IBM asset and service management solutions
White paper

Tivoli software

Asset and service management for Departments of Transportation.

March 2007

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Executive summary

Departments of Transportation (DOTs) have historically made large investments in solutions to help them plan and manage the maintenance of their extensive infrastructure assets. To date, these efforts have largely resulted in the implementation of multiple systems that are not well integrated. They are costly to own and operate and cannot easily meet changing information and reporting requirements. This results in lost opportunities to reduce inefficiencies in work planning and service delivery—opportunities that DOTs can no longer afford to lose.

By combining their asset management and service delivery applications to provide a holistic, department-wide view on activities, DOTs can improve the timeliness and quality of information flow to planners, engineers and other key decision makers. This helps eliminate inefficiencies such as wasted work, which can consume upwards of 15 percent of maintenance budgets. Managing assets and services together also enables DOTs to deliver improved service quality, manage assets more efficiently, reduce operational risk, and improve accounting and compliance reporting.

For DOTs, the integration of conventional asset management and service delivery applications is insufficient to optimally manage their great diversity of linear, fleet, facility and IT assets and services. DOTs require an asset and service management solution that also integrates with geographic information systems (GIS), as well as with pavement management and estimating systems, because these data sources are critical for construction and maintenance planning and execution.

Introduction

In today's tough economic climate, DOTs face significant challenges in their efforts to maintain and expand aging infrastructure, provide intelligent transportation systems, improve security and emergency response and comply with new environmental and accounting regulations. Most have already invested in technology to help them manage assets and service delivery. In many cases, however, the scope and diversity of the assets and services to be managed, involving pavement, bridges, tunnels, toll plazas, lighting and signs, have given rise to multiple, heavily customized systems that are poorly integrated, expensive to operate and difficult to change. Because each system is focused on a specific asset or on managing service providers and contracts rather than assets, they cannot support the holistic perspective required to respond proactively to maintenance problems. Further, they lack the ability to aggregate information about assets in a way that supports executive-level decisions.

The legacy approach to asset and service management is no longer sufficient. The pressure to revamp these systems comes from three directions:

- *Assets are increasingly interdependent, so the systems that manage them cannot remain separate. For example, roadway signs alerting motorists in advance of heavy traffic or weather hazards rely on other technology systems that are now integral to the roadway.*
- *To streamline costs it is critical to understand the way individual assets affect service to the business, so that services can be coordinated across assets. For example, performing repairs to co-located signs, lighting and pavement at the same time results in reduced congestion.*
- *Departments need the "big picture" view to justify and defend their budgets, improve service levels, support long term planning and address risk and compliance mandates. Governmental Accounting Standards Board (GASB) Statements Number 34 and 42 are primary examples of this ongoing trend.*

Highlights

The current, fragmented approach to managing assets and services has invariably led to organizational blind spots in areas like enforcing service level agreement penalties and accountability of all assets, which result in poor cost control, reduced service levels and project delays. What is required is a solution that empowers DOT executives to manage both assets and services from a perspective that identifies the dynamic relationships between them. DOTs that are willing to innovate can leverage today's superior information technology to unify asset management and service management, enabling them to deliver services more efficiently, optimize asset life and stretch lean maintenance budgets.

This paper outlines solution requirements and technology best practices for DOTs and other organizations that need to maintain and improve a large-scale roadway infrastructure. It introduces the concept of unified asset and service management and explains the business value of this approach, as well as the specific functional capabilities that DOTs require.

Unifying asset management and service management

A unified asset and service management approach embodies a set of processes and practices that enable organizations to optimally manage the performance of all their critical assets according to the expectations and requirements of all the organization's stakeholders.

Better decisions about resource allocation and utilization are made by improving the quality and timeliness of information.

Effective, unified management of assets and services enables DOT executives to make informed decisions about resource allocation and utilization, and improves their ability to track the results of these decisions over time. Better executive decision making is made possible by improving the quality and timeliness of information. In particular, an asset and service management approach enables resource allocation decisions to factor in not only the funding required for construction projects and similar activities, but also the utilization of other value-added resources like staff, equipment, materials, real estate and even information. The end result is a pragmatic, systematic process for maintaining, upgrading and operating physical assets in a highly cost-efficient manner.

Key asset and service management capabilities

Traditional asset management approaches often employ off-the-shelf, stand-alone systems that provide basic capabilities like budget planning, preventive maintenance and work order processing. These systems are typically augmented with expensive, consulting-based customization and integration to meet specific requirements. While able to process work orders and manage contracts acceptably well, they fall short in their ability to track individual assets over the life cycle of the asset. This often leads to inefficient, reactive responses to maintenance and an inability to maximize the useful life of assets.

