

A Ventyx Whitepaper:

Managing Linear Assets with Ventyx Ellipse

Discover How Ventyx solutions Uniquely Meet
the Requirements for Linear Asset Management



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Executive Summary

Organizations charged with managing roads, rails, pipelines, and other linear assets have unique asset management requirements. Most asset management software, having been designed around discrete assets, fails to comprehensively address these demands.

In consequence, many businesses must rely on multiple, largely standalone systems and manual processes (e.g., GIS, work history databases, spreadsheets) to store and access various linear asset information. This makes it time-consuming and problematic to aggregate and analyze performance and cost data, schedule and prioritize work, and track work progress for linear assets. Data redundancy and prohibitive IT costs are further concerns.

What is needed is an asset management system that can aggregate all key linear and discrete asset data to provide a “single source of truth” for decision-making purposes, which is accessible to users in their choice of formats.

This paper discusses linear asset management requirements, and briefly describes how the Ventyx Ellipse asset management solution meets those requirements..

Introduction

Charged with meeting growing service and regulatory demands with aging inventory, organizations whose critical infrastructure includes roads, rail, pipelines, and/or power lines face unique asset management challenges. Not only must these businesses maintain discrete assets like facilities, poles, substations, and IT systems; but also the linear or continuous assets that are the foundation of their operations.

Most asset management software uses a top-down or hierarchical approach to referencing assets that is inadequate for linear asset management. Whereas discrete assets can be readily identified by unique numbers, bar codes, and/or locations, linear assets are long and contiguous, often forming a network. This makes linear assets much harder to differentiate and describe using numeric hierarchies; spatial references work much better.

A further challenge to managing linear assets is that their characteristics vary across their length. Based on these variations and other factors, linear assets are best divided for maintenance purposes into virtual segments, which may or may not correspond to physical reference points. Roads consist of different tarmac/asphalt types, for instance; guardrails may be painted with different coatings at various points; and pipelines can vary in diameter or composition. To accurately capture and analyze asset performance history for maintenance and cost purposes, it must be straightforward to relate these virtual segments to specific areas along the length of the asset, and to record and analyze quantitative data about them. This capability – or lack thereof – is particularly relevant where asset ownership and maintenance responsibilities may be at issue.

Linear assets also invariably encompass numerous discrete assets. Railways, for example, include bridges, tunnels, frogs, signals, and switches in addition to tracks and ballast. To manage these assets and the data associated with them, it must be possible to uniquely identify each discrete asset in terms of its position along the linear asset.

Solution Requirements

Road, rail, and utility companies must strike a balance between wringing the most value from every asset with maintaining exceptionally high levels of reliability, safety, and regulatory compliance. To schedule and prioritize work, track work progress, and analyze materials performance and costs, the business must accurately identify not only which asset to work on, but also where along the asset to work.

These unique requirements introduce complexities that most enterprise asset management (EAM) or enterprise resource planning (ERP) software cannot adequately support. In particular, linear asset management calls for some way to integrate relational location data with GIS-type visual location information. Asset-intensive businesses with linear assets also have all the conventional asset management requirements associated with discrete assets.

The result has been a need to store and access data from multiple systems, including GIS, legacy systems, inspection reports, work history databases, etc.; often with little or no integration between applications and therefore a lack of clear direction for decision-makers. For example, many organizations manage key linear asset feature data in standalone GIS systems. They often lack a way to rationalize redundant data and integrate GPS and GIS inputs with EAM and ERP systems. The ability to meet cost, reliability, and safety objectives for linear and related discrete assets is therefore compromised.

Many organizations, such as municipal governments or mining companies maintaining private rails or roads in remote areas, are unable due to IT resource constraints to manage their linear assets as effectively as they can their discrete assets. Such businesses are increasingly struggling to maintain custom (and often poorly automated) systems for linear asset management in the face of shrinking IT budgets.

What is fundamentally required is an asset-centric (EAM) system that can aggregate spatial (GIS) and hierarchical/relational asset data to provide a “single source of truth” accessible to users in their choice of visual or tabular forms. Crews need to be able to reference work by distance or chain markers, lane, direction, track number, frogs/crossings, and so on. Conditions observed in the field need to be quickly and reliably shared with operations management to facilitate timely resolution. Organizations similarly need to identify all the work to be performed along a given area, so that crews can combine repairs and minimize the time an asset is out of service.

