindset of key political and transportation agency leaders. In the transportation field, where each state and local agency deals with a set of similar but geographically separate issues, drives their own policies and procedures, and do not necessarily seek advice from outside their region, it seems that asset management will advance incrementally,

as agencies take time to discover its benefits in their own environments.

## **TRANSPORTATION ASSET MANAGEMENT TODAY**

The most persistent advocates of transportation asset management in the U.S. have been federal agencies such as the FHWA and national membership organizations such as AASHTO. Through conferences, meetings and educational outreach programs, these organizations have attempted to answer many of the existing questions about asset management, and explain the benefits of applying its principles in state and local environments (10).

A major challenge in educational outreach is the lack of educational materials. Because asset management is an emerging field, much of the knowledge that does exist about its practice is still developing and has yet to be codified. When combined with the challenge inherent in the nature of asset management — that it is hardly a one-size-fits-all proposition and requires knowledge from a variety of disciplines — there is a particular need for innovative outreach approaches.

Recognizing these particular challenges, AASHTO — along with FHWA and TRB — created Transportation Asset Management Today, an Internet site that offers an electronic library of reference materials on asset management and provides a “virtual” space where interested transportation professionals can interact on a peer-to-peer level. This not only allows individuals to access the most recent publications, research and case studies, but to also take their own individual experiences — the tacit “knowledge” that will never be written in a book — and share them with people throughout the field of transportation. Together, the hope is that professionals in the transportation field can use the site to help advance the state of the practice and begin establishing the “common language” of transportation asset management.

## **SITE INITIATIVE**

The initiative to create the site was that of AASHTO’s Task Force on Transportation Asset Management, a committee created in 1997 to guide the association’s efforts in asset management and create an official “asset management guide” for the association (11). Along with help from the FHWA and TRB’s Task Force on Asset Management, members of AASHTO’s Task Force built an initiative to provide a central Internet location for their outreach efforts, but in a way that was interactive and recognized the particular challenge of asset management.

Participation by the FHWA was key to this decision. This is because, for a number of years, the FHWA had been developing its “knowledge management” initiative, a group of Internet communities that provide a mechanism for communication and shared learning between its employees and the many other members of the transportation community. This effort has included internal, password-protected sites for FHWA employees as well as external “knowledge” sites built around topics such as highway safety and environmental requirements. These FHWA sites were built to tackle many of the same challenges faced by those hoping to provide education on asset management; namely, how to educate a dispersed population of transportation professionals on issues central to the FHWA’s mission, and how to take advantage of the tacit knowledge that already exists within this talented group of employees (12).

With the FHWA’s experience and technology in place, creating a site around the asset management education initiatives of the AASHTO Task Force was a matter of applying new principles to an existing technology. Working with AMS — the technology consulting firm that

had created and managed the technology for FHWA's family of "knowledge management" sites — the initial structure of the site was created.

## SITE STRUCTURE

The site's structure mirrors that of the other FHWA knowledge sites, and is built around different "topic areas" that all have the same structure and features. The site is completely open to the public, with all site features accessible for anyone to browse through.

Upon first visiting the site, the user is offered the choice of 19 different topic areas, and can navigate according to the facets of asset management that interest them most. The site is arranged into 19 different topic areas (15 that have existed from the beginning, and another four that have since been added):

- *Asset Management 101*: the basics of transportation asset management
- *AASHTO Guide for Asset Management*: updates and news about this recently published guide from AASHTO
- *Innovation and Success*: case studies and examples of asset management initiatives from around the country
- *Pavement Management Systems*: information on the latest technology and software for monitoring pavement investments
- *Bridge Management Systems*: a focus on the technology and methods available to professionals involved in bridge management
- *Tunnel Management Systems*: advice and current topics in maintaining transportation tunnel structures
- *Roadway Hardware Management Systems*: the latest information about tools and methods for managing other roadway assets (signals, signage, guardrails, etc.)
- *Maintenance Management Systems*: updates on procedures for documenting and coordinating their maintenance activities
- *Transportation Preservation*: initiatives for the preservation of existing transportation infrastructure
- *Integration of Data and Management Systems*: discussion and materials on what can be a major obstacle to effective asset management
- *Engineering Economic Analysis Tools*: updates and advice about the economic analysis of asset management initiatives
- *Research*: the latest studies and reports about the value and practice of asset management

