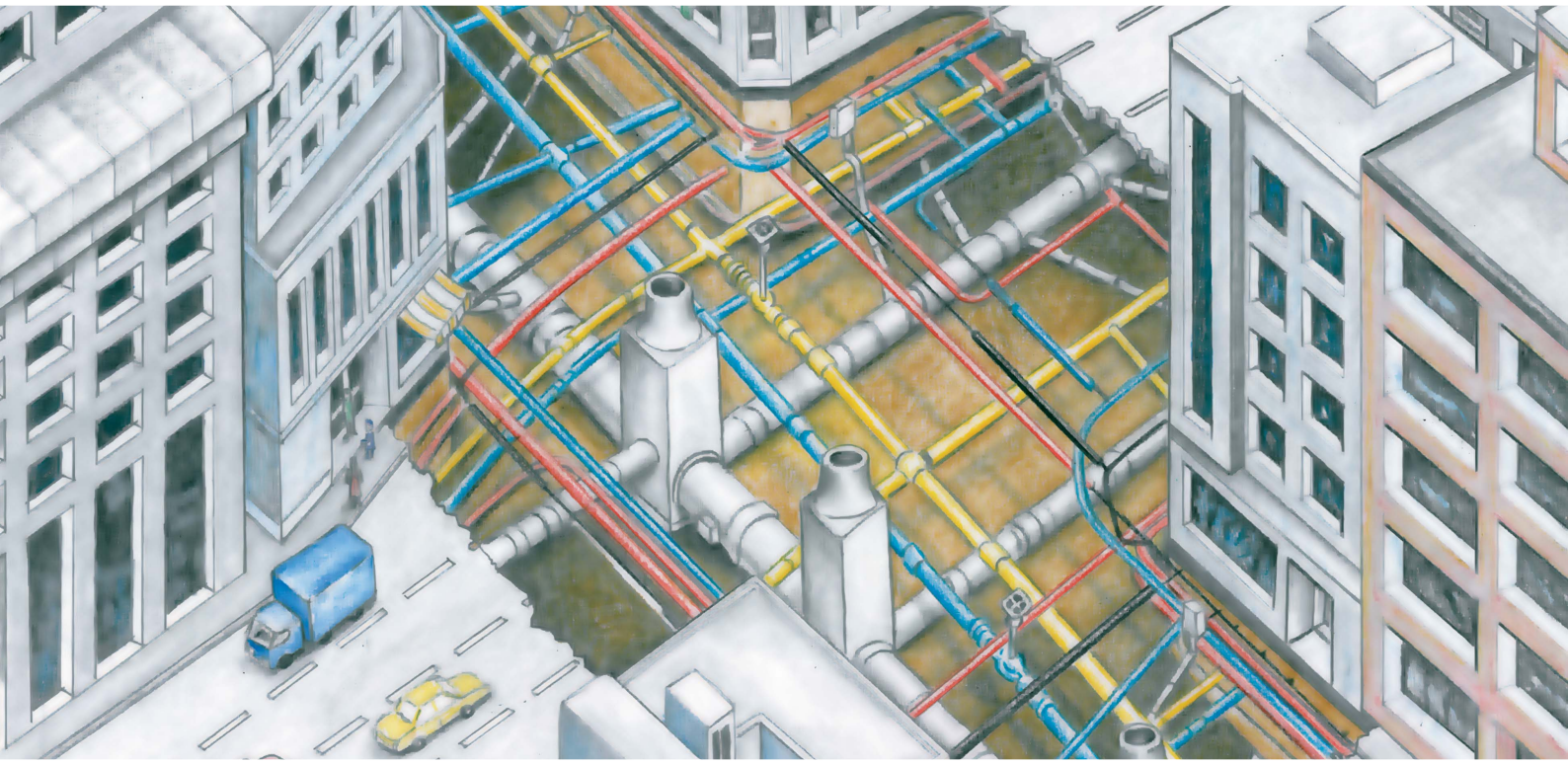
GIS Solutions
from Mettenmeier



Network Resource Managers

for Smallworld GIS

Your Smallworld GIS with a new approach

- Smallworld standard data models for utilities
- Worldwide user group ensures on-going product quality
- Scalable from small to large network operators
- Rapid productivity and reduced training time
- Optimised functionalities for low-cost data conversion and update
- Wide range of add-ons for network calculation, asset management etc.