Ventyx Ellipse: Comprehensive Support for Linear Asset Management

The Ventyx Ellipse EAM solution offers a unified suite of capabilities for capturing, viewing, and analyzing linear asset condition and performance data. Ellipse provides a single source through which decision-makers can collect, visualize, analyze, and act on comprehensive information about their linear assets – enabling the business to know what work to perform, and when and how to perform it.

Ellipse enables maintainers of rail, road, and utility infrastructure to:

- Reduce maintenance costs
- Efficiently perform long-range maintenance planning
- Better allocate scarce maintenance resources
- Improve asset reliability and in-service time
- Maximize asset life without incurring increased maintenance costs

Key Linear Asset Management Capabilities in Ellipse

Well-established as an industry-leading solution for discrete asset management in industries like mining and defense, Ellipse has likewise offered strong support for managing linear assets. In recent releases, Ventyx has added major new capabilities that make Ellipse a best-in-class solution for managing linear assets, including:

- Support for both scripted and unscripted inspections, including alarms and defects management; plus support for onsite inspections using mobile devices
- The ability to survey asset inventory and securely update data for both new and existing assets and their attributes in the field, including equipment and location parameters
- Integration with leading GIS systems
- An end-to-end, fully integrated mobile solution built on an industry-leading mobility middleware platform, to support in-field work and asset management

Inspections and Defects Management

Equipment, safety, and environmental inspections across linear assets enable organizations to identify potential and actual defects before they present serious risks. Ellipse enables customers to schedule and conduct both scripted and unscripted inspections and register defects, using integrated mobile applications. Built-in mobile support allows field technicians to record defects as they “walk” a linear asset; for example, recording potholes along a road segment using GPS geo-coding to pinpoint the location of each defect.

Ellipse can prioritize alarms and defects based on risk assessment and the criticality of the asset involved, automatically turning the inspection results into work requests or work orders. Alarms and defects can also be grouped; for example, fifty trees requiring trimming along an easement can be identified with one work order or work request. Corrective actions can be initiated automatically for immediate attention and performed by maintenance crews using mobile devices.

Now maintenance and safety data can be managed within a single system, and inspection results can be assessed and prioritized together, streamlining work scheduling and maintenance and eliminating considerable manual effort.

Asset Inventory Survey Capabilities

Linear asset management requires robust capabilities for identifying and registering new assets as well as changes to existing assets and their attributes. Many organizations record asset attributes in a GIS system because their EAM or ERP platform does not support these functions.

The Asset Inventory Survey (AIS) module in Ventyx Ellipse integrates with the inspection and defects capabilities to enable mobile inspectors and auditors to undertake inspections and asset surveys at the same time, with up-to-date information. AIS also allows field staff to audit, modify, and collect critical asset data related to equipment, its nameplate, and/or its location which, upon verification, can automatically update the Ellipse asset registry to improve data accuracy.

The ability to register survey attributes is especially useful for linear asset attributes. For example, road attributes can include type of surface or sub-surfaces, type and length of central reservation, and type of fence and distance from the centerline – as well as many other data elements often held in GIS systems. Users can define assets in terms of linear features like length and GPS coordinates. Work orders can be written against any segment or point along a linear asset, so that the cost and work involved is attributable for analysis purposes to that specific segment rather than the entire asset.

Built-in GIS Support

Ventyx Ellipse includes a standards-based, vendor-neutral gateway that delivers seamless integration with any GIS system. This built-in integration enables customers to further leverage their GIS investments, while eliminating data redundancy and reducing IT complexity around where and how best to store and access linear asset data.

The ability to view and analyze GIS data within the EAM system, and vice versa, maximizes the strengths of both solutions. Users benefit from a browser-based, geospatial view that enables them to visualize and interpret spatial relationships among both linear and discrete managed assets. This geospatial view encompasses Ellipse entities including work orders, work requests, maintenance schedule tasks, defects, inspection results, and asset features.

