



Product Sheet Maintenance Manager



Key features & benefits

- ◆ **Flexible Inspection** regimes to cover all road types
- ◆ Comprehensive, user definable recording of defects for all assets
- ◆ Builds Works **Orders** to meet the required response times
- ◆ Creates work budgets and keeps track of actual work expenditure
- ◆ Tracks repairs and maintains a full **history** of work undertaken
- ◆ Provides a **complete** audit trail for defence of legal proceedings
- ◆ Optional interface to **GIS** for map display of maintenance activities

To provide transportation infrastructure that the public expects, roads have to be managed. In order to do this effectively, it is **necessary** to establish a regime that ensures **inspections** are undertaken at appropriate frequencies, data is collected and stored in a **consistent** and **logical** manner and **information** is readily available for informed decision making. **Exor's** Maintenance Manager is a specialized tool designed specifically for this purpose.

Inspection Assessment and Recording

The establishment of an **effective** regime of inspection, assessment and recording is the most crucial **component** of highway maintenance. Maintenance Manager enables the characteristics of an inspection regime to be easily defined, including the frequency of inspection, items to be recorded and nature of response.

By applying these criteria systematically and consistently, in accordance with the principles of Quality Assurance, it becomes possible to monitor network safety and serviceability, while also maintaining information that may become **crucial** during legal **disputes** and proceedings.

All authorities are strongly advised to undertake 'safety inspections' by the Code of Practice for Maintenance Management 'Delivering Best Value in Highway Maintenance', providing the **ability** to support a defence under Section 58 of The Highways Act 1980 and equivalent legislation within the UK Devolved Administrations.

Conducting more detailed 'service inspections' is also encouraged, and Maintenance Manager provides a single, fully integrated, Management System to effectively store and apply the data recorded

Effective Work Management

Once defects have been recorded, either from an **inspection** or from third-party sources such as the general public, an authority has a duty to undertake repairs within the **timescales** established by **their individual** Risk Assessments and as deemed appropriate to their **particular** local **circumstances**.

Maintenance Manager assists greatly in this process by grouping together similar defects and building the Works **Orders** needed to instruct their repair. Urgent repairs are issued on a daily basis, whilst less urgent responses **can** be built into programmes to enable cost-effective use of repair gangs or contractors. Options are available within the system to apply 'standard treatments' to defects and to automatically price Orders **from** Schedules of Rates

Defects are cleared from the system with full history - from discovery through repair to being fully maintained. In a similar way, the system automatically updates the database for defects corrected by scheduled Cyclic Maintenance and by major structural works.

Financial Monitoring

Maintenance Manager can hold details of many Contracts and Contractors together with **their** priced Schedules of Rates. Works Orders can be priced to provide estimates for the work. Budgets for each type of work are entered onto the system and as Orders are raised and issued, the software tracks how much is being 'committed'. When Orders are completed and the final costs entered, the **committed** amounts become actual spent and budget figures are automatically updated to provide the breakdown needed for accurate financial monitoring.



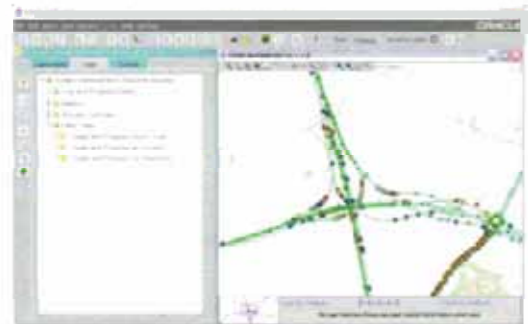
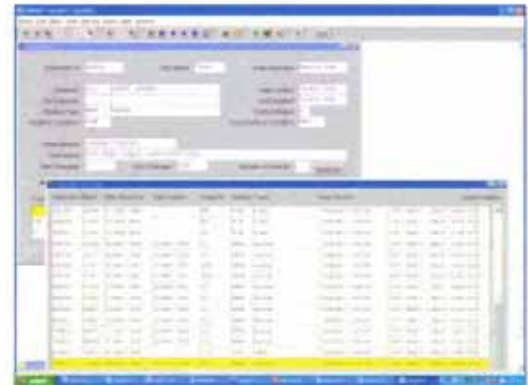
System Integration

Maintenance Manager integrates fully with Exor's Spatial Manager and Asset Manager, enabling map displays of all maintenance activities in a GIS, and linkages to asset records. Work requests can also be raised and tracked through Exor's integrated Enquiry Manager help-desk facility.