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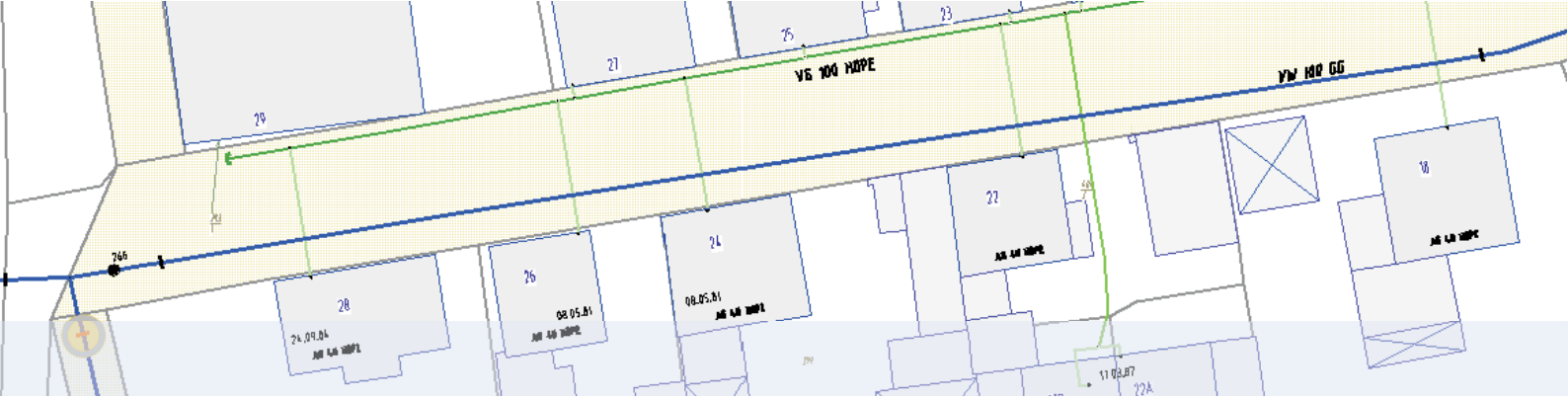
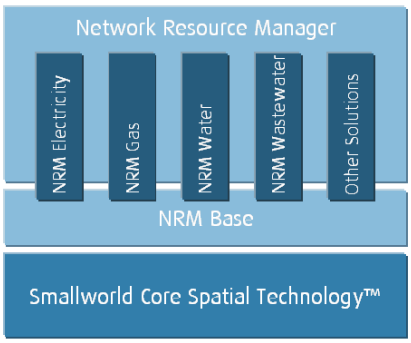


Smallworld NRM – Network Resource Manager

The standardised practice-oriented Smallworld data models, referred to as NRM, provide utility network operators with off-the-shelf geospatial solutions chosen by more than 300 organisations worldwide. The savings potential in terms of implementation and maintenance costs is enormous. In contrast to customer-specific solutions, the development costs are distributed over a large number of customers which gives Smallworld users the chance to break the upgrade cost-cycle.

Benefits of NRM products

The standardised Smallworld NRM data models are designed for geospatial-related issues of utility network operators. In conjunction with the reliability of Smallworld GIS, utility companies can quickly achieve a high level of productivity. This provides a secure future for company-specific solutions by supporting the business workflows and geospatial-related processes. NRMs support documentation and updating of networks and assets, providing the customer with:

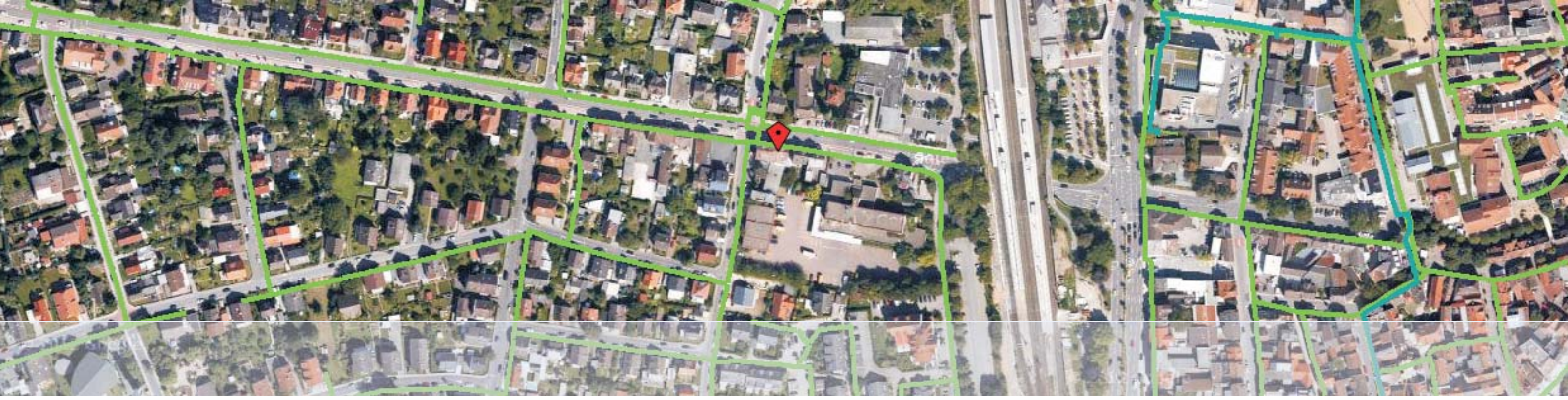


Based on many years of experience developing spatial solutions for the gas, water and electricity industries, the NRM product suite is available as off-the-shelf solutions which give users the chance to break the upgrade cost-cycle of heavily customised solutions.

- Standard system environment which can be put to work immediately
- Proven product quality as a result of a large number of users, organised in user groups, and the on-going alignment with regulatory and user requirements
- Modular solution with configurable components
- Reduced training costs due to the consistent user interfaces of the NRMs
- Provision of standard upgrade path incorporated into each NRM release and available to all customers
- Configurability of the applications for data capturing, analysing, viewing, etc.
- Software environment oriented to the real world of a utility network
- Cost-favourable data capturing due to construction and dimensioning functions

Data Model Concept

GE Smallworld Core Spatial Technology is specifically designed to model geospatial data based on the unique concept of a "real-world object". Not only are all attributive data handled as a unit, but this also includes any desired number of associated geometric properties, as well as any relations to other real-world objects. All relevant objects required to manage a network's assets and their dependencies are part of the NRM data models. Topological object interdependency is managed automatically based on business rules, and data integrity is ensured at all times. Any underlying problems which may occur are recognised in advance from their object specific behaviour during data capture and don't need to be eliminated by time-consuming diagnostic routines afterwards. Geometry interdependencies between real-world objects allow network tracking and geospatial-related queries. All objects, together with their metadata, display information, etc., are fully managed with database support, which was developed specially for the requirements of spatially-related information systems. This technology is distinguished by its excellent scaling and distribution capabilities.



Common Features

The individual industry specific NRMs are using numerous common features with regard to their functions (e.g. object editors, labelling, detail views, dimensioning and related documents). Common functions and object classes used by several NRMs are gathered into a centralised layer: the NRM Base. This provides the integration platform for all NRMs. Moreover, the basic Smallworld functions are still available with all NRMs, e.g. data analysis, network tracing, user-defined searches, MS Office integration, authorisation, printing, long-term transaction and raster data management.