A unified asset and service management solution, in contrast, provides a strategic view of all essential assets. This gives organizations the right levels of visibility, control and agility to more effectively—and proactively—manage assets and services throughout their life cycle. Such a solution can enable the following capabilities.

Support a wide array of services and assets

Instead of supporting just a single asset class or a subset of services, asset and service management solutions should support a wide variety of services and assets (linear, fleet, etc.), allowing the enterprise to control performance by taking into account the interdependencies of assets and services.

Provide integrated management support

Rather than supporting only customer-facing processes like a help desk or a maintenance technician, the service component of the solution should integrate with back-office processes, such as integrated cost management and life-cycle management, to enable greater cost-efficiency. DOT executives, for instance, need accurate estimates of maintenance and program costs. This data provides a solid budget for the asset and work management system which, in turn, can then provide the correct actual costs and offer real-time program status and expenditures.

Highlights

Each division or bureau within a DOT needs its own solution to deal with specific regulatory and accounting issues.

Provide an enterprise-level solution

Unlike an approach where each department or region needs to implement its own distributed version of the solution because of technical and data model limitations, an asset and service management solution should support multi-team or multi-site capabilities. This significantly reduces IT costs and complexity by reducing the number of applications IT must manage, while improving economies of scale. DOTs, for example, require a solution that can support each division or bureau in the organization, from highway operations to structures to environmental services, in dealing with its particular regulatory and accounting issues.

Leverage evolving IT standards

In order to incorporate asset and service management into an evolving IT infrastructure, the solution should be built on the principles of a service-oriented architecture (SOA). Such solutions provide a foundation upon which to implement Business Process Management (BPM) because they separate application and business process flows and leverage new industry standards for business process definition, while eliminating multiple integration and access challenges. SOAs are particularly relevant to DOTs implementing rational consolidation of legacy asset management technology and other IT systems.

Leverage intelligent assets

DOTs and other organizations are beginning to leverage a growing number of assets with built-in computing technology to support more advanced diagnostics, self learning, asset health monitoring, etc. This includes real-time traffic devices like toll booth cameras for improved congestion and incident management. An asset and service management solution must have the flexibility to adapt to these new asset types.

Business benefits of asset and service management

A unified approach to asset and service management can drive significant benefits for any enterprise. These benefits strengthen the bottom line directly, but also extend to improving the agility of the operation and its ability to better control risks and comply with regulations. Business benefits of a unified approach to asset and service management include:

- *Better alignment of services with the business, by leveraging and enforcing a governance framework that enables the business to create a link between the services expected and the performance requirements of the assets that are providing the service.*
- *Improved risk and compliance management, by capturing in a single repository the condition, state and performance of assets and the relationship of the assets to the business. A central data repository facilitates organization-wide visibility of the control activities (assessments, audits, inspections, prevention, detection, reporting) that are required to meet risk management and regulatory requirements.*
- *Operational excellence, by applying operational excellence programs founded on the principles of best practices and standardization of business processes to asset and service management activities. Enable measurement of current practices and the ability to compare performance across sites and departments.*

Asset and service management solutions for DOTs

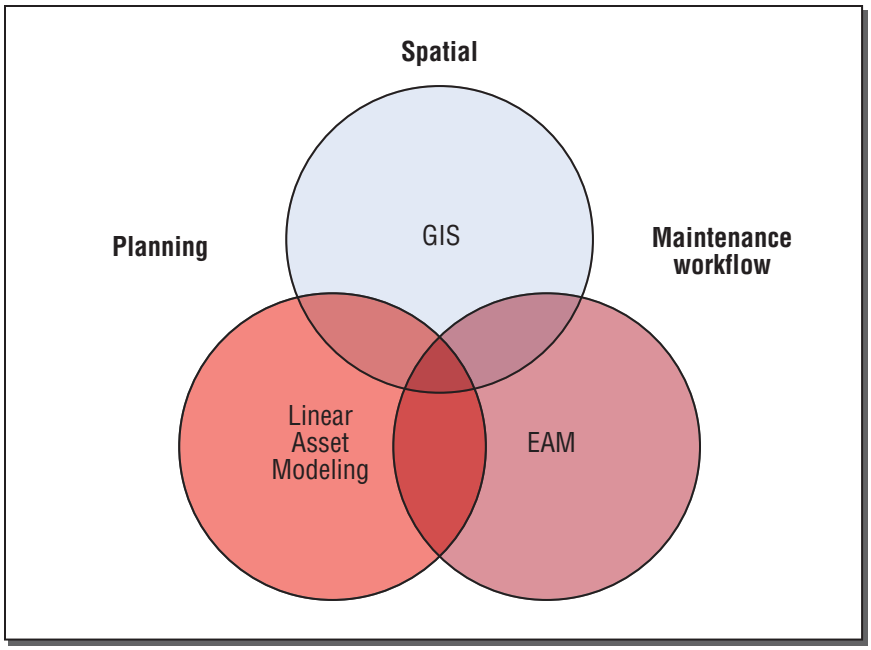
While the primary capabilities and associated business benefits of asset and service management apply to any organization, the components of individual solutions should be specific to the assets and services being managed.