Links with MapCapture and Exor Mobile:

Safety Inspections provide for integration with inspectors and engineers in the field and aids in the effective management of the assets. Defects of a severe nature can be downloaded live to exor Maintenance Manager and a Works Order issued immediately to repair it. This helps to ensure the Asset Maintainers meet Service Levels for Defect Repair. Field inspectors can record details of Asset Condition before they reach a severe nature, which can be used to help plan preventative maintenance programmes

Using Contractor Interface Manager (CIM) and Financial Interface Manager (FIM) links to both Contractor and Financial Systems can be established to improve efficiencies of the whole works management process.



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Product Sheet

Network Manager



Features & Benefits

- ◆ Fully **flexible** Network Data Model
- ◆ **Dynamic** Data Validation
- ◆ Multiple Networks
- ◆ **Multiple** Linear Referencing **Methods**
- ◆ Full Network Editing functionality
- ◆ **Network** Hierarchy
- ◆ Full **Network** History
- ◆ Fully **Integrated** with **all other Exor Products**

Effectively managing transportation corridors requires the assimilation of a number of information silos, many of which reflect departmental perspectives. Infrastructure assets, repair assignments, maintenance activities, accident reporting, and traffic counts are typically collected, indexed and recorded in a manner that **best** suits the responsible department. Linear Referencing Systems (LRS), a preferred data modeling technique for managing the one-to-many relationships within a transportation network, provide an effective means of organizing data that both accurately models the real world and provides useful information.

Exor's Network Manager is a proven software and database technology that allows Highways and **Transportation** Organisations to manage the roadway network infrastructure, in a single, **spatially** enabled, database using multiple linear referencing methods. It provides a robust network database model for integrating applications and forms the keystone to the **Exor** LRS Hub

Multiple Networks and Multiple Referencing

Designed to support multi-modal applications, Network Manager has the ability to handle multiple networks and network types, such as distinct road classes, rail lines, **drainage**, pipelines, and utility networks in a single database. Connectivity between networks can be provided either by shared nodes or **through** the concept of shared assets for cases where breaks are not required in the network model.

Network Manager supports sub-classes and groups to categorize network **elements**. For example, a user may wish to differentiate between **network** elements on a road network that is either single direction, such as a divided highway, or multi-directional

Network Manager allows the user to create a **hierarchical** network model, **topologically** consistent, supporting the use of different departmental Linear Referencing Methods (LRMs) on many network types that can be shared by the **entire organization** running a variety of software **applications**. Network Manager supports unlimited userdefinable network types and **associated** LRMs that

conform to the BS7666 standard and the NSG in the UK, and the NCHRP 20-27 **model** in the United States

Network manager supports the various ways in which LRMs may **be** constructed. These can be broadly defined as

- ◆ **Kilometre/Mile** point (eg, **9.29**)
- ◆ **Kilometre** post (eg. 9 29 Equations)
- ◆ Reference post (eg, **xx + 0.29**)
- ◆ Reference point (**eg, xx+0.29**)
- ◆ Link - **Node** (this is a special application of the reference point method)

The user **can** translate from one reference system to the next using **pull-down** menus. One benefit is that inspection crews can use the most efficient referencing method when performing condition assessments, such as offsets from the nearest bridge, then translate the data into a Linear Referencing Method **best suited** for reporting purposes.

Historical Record of Network Changes **Exor's** unique **date-stamping** approach in Network Manager allows users to view the **network** and related assets based on any historic or future date. A complete historical record of the network and assets is maintained in the database, facilitating time-related studies, and the input of field data months after it was collected.