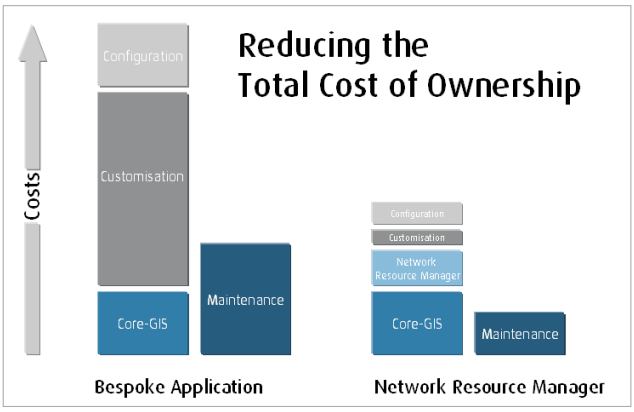
Location

Often the location keys of an object are not always matching the official coding (municipality, street, house number). The integrated location module, designed to update and manage location data, provides a solution to this problem. The data model of the location module is structured from State down to house number. The location module may be set up centrally or configured separately.

Evolution within the company

The NRM data model offers a range of productivity tools for initial data capturing and the on-going network updates. Additional off-the-shelf products can be integrated quickly to support the various issues and processes evolving around geospatial asset data:

- Data provider: The database serves as a repository for issuing information company-wide. For that purpose, the Smallworld Internet Application Server provides web-based access to the data. This also applies to mobile applications for on-line network information.
- Network design: The database supports network construction projects. Solutions like the Smallworld Design Manager or the light-weight Variant Database (VRDB) support integrated workflows and version-managed network design.
- Network calculation: Pre-configured to be used with NRM, standard network calculation interfaces support the exchange of data including all relevant structural components and topology with various calculation engines.



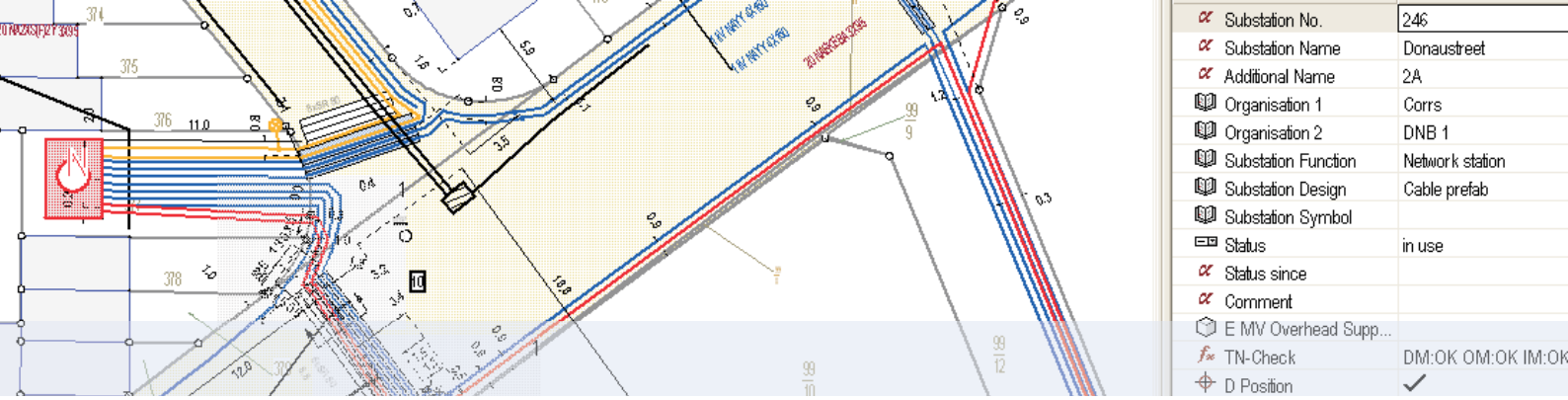
Historically in the utility industry, the implementation of geospatial systems has involved buying a software product like GE Smallworld Core Spatial Technology and then doing some data modelling and customisation on top to create a bespoke solution that meets the company's requirements. While this approach incurs additional cost for the customisation, the maintenance and specific support, Smallworld NRM being an almost completely off-the-shelf system reduces on-going cost of ownership.