Departments of Transportation need to manage linear assets, particularly pavement, in a manner that supports GASB 34 and 42 compliance and facilitates the reporting necessary to obtain highway funding. This mandates a solution that includes these principle components.

- *An enterprise asset management (EAM) solution with the scalability and flexibility to effectively manage all DOT asset classes*
- *A GIS application that integrates with the EAM system, so linear assets can be associated with spatial and geographic references like length, mile markers and Global Positioning System (GPS) coordinates*
- *A linear asset application that combines linear asset modeling with estimating/budgeting capabilities, to supply critical data required to optimally manage roadway corridors throughout their life cycles*

Figure 1 shows the relationship between the key components of an asset and service management solution for DOTs

Figure 1: Enterprise view of asset and service management for DOTs



EAM

The EAM component of an asset and service management solution for DOTs must be scalable and flexible enough to manage all departmental assets, including linear assets like highways, vehicles and other fleet assets, and facility assets such as depots and buildings, as well as service provider relationships. Ideally it should also allow for the management of IT assets (servers, networks, desktop and laptop computers, software, telephony, etc.) for DOTs that are ready to move these investments into the category of assets.

Highlights

In addition to supporting multiple asset classes, the EAM solution should offer built-in features that DOTs will find particularly useful. These include workflow and automated alerts that can be associated with procurement decisions or problem escalations; modules for contract management, warranty management, labor certification and service management; built-in depreciation calculation functions for trucks and repair equipment; and so on.

EAM solutions should offer built-in features that mesh with evolving IT initiatives and reduce infrastructure complexity.

Equally important, the EAM solution should be built on an advanced, standards-based architecture that can mesh with evolving IT initiatives and reduce infrastructure complexity, not burden IT with another legacy application to support and integrate.

GIS

By managing assets and services spatially, DOTs can better coordinate activities for improved efficiency and availability. GIS technology enables DOTs to establish and maintain detailed, spatially accurate inventories of roadway assets such as signs, signals, pavement, bridges and lighting. A GIS software solution embedded with both the EAM and pavement management components of asset and service management can support fine-grained analysis and management of critical assets, including capabilities to:

- *Access up-to-date information on ongoing projects, including the ability to view roadway and other infrastructure assets via an easy-to-use mapping interface that changes dynamically as data are updated.*
- *Identify all bridges, incidents, projects, etc. along a road by entering their milepost location or range, or by pointing and clicking on a map image.*

For example, GIS can provide a dynamic map that better enables DOT dispatchers to locate emergencies and deploy appropriate vehicles and services. The EAM users can see existing work orders and service requests associated with that location without leaving the user interface they are accustomed to using.

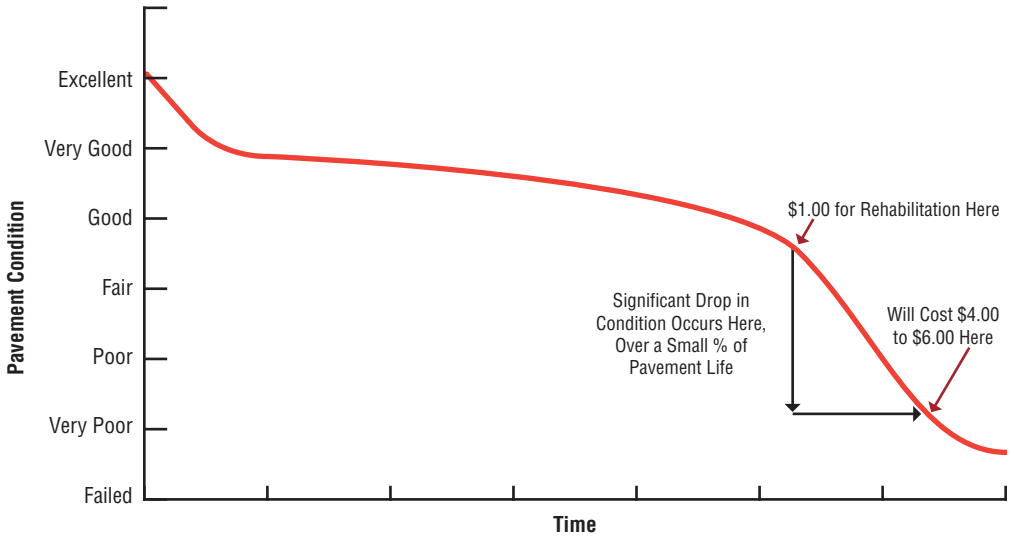
By managing assets and services collectively in terms of location, DOTs can better coordinate activities for improved efficiency and effectiveness.