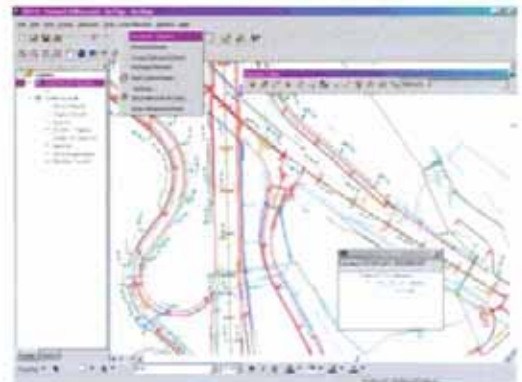
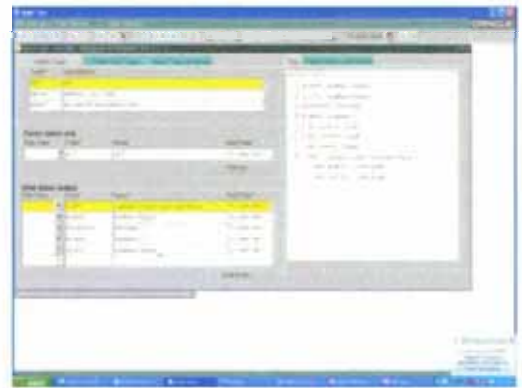


Geography-based Network Management

Network Manager is spatially based using Oracle Spatial at the database level and is designed to integrate with popular GIS software for the direct spatial query and map display of assets, activities and/or events associated with the network through the LRM. The Network Manager database supports dynamic segmentation, the process of determining feature location on the features from tables of features containing measurements. No longer is it necessary to define fixed length segments of homogeneous attributes.

Integration

Exor's Network Manager provides a common, centralized database referencing framework that supports all applications related to the network and underpins the whole Exor solution as part of the LRS Hub.



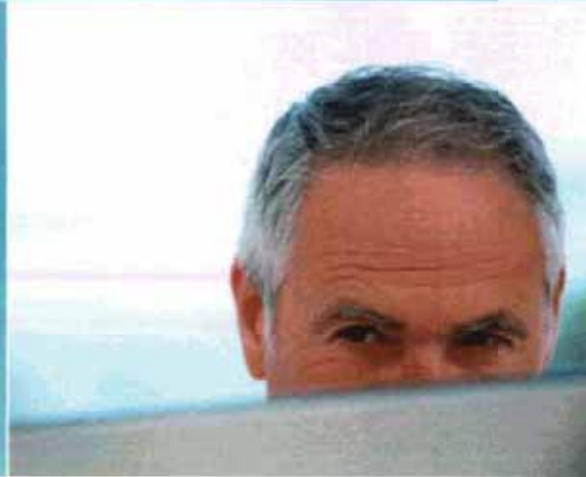
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Product Sheet Information Manager



Features & Benefits

- 4 Simplification of your organizations data into meaningful & accessible information
- ◆ Real time dashboard relevant to your mle
- ◆ Fast & exact information via the web
- ◆ Reduce costs by efficiencies in retaining, accessing reporting on data
- ◆ Intuitive search & analysis using visual metaphors
- 4 Cost effective enterprise deployment of information
- ◆ Easily tailored to match specific client requirements
- ◆ Ease of use – little or no past knowledge of Exor applications

The information you've always wanted in real time.. fast

Information manager - Overview

For many users of an integrated infrastructure Asset management System their main requirements centre around performance management and reporting. They wish to see aggregated high level executive information and only where a particular area is under performing do they wish to investigate further. This is sometimes referred to as an Executive dashboard or report scorecard. The same dashboard approach allows Corporate Key Performance and National Indicators to be displayed giving Users and managers alike instant access to upto date information.