Open system architecture

GE Smallworld pursues an open products strategy. This is reflected in open-client philosophy and particularly in open-server architecture allowing quick access to data and applications. GE Smallworld consequentially pursues its openness policy with the support of standards such as SQL, ODBC, XML, WMS/WFS, OLE/COM and CORBA. Smallworld is a member of the OpenGIS consortium.

GIS Web Services

Mettenmeier's GIS Web Services is a powerful integration technology for Smallworld GIS designed to support service-oriented architecture (SOA) systems and to leverage the geospatial capabilities of the GIS to enterprise business systems (e.g. SAP, DMS, SCADA, BI etc.) This technology adds a web service interface with additional monitoring tools to GE Smallworld. In this way, the GIS is opened up to the integration of information and business processes across technical and organisational boundaries (matching of data, provision of maps for assets or tasks, processing of network information etc.). It allows flexible data exchange for the enterprise applications and easy GIS data update using web service clients. EAI integration platforms can be deployed to connect the GIS to other web service enabled systems.



NRM Electricity

The outstanding feature of Electricity NRM is its ability to display both single cable sections and groups of cables running parallel to one another. Alongside documentation of the network and its installations, this permits the on-going integration of planned facilities. In addition to this, the Electricity NRM supports the all-embracing requirements and tasks of network operation.

Network logic and data model

NRM Electricity reflects the closed system energy flow from network supply points through to consumer points, including the network connection/disconnection status. Sections of the network still in the planning phase may also be topologically integrated into the existing network. Analogous to the real world, objects are distinguished in terms of different voltage levels:

- High voltage (Transmission, Subtransmission)
- Medium voltage (1 - 50 kV)
- Low voltage
- Street lighting
- Remote monitoring and information network

Company-specific and configurable catalogues ensure a high level of flexibility and data quality. Using the NRM basic technology, theme-related network tracking can easily be carried out, specified by pre-defined or user-defined stop criteria. Results can be exported to the MS Office world.

Maps and representations

NRM Electricity is pre-configured so that all important maps can be represented in the system.

- Geographical Maps with multi-line representation containing detail and overview maps, both available as single or multi-section map.
- Schematic maps for high and medium voltage and general connection diagrams for the schematic mapping of the energy flux-related components of facilities and integration into the geographical maps according to the network logic.

Support of working procedures

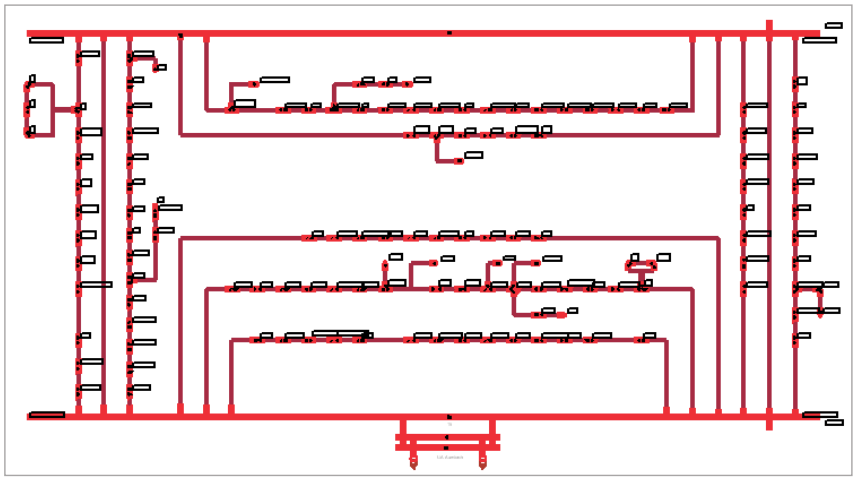
NRM Electricity is pre-configured to facilitate its quick and productive use and has high integration proficiency in supporting internal workflows and procedures:

- Integration with SAP
- Interfaces for network calculation systems, e.g. PSS/Sincal
- Integration into GE Smallworld's process solutions for planning, operation and business analysis

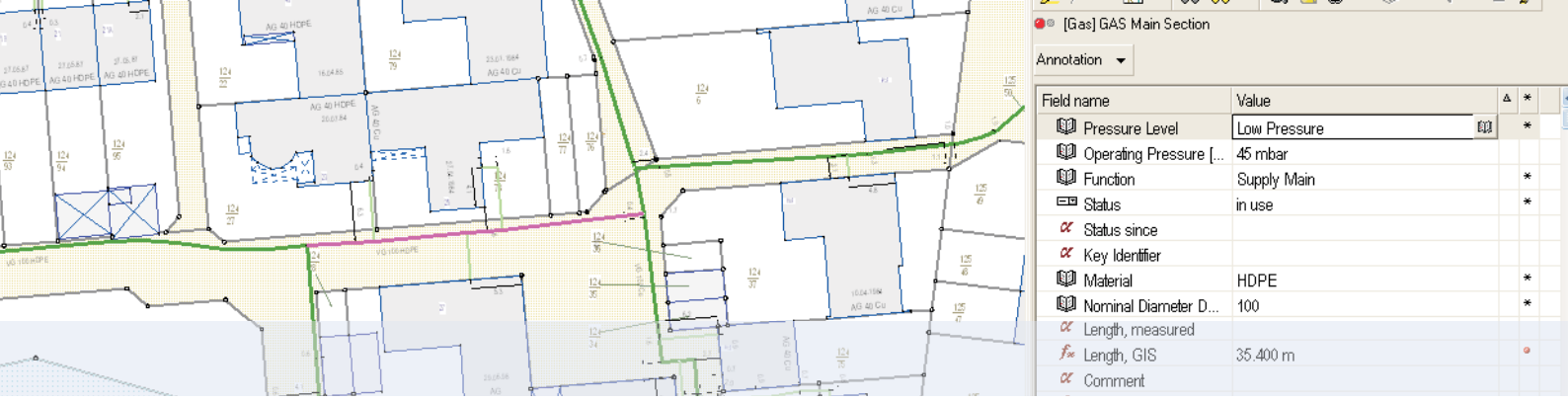
Statistics and analyses

Statistics features have been added to support planning and reporting requirements:

- Outage Report allows outages to be documented directly in the GIS including the outage duration and house connections concerned.
- Network Statistics produces figures like the number of service connections, substations and other objects, length of circuits and tray lengths.
- Operation Analyser allows simple calculations in all voltage levels and analyses on network conditions.



One solution for all voltage levels – multi-line representation and schematics



NRM Gas

NRM Gas is a sophisticated fully operational product designed for the documentation of gas distribution networks. Development was based on common standards, meeting the requirements of industry associations. NRM Gas provides digital documentation of the current status of gas networks as the basis for optimised operating procedures.

Network logic and data model

This Network Resource Manager reflects the gas flow from network feeder locations through to consumer locations. Sections of the network still in the planning phase may also be topologically integrated into the existing network. Analogous to the real world, objects are distinguished in terms of different pressure levels:

- High pressure (HP)
- Medium pressure (MP)
- Low pressure (LP)
- Service connection (MP, LP)

Gas mains systems are topologically separate entities. Topological links between high, medium and low pressure networks can only be established by means of gas pressure regulating devices. Private (service) terminals are connected with low and medium pressure supply lines using branch piping. Operating pressure is documented as an attribute. In addition, the types of pipe are distinguished between "feeder mains", "supply mains" and shared "service mains". Using the NRM basic technology, theme-related network tracking can easily be carried out, specified by pre-defined or user-defined stop criteria. Results can be exported to the MS Office world.

Maps and representations

“Detail map” and “overview map” scales are managed independently in NRM Gas. A copy function makes possible to transfer the location of a pipe from one map level to the other. Subsequently, the position of the pipe may be adjusted and/or generalised using the efficient Smallworld data capture tools. Schematic representation and general connection diagrams can be displayed and integrated into the geographical maps according to the network logic.