Linear asset modeling and pavement management

In line with accounting and regulatory changes like GASB 34 and the American Bar Association's 2002 Model Procurement Regulations, there is a growing focus among DOTs to manage costs across the roadway life cycle with an emphasis on maintenance and repair over replacement. The drive to optimize roadway life-cycle costs makes preservation, maintenance and repair decisions inherently more complex logistically, because there are more decisions to make over time and their timing and coordination are more critical.

Figure 2 illustrates how dramatically a pavement repair strategy can impact long-term costs. By repairing pavement over time before its condition rapidly deteriorates to the point where replacement is required, DOTs can stretch budgets much further while maintaining higher service levels over the asset's life cycle.

Figure 2: How rehabilitation costs vary with pavement condition*



Over a large road network there are thousands of such decisions to be made annually. DOT executives charged with annual capital program and maintenance budgeting processes need to be aware of current condition and rate of change of assets, recommendations for intervention, and estimated and actual costs; they also need to record and track results. When integrated with EAM and GIS components, a pavement management and linear asset modeling application can deliver fast access to visual information that supports an optimal balance of cost and service levels for linear assets.

For example, DOT managers can leverage these capabilities to evaluate alternative pavement treatment strategies using "what-if" scenarios that adjust preservation versus addition/reconstruction activities within a specified budget. Once a scenario is selected for implementation, it can be used as the base plan for implementing the work defined within it. Work orders for all tasks identified within the scenario would be generated automatically through the EAM system. These tasks would then be used to complete and reconcile work through work orders for the current fiscal year.

The high level of integrated planning, management and reporting capability that pavement management and linear asset modeling technology makes possible enables DOT executives to fine-tune long-range planning and resource allocation decisions to stretch budgets further while expanding service activities.

A complete asset and service management solution for DOTs

IBM and our Business Partners offer DOTs a comprehensive asset and service management solution for optimizing value, performance and service quality across all the organization's assets, in line with budget and regulatory considerations. Combining the industry's leading enterprise asset management software with integrated GIS and linear asset modeling capabilities, IBM's asset and service management solution gives DOTs the tools they need to work smarter and do more with less.

Enabling DOTs to consolidate all assets and services into a single solution on a standards-based, Internet-ready platform, no competing approach offers equivalent power or value. At the same time, a configurable interface gives decision makers at all levels the perspective they need to do their job more effectively. The ability to consolidate views facilitates reporting and enables direct comparison across projects or bureaus to better analyze both problems and successes.

How it works

The asset and service management solution for DOTs offered by IBM and our Business Partners includes these components.

- *IBM Maximo® Asset Management, the leading EAM solution in many transportation industries*
- *ArcGIS from ESRI, the world's leading GIS solution provider*
- *Linear asset modeling and pavement management from Envista Corporation, a ground-breaking solution that improves capital budgeting and programming capabilities while simplifying GASB 34 compliance*