Providing pre-packaged and ad-hoc reporting tools is another key requirement to help organisations deliver the right information at the right time considering the wide diversity of information needs within any organisation

Built to run on the Web, Exor's Information Manager is designed with the end user in mind to provide a complete Reporting and Information Centre for all levels of Exor User from everyday 'power' Users to senior managers who use the system infrequently

Built and designed to run on the Web, Information Manager allows Users to view aggregated performance management data and then drill to a more detailed level of Information both textually and spatially to investigate non-performant areas

Dashboard

Information Manager allows an unlimited number of dashboard indicators or 'Pods' to be configured and displayed in a manner that best suits the nature of the information in question Updated in real time or at a predefined time interval, 'Pods' can be configured as Pie Charts, Bar or Line Graphs tables or a wide number of other display formats With data security in mind, each Pod is protected by a User Role with only those Users who have been granted the appropriate Role having access to the Pod

Each Pod can be configured to allow the User to drill to a more detailed level of information both textually and spatially

Location Setting

The information displayed within the Executive Dashboard can be restricted to specific locations by setting the desired location within the IM Toolbar The location can be set to any Network Section or Group defined within the Exor system to provide specific performance measures or information relating to only features that are located within the selected location

Mapping

Information Manager includes Web Eased mapping allowing multiple data layers to be displayed providing the possibility of increasing workplace productivity through improved information access Built on proven Oracle Spatial technology, Information Manager allows any data held within the Exor database or other 3rd party data accessed using Exor's External Asset functionality, to be displayed including Open Geospatial Consortium Web Map Service (WMS). Designed with ease of use in mind, Information Manager Map controls, for access and navigation, follow 'guidelines' and standards now commonplace and in use by Companies such as Google and Mapquest Map Layers may be toggled on / off allowing a wide variety of spatial information to be displayed

Intuitive Search capability

When licenced with Enquiry Manager or Street Works Manager IM provides a powerful yet simple search engine to find Enquires or Streetworks When used in the context of Roadworks, the IM search Engine allows a User to query and display all Works due to take place during a specific date range on a given Street or Town The search may be further defined using the likely impact of the Works on Traffic flow The results of the Search may be either displayed in tabular format showing the details of each Roadwork or directly on the Map



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Printing

The information held within any Pod or tabular report displayed within Information Manager can be printed, saved in a variety of formats, such as html, pdf, csv, or exported directly to MS Excel allowing further off line presentation or analysis. The Map display can also be saved as a pdf file or printed along with a Map Title and Map legend is required.

Reporting

Exor provide many standard reports that are required to meet specific business needs. Each report comes with a standard set of parameters the values of which can be varied to suit the Users needs. Information Manager allows these standard reports to be grouped in customer defined Business Folders with each folder containing the reports from any Exor Product that relate to that specific business area.

For the production of user specific and ad-hoc reports Information Manager provides an option for using the Oracle Discoverer and II or Oracle BI Publisher products. These products offer high quality business graphics, data mining and offline scheduling capability. Reports written in these tools via Information Manager can be saved and added to a Business report Folder and run by other Users.

Usability

Information Manager has been designed with ease of use and practicality in mind. Instead of lengthy pick lists, IM uses 'predictive type-ahead' functionality that dynamically displays a list of the relevant information. This ensures that little or no expertise or experience of using other Exor products is required.

Worktrays

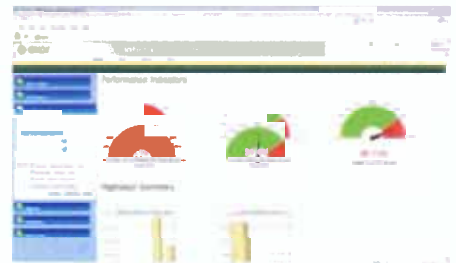
Information Manager provides an option to add User 'Worktray's' to the application. This allows a user to display a summary level view of their outstanding actions. For example, an Enquiry Manager User can display all Enquiries received today or within the last 7 days that need actioned. Using the drill down functionality within Information Manager, the User can drill to the Individual Enquiries or view them on the Map. If required the User can also update the actual Enquiry Manager record from within Information Manager without the need to launch the main Exor application.