Moreover, the internal representation manages those elements that are crucial for network calculation.

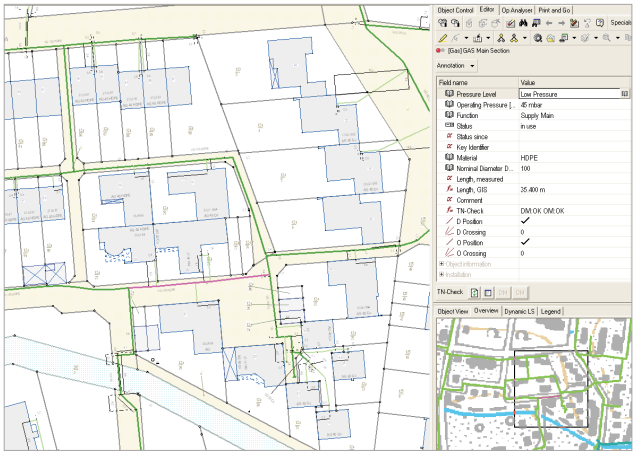
Support of working procedures

The following operating conditions represent the support of network planning and operating procedures: planned, under construction, not yet in use, in use, out of use. The topological behaviour and graphic appearance of the objects vary accordingly. This ensures on-going representation of both the planned and the currently active network.

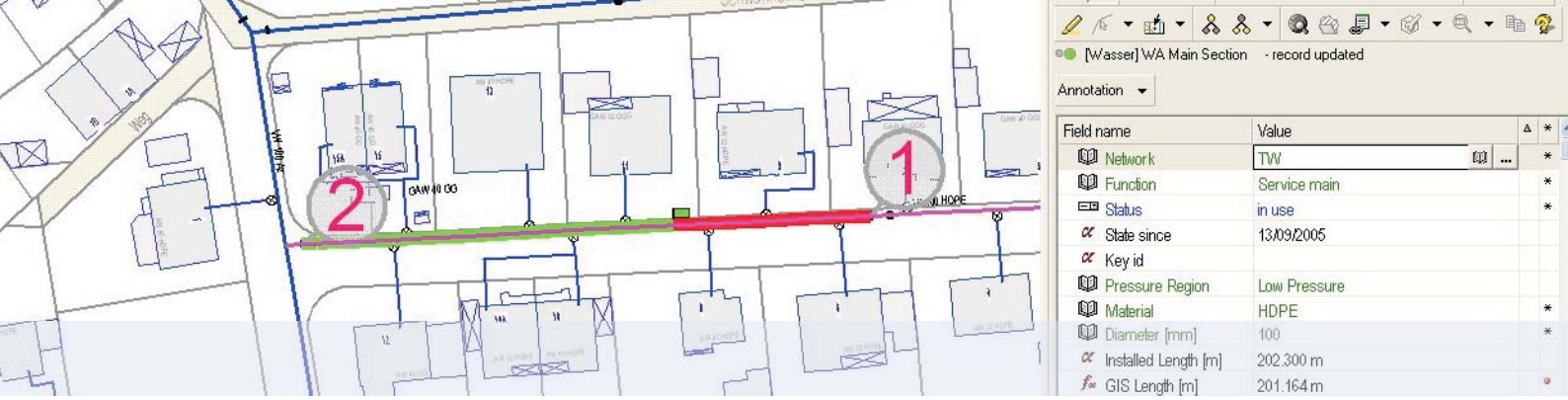
Statistics and analyses

Statistics features have been added to support planning and reporting processes:

- Outage Report allows outages to be documented directly in the GIS including the outage duration and house connections concerned.
- Network Statistics produces figures like the number of service connections, PRS and other objects, length of mains etc.



Development based on industry standards – Statistics features for regulation reports



NRM Water

NRM Water is a product of proven worth, available for the documentation of water networks. This covers the fields of water recovery, transport and distribution. Development was based on common industry standards. NRM Water provides digital documentation of the current status of water networks as the basis for optimised operating procedures.