- *GASB 34*: information about Governmental Accounting Standards Board Statement 34, which lays out a modified procedure by which government agencies can report their assets
- *AASHTO Asset Management Task Force*: information sharing for the task force themselves, and information about the group's meetings and goals
- *Asset Management at the Transportation Research Board*: similar information about asset management activities and conferences at TRB, including the TRB Task Force
- *Public Transportation (added 03/03)*: materials and discussion for public transportation agencies, which have a wide variety of assets to manage (vehicle fleets, guide ways)
- *Performance Measures (added 03/03)*: a topic considering the various methods of rating the performance of a piece of infrastructure
- *Local Government Perspectives (added 03/03)*: for local governments practitioners, who are responsible for managing much more than just transportation infrastructure
- *Education (added 03/03)*: a topic for the many individuals, both within the academic field and elsewhere, tasked with teaching the theory and practice of asset management

Within each of the different topic areas listed above are a set of features that have the same look and feel no matter which area one is in. Each of these different features can be accessed by clicking on one of a group of four tabs arranged across the top of the screen.

The discussion boards are the primary feature of the site, and are thus the first to display when a site visitor enters a topic area. Any site visitor can post new topics on the discussion boards or respond to previous posts, and users have the option to identify themselves, or to post anonymously.

The references area contains a categorized group of postings that provide access to and explain what materials there are that exist on asset management, including primers that have been written by the FHWA, research reports and presentations from recent conferences. These posts, with web links or attached electronic files, can only be made by site facilitators and administrators (explained below).

The works in progress portion of each topic area is a space where individuals can post reports, papers and other items that they have been working on, submitting it to the site in hopes of receiving feedback from others. Once a post has been created by a site administrator or facilitator, anyone can respond and give comments based on their experience.

Finally, each topic area contains a directory, which is a list of those individuals that have registered on the site and indicated interest in that particular topic. This listing includes names, professional affiliation and an email address. This directory is seen as important to helping establish a core group of individuals, and helps the users get a sense for the types of individuals (public sector, local, consultants, etc.) that make up the transportation asset management "community."

## **ADDITIONAL SITE FEATURES**

In addition to the various topic areas listed above and the features within them, there are a two other key features that shape the user's experience. These are the site's event calendar and registration form.

The event calendar offers users access to information on asset management-related conventions, meetings, workshops and training. This information appears as a chronological listing of events, generally with a brief introduction to the event, where it is located, and where to go for additional information.

The site registration form, accessed off of the home page by clicking on a link labeled "My Interests," is one of the most valuable features of the site. This allows users to personalize their site experience by choosing the topic areas that most pertain to their particular interest. Registering on the site not only places their names in the site directory, it ensures that they are sent an email update every time that a new posting or reference has been put in an area of interest. This feature has driven a significant amount of traffic to the site, as users are able to click directly from the email through to the posting that they have an interest in.

## **SITE ADMINISTRATORS AND FACILITATORS**

Another key component of the site's current success and future potential is a group of practicing transportation professionals that have been enlisted to guide the site's offerings and serve as a resource to site visitors: these are the site administrators and facilitators.

Site administrators are individuals that were tasked by the AASHTO Task Force to create and administer the site. These individuals have the ability to alter any aspect of the site, including deleting inappropriate or mistaken postings from site users. The site's administrators are Lou Adams, webmaster, from New York Department of Transportation; Sue McNeil, University of Illinois-Chicago; and Thomas Van, FHWA.