Information Manager Sewer

Information Manager is powered by a set of 'Business Area Views' which simplify the underlying schema allowing easy access for users wanting to write ad-hoc reports. Information Manager Sewer is designed and built to negate the need to re-write reports or Pods after an Exor Upgrade should the underlying database definition be changed. This offers complete protection in the Investment made in writing customer reports.

Enterprise Wide Deployment

Information Manager can be easily deployed across the entire Organisation allowing performance indicators and measures from a wide variety of disparate Departments to be displayed and monitored within a single Web based application. Combined with Exor's 'External Asset' functionality Information Manager can act as the Hub to consolidate and gather the wealth of detailed data that exists within any Organisation, providing a single source of truth.



Product Sheet Spatial Manager



Benefits

- ◆ Uses leading GIS technology to Spatially reference all transportation assets, activities and events in one common Oracle database
- ◆ Geographic display of highway networks, roadway infrastructure and their attributes
- Full map-based data entry and editing of road networks and any associated data such as accident locations
- ◆ User-friendly geographic query and reporting features in the database
- ◆ Interface with Exor database to provide desktop GIS access to data for all Exor modules

Spatial Manager provides a powerful desktop GIS (Geographic Information System) based environment to display, edit and publish Exor network and asset data. Spatial manager enables users to display all highway infrastructure data on a map including assets, crash records, traffic statistics, defects, pavement condition, street works and so on. Users can then input, edit and relocate these records as geographic features using the map. All newly posted spatial features automatically update related business information

Spatial Manager is used as an editor in conjunction with Network and Asset Manager. The combined modules provide for full graphical display of highway network attributes and allow full GIS functionality in a surface transportation information system

Map Display of Highway Network and Attributes

Viewing infrastructure data geographically reveals patterns and details not apparent in tables and reports. Spatial Manager enables users to view road networks related assets and characteristics together with other GIS data layers. This contextual information together with the ability to see geographic patterns and carry out spatial analysis of assets, maintenance activities, crash and project data significantly improves asset management decision-making

Map-based Editing Environment for Networks and Assets

Spatial Manager enables users to define changes to the underlying road network using the map while the logical database defining the road network is automatically kept in step. Spatial Manager provides powerful editing tools to maintain road networks and assets through its map interface that is built right into the GIS software screens

Users have a variety of options to update the network including tools to add, delete, shift, merge and split network elements. The entire network editing functionality is available from a movable toolbar on the GIS screen

Geographic Query and Reporting Tools
Spatial Manager is a user-friendly graphical reporting tool enabling users to query and report on data without any programming knowledge. This ensures all information is available to all types of users. Spatial manager is a GIS technology allowing a map-based view of the Exor database for spatial analysis, queries and reporting

Spatial Manager provides a variety of tools to organize and search for information based on record attributes and location. It supports multiple linear referencing methods and includes a linear reference method tool to identify all concurrent linear network locations at any point as well as a tree-like view to display hierarchical information and provide easy, navigable access to your network and asset data

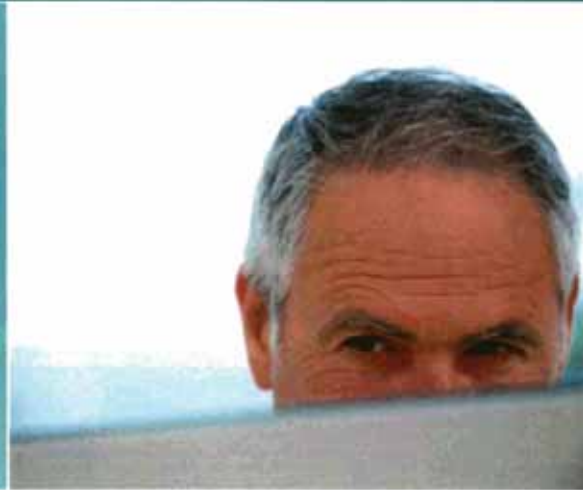
Integrated Spatial Database

All network asset queries and display functions are integrated with the map-based user interface and standard desktop GIS functionality. All network and asset data, both spatial features and business attributes, are held in a shared Oracle database, so all changes to the network geometries are automatically synchronized with changes to asset locations. Spatial Manager enables users to maintain and use multiple linear referencing systems to update assets located using dynamic segmentation or using off-network geometries