Figure 3: A complete asset and service management solution for DOTs

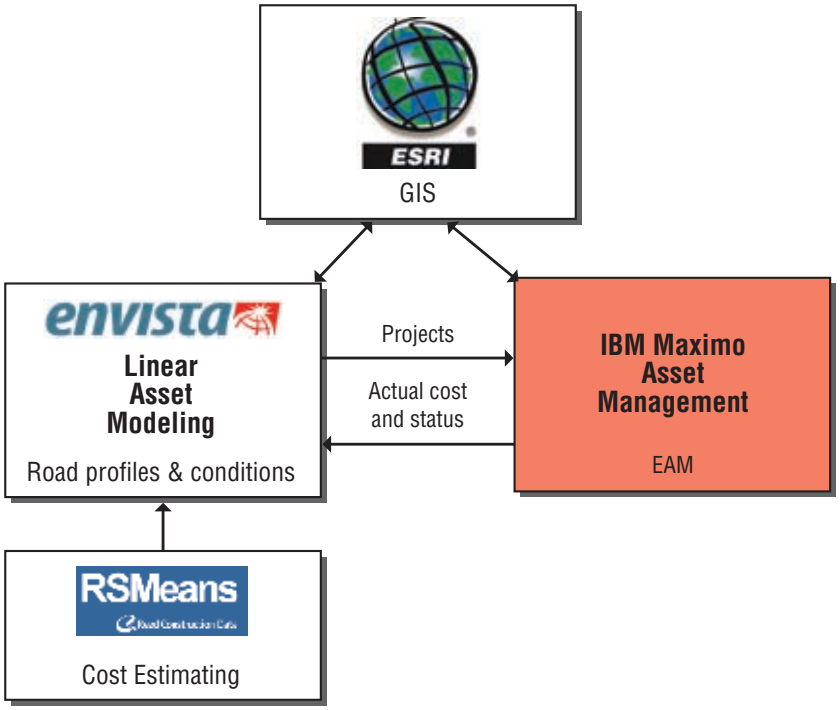


Figure 3 illustrates the overall solution. GIS is integrated with both the linear asset modeling and EAM components, so that map-based, spatial references for assets are available and consistent across all activities. Cost data, available through the R.S. Means solution, along with available condition and profile data, is directly available for roadway corridor management. The linear asset modeling solution allows the DOT to assess the current conditions of all roads, and use "what-if" scenarios to develop a program budget. It then integrates the approved budget as work orders in the EAM solution. The EAM component manages work and actual cost and status data for assets, and drives service requests, work orders, inventory control, procurement and other activities. It then feeds actual costs back to the linear asset modeling application to close the loop on the capital and operating programs.

Highlights

The asset and service management solution delivered by IBM and our Business Partners meets DOT requirements for scalability, flexibility and rational system consolidation, while leveraging a common information resource base across all assets and services. This comprehensive approach, with integral GIS and linear asset modeling, enables DOTs to optimize long-range planning and resource allocation across capacity, operational and preservation investments, resulting in improved performance and more efficient operations.

IBM Maximo Asset Management serves as the unifying framework for the overall DOT asset and service management solution.

Part of the IBM Tivoli® software portfolio, Maximo Asset Management serves as the foundation for the overall DOT asset and service management solution. It not only incorporates GIS and pavement estimating capabilities, but also integrates readily with business-critical systems like enterprise resource planning (ERP), asset health monitoring, document management, computer-aided facility management and fuel/fluids management. This unifying framework brings technology together so management has the information it needs—without overburdening IT.

Summary

The management of assets and services from an enterprise perspective has long been a challenge for DOTs, because no single solution could span their diverse requirements. The need to manage different classes of assets with different applications has resulted in a patchwork of poorly integrated systems that cannot provide executive-level information about asset maintenance, replacement or life-cycle history.

IBM and our Business Partners provide a single solution for asset and service management that supports the needs of diverse DOT asset classes and helps DOTs respond with real-time data to the regulatory and accounting concerns of individual bureaus or divisions. Now DOTs can begin to replace their disparate legacy asset management systems with a unified solution based on a Web-standard, services-oriented architecture.

For more information

To learn more about IBM Maximo Asset Management, please contact your IBM representative or IBM Business Partner, or visit **ibm.com**/tivoli or maximo.com

About Tivoli software from IBM

Tivoli software provides a comprehensive set of offerings and capabilities in support of IBM Service Management, a scalable, modular approach used to deliver more efficient and effective services to your business. Meeting the needs of any size business, Tivoli software enables you to deliver service excellence in support of your business objectives through integration and automation of processes, workflows and tasks. The security-rich, open standards-based Tivoli service management platform is complemented by proactive operational management solutions that provide end-to-end visibility and control. It is also backed by world-class IBM Services, IBM Support and an active ecosystem of IBM Business Partners. Tivoli customers and partners can also leverage each other's best practices by participating in independently run IBM Tivoli User Groups around the world—visit www.tivoli-ug.org

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03-07
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* Source: "Pavement Preservation: The Preventative Maintenance Concept, Executive Overview." The Foundation for Pavement Preservation.

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TIW10329-USEN-00