In addition to the administrators, who have overseen the implementation of the site as a whole, each topic area on the site is hosted by a facilitator—an individual who serves as an "expert" in their respective topic area and ensures that any postings to the site are answered in a timely fashion. In addition, site facilitators help to drive the content within the different topic areas, keeping an eye out for news updates and possible reference materials.

Because of the variety of topic areas on the site, there are a wide variety of facilitators participating, representing different backgrounds and mirroring the diversity of individuals working within transportation asset management. For example, site facilitators include officials from the FHWA; individuals representing many of the state departments of transportation; academics; and private consultants. In addition, these individuals have professional backgrounds in fields such as engineering, finance, economics, and public administration, helping site users to gain access to a variety of asset management perspectives.

## **SITE HISTORY AND USAGE**

Although the structure of the site was finished near the end of 2001, it took a year before the site had been fully organized and promoted. In that time, facilitators for all of the areas were sought

out, and each topic area was populated with what reference materials were in existence. Table 1 below offers a brief timeline of the site thus far.

**TABLE 1. Site Timeline**

<b>Date</b>	<b>Activity</b>
Mar 2001	AASHTO Task Force approves use of FHWA Community of Practice template for development of site
Dec 2001	Site created by AMS, site administrators chosen, first references posted
Aug 2002	University of Illinois-Chicago team begins efforts for promoting, managing site
Oct 2002	Existing reference materials organized, facilitators trained on site operations
Jan 2003	Promotional brochures released, site is demonstrated at TRB 2003
Mar 2003	New topic areas added
May 2003	Site traffic reaches nearly 2,000 visitors per day

Since December 2002, the site's promotion has driven traffic numbers up and helped introduce the site to new users. These efforts have included an informational brochure mailed to transportation officials around the country; a live demonstration at the AASHTO booth during the 2003 TRB Meeting, where individuals were able to see the site live and register; and articles in various transportation publications about the initiative (13).

Since the site's official launch in early 2003, site traffic and registration has continued to grow. Table 2 shows some of the vital statistics starting from December 2002 (FHWA, *unpublished data*), when word about the site began to spread, up until the present time. In addition to this documented site activity, as of May 2003 over 250 individuals have registered to receive the regular email updates, which have served to as a significant boost for traffic to the site.

**TABLE 2. Site Traffic Trends**

<b>Month</b>	<b>Successful Hits</b>	<b>Page Views</b>	<b>Page Views per Day</b>	<b>Visitor Sessions</b>	<b>Avg. Sessions per Day</b>	<b>Unique Visitors</b>
Dec 2002	31,931	10,373	334	1,709	55	879
Jan 2003	41,599	11,113	358	2,394	77	1,180
Feb 2003	44,852	14,259	509	2,557	91	1,232
Mar 2003	49,395	15,904	513	3,116	100	1,455
Apr 2003	46,333	13,247	441	2,996	99	1,454
May 2003	54,621	15,729	507	3,821	123	1,981

In addition to consistent growth in traffic, there continues to be consistent activity on the site's discussion boards. By May, one post asking about the definition of asset management had received 19 responses. There is certainly more room for growth in the future, as the goal of site administrators is to create a regular destination for visitors wanting to keep up with the latest trends in asset management from across the country and around the world.

## **CONCLUSION**

After less than a half year, the Transportation Asset Management Today site has built a strong following, reaching an average of nearly 2,000 visitors a day. Many of these individuals have posted information to the site and the collective pool of information has consistently grown.

As the practice of asset management begins in many agencies — and begins showing results in others — there is an expectation that this trend will continue. It is certain that the site will remain a key portion of the efforts of AASHTO and FHWA to promote learning and information-sharing about asset management.

Finally, it will be valuable down the road to assess the state of asset management practice and the effect that this Internet initiative had in connecting a “community” of asset management practitioners. From this, it could be ensured that this innovative use of the Internet as a collaborative learning and outreach tool offers lessons for similar transportation-industry efforts in the future.

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