Users can combine location-based queries with Ellipse queries and display the corresponding Ellipse items on a map. For example, it is straightforward to identify work completed or planned within political boundaries (electorate, city, suburb, etc.) along a linear asset that intersects several such boundaries. Similarly, the analysis of past work at each location could show the variation in maintenance costs, types of work done, and even environmental impacts; e.g., comparing the guardrail along a road where it runs beside the coast versus inland.

Mobility Support

Best-in-class mobile support is integrated into Ellipse from the ground up. Unlike most other EAM vendors who focus on discrete asset maintenance, Ventyx's mobile applications are designed not only to aid route-finding and communications with enterprise systems, but also to support safe, high-quality work on linear as well as discrete assets, in line with industry-specific best practices.

When scheduling and dispatching work on segments of a road, for example, Ellipse mobile applications can ensure there is no overlap of work, and that unsafe work practices such as crisscrossing the road to inspect poles are avoided.

Ellipse-based EAM processes with integrated mobility support include: asset inspections and defects, surveys and audits, in-field work management, work scheduling and dispatch, and approvals management. Ventyx mobility solutions are also integrated with GIS and GPS support on the mobile device, to aid in locating assets and job locations, establishing spatial relativity, and recording position information.

Ventyx mobility support connects field workers to key business workflows and automates error-prone manual processes – enabling rail, road, and utility companies to reduce operating costs; increase productivity; improve data and reporting quality, service quality, and asset utilization; and reduce risk to assets and people.

If, for example, a section of power line is down due to high winds, an authorized user can create a work order on that specific segment of the line and dispatch a field crew to that location. Simply by selecting a status option in the mobile application the field crew can communicate progress to the call center. It is equally easy to automatically set or change dates/times for service off, work commenced, service on, and work completed; or to transfer the work to another crew.

The Value of Integrated Linear Asset Management

The integration of inspection/defect, AIS, mobility, and GIS features within Ellipse enables a wide range of linear asset management capabilities not otherwise possible, greatly enhancing the solution's overall business value.

For example, the integration of inspection/defects and AIS let customers identify asset inventories in a linear framework (guardrail or fence length and characteristics, for instance) to better manage work, replacement strategies, and overall costs. Items like guardrails can be difficult to record as specific equipment as they continually change in configuration. By enabling users to record each section of guardrail as a feature of the road it is linked to, Ellipse supports financial asset valuation that can more easily be justified and validated by auditors.

Railroads similarly need to know the status of rail, sleepers, ballast, etc. in order to efficiently perform maintenance. Ellipse can record all inspection data and make it available alongside GIS data to pinpoint where to work. It is also possible to view Ellipse data alongside information from other systems (such as political boundaries, geographic features, third-party assets, traffic flow/density data, or traffic incidents) using GIS to display and link the information.

These integrations make it easier to plan where and when to send crews in the future, for more efficient allocation of maintenance resources. Improved preventive maintenance also improves job estimation capabilities and supports capital works programs for sections of linear assets.

Integration across the Ellipse scheduling and dispatch systems supports quick responses to unplanned problems, because managers know where crews are *now* in relation to locations for unplanned work and scheduled maintenance alike. Maintenance technicians can record work performed on a mobile device, connect with enterprise systems over the telephone company network, and automatically update EAM data in real-time. Companies can thus perform analysis and schedule corresponding work more quickly and efficiently.

Conclusion

Integrating key linear asset management features in a comprehensive EAM application suite built on a service-oriented architecture (SOA), Ventyx Ellipse offers best-in-class visibility and manageability of both linear and discrete assets in line with industry best practices. Ventyx is uniquely positioned to help organizations that maintain interconnecting assets like roads, railways, and utility lines to maximize service quality, safety, compliance, and profitability.

About Ventyx

Ventyx, an ABB company, is the world's leading supplier of enterprise software and services for essential industries such as energy, mining, public infrastructure and transportation. Ventyx solutions bridge the gap between information technologies (IT) and operational technologies (OT), enabling clients to make faster, better-informed decisions in both daily operations and long-term planning strategies. Some of the world's largest private and public enterprises rely on Ventyx solutions to minimize risk, enhance operational and financial performance, and execute the right strategies for the future.

To learn more about Ventyx solutions visit www.ventyx.com or contact a Ventyx sales representative today.