Product Sheet Asset Manager



Features & Benefits

- 4 Fully Flexible data Model
- 4 Dynamic Data Validation
- 4 Cross Attribute Validation
- 4 Cross Item Validation
- 4 'External' Assets
- 4 Off Network Assets
- 4 Point, line and Polygon Assets
- 4 Full History of Asset updates
- 4 Fully Integrated with all Exor Applications
- 4 OpenAPI

Cost-effective management of public assets is increasingly difficult in these times of deteriorating infrastructure, high user demand, shrinking budgets, and fewer staff resources. Increasingly, the power of the computer is being used to record analyze and report on valuable information about the location, characteristics, condition, and valuation of assets. Automated databases and decision support tools are allowing public agencies to do more with less. Asset Management Systems are coming into the forefront as the preferred approach for effectively managing assets and the resources used in their upkeep, and for making trade-off decisions among alternative infrastructure investment options

Asset Definition

Exor's Asset Manager forms part of the Exor LRS Hub solution which allows Highway and Transportation organizations to manage their Investment in public Infrastructure in a single Integrated database containing asset features conditions valuation and location information. Fully flexible and user-definable the full range of assets and associated attributes from signs guardrails pavement surface street markings and street lighting to culverts traffic signals and bridges can be modeled and managed in an integrated fashion. Implementing Asset Manager as part of the LRS Hub with Exor's Network Manager module provides an asset Inventory database that is both geographical and referenced to the highway network

Importantly using Exor's external data functionality data residing in external databases may be associated with the Asset Hub without the need to duplicate the data or remove from the source system. Asset Manager will create a view onto that data and allow for the data to be used in analysts query and reporting inside the Exor Hub

Asset Location

Using the linear referencing capabilities in the Network Manager module Asset Manager provides support for managing assets based on their physical locations along the road network. Different asset groups can be analyzed by individual street segment or by an entire road class to provide flexible reporting of condition service level and valuation

Asset Manager provides support for

hierarchical polygonal and non-linear assets such as bridge substructures parks properties and buildings. Assets can be located against the linear street network using distance or offset measures. Regardless of how the asset is initially located it can be viewed and retrieved using either type of measure. GPS coordinates can also be stored against each asset and the asset's location can be automatically referenced to the street network

Geography-based Asset Management

Exor takes advantage of map display spatial query and geography based reporting through a tight integration of the Asset Manager database with the Oracle Spatial database. Adding Exor's Spatial Manager module allows assets edited and managed in a map environment. Exor's Locator module provides simple map tools designed for the engineer





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Assets can be queried, and grouped by geography for reporting purposes and color-coded maps can be produced

Historical Record of Asset Changes

Exor modules provide a full maintenance history against each asset in the database. By back-dating query requests, a complete historical record of all changes to assets (e.g. condition, relocation), additions to the road network (e.g. new subdivision) and work activities performed on assets (e.g. resurfacing) can be created. This technique can be used to track changes over time, perhaps to justify the need for additional maintenance budgets.

Integration

Exor provides integrated software tools for updating asset condition and valuation changes as the result of on-going maintenance activities and completed refurbishment projects. Asset Manager underpins all Exor Business Modules. It is frequently used with Exor's Maintenance Manager module to provide integration of scheduled, in-progress and completed maintenance activities against assets. This integrated approach records all maintenance activities performed against assets in Asset Manager in a single integrated database.

To complete the information loop, Exor's Integrated Map Capture field data collection software module can be used to conduct asset field inventories, to perform condition assessment inspections and to report maintenance work progress. Asset data can be downloaded into Map-Capture prior to going into the field, and collected data can be uploaded in Asset Manager without special programming or reformatting of data.



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