Network logic and data model

The NRM Water reflects the water network from the water works through to consumer locations. Sections of the network still in the planning phase may also be topologically integrated into the existing network. Analogous to the real world, objects are distinguished in terms of their functions: obtaining mains, transport mains, supply mains, private (service) mains.

Water mains systems are topologically separate entities. Topological links between recovery, transport, supply mains and service networks can only be established at predefined transfer nodes. Service terminals, for example, are connected to the supply network via a service main. The pressure zones are laid down as an attribute. In addition, the types of mains are distinguished between "distribution main", "supply stub mains" and shared "service main".

Maps and representations

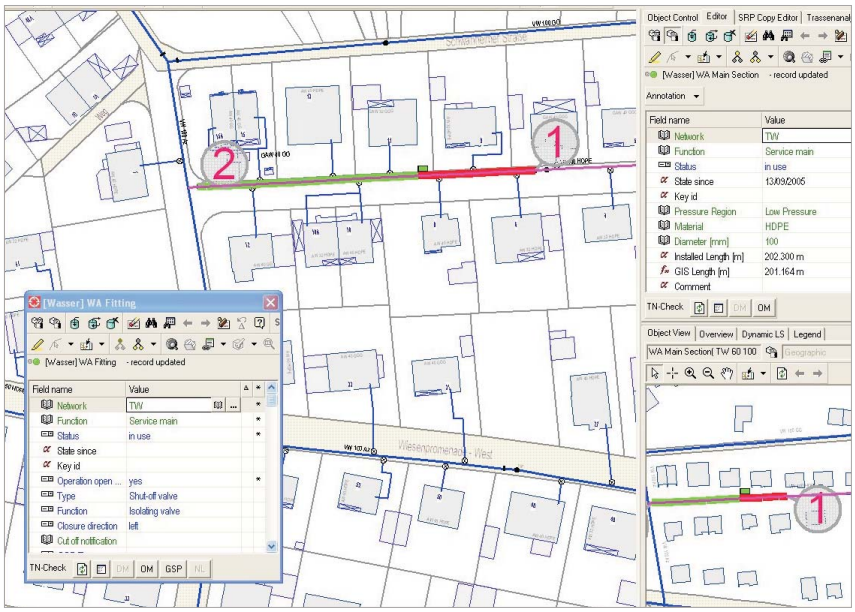
The detail map and the overview are managed independently in the NRM Water. A copy function makes possible to transfer the positioning of a main already constructed from one map level to the other. Subsequently, the position of the main may be adjusted and/or generalised using the efficient Smallworld data capture tools. Moreover the schematic representation of the network can be displayed.

Support of working procedures

The following operating conditions represent the support of network planning and operating procedures:

- planned
- under construction
- not yet in use
- in use
- out of use

The topological behaviour and graphic appearance of the objects vary accordingly. This ensures on-going representation of both the planned and the currently active network.



Upward compatibility between different software releases

NRM Wastewater

The Wastewater Network Resource Manager is not only a stable basis for high-quality documentation of complex sewer networks. It also provides an overall solution to all issues concerned in sewage-related fields with its integrated data capture, updating, design and analysis toolkit.

Network logic and data model

This application reflects the course of wastewater from consumer locations through to the sewage treatment plant. Sections of the network still in the planning phase may also be topologically integrated into the existing network. A distinction is made between rainwater, wastewater and combined sewage.

Special functions

- Centralised management of all blueprint, operation and planning data with reference to the fields of hydraulic calculation, assets assessment, damage classification and condition assessment
- Management of sewer condition data according to EN 13508-2 standards
- Automatic inclusion of reaches and other drainage connectors when moving manholes
- Integrated storage of video inspection data including history and image archive to allow automatic derivation of damage/ side-arm maps.

Maps and representations

The following map types are managed independently in the Wastewater NRM:

- Detail and overview maps
- Treatment plant view and longitudinal section
- Visual representation of condition classifications in accordance with EN 13508-2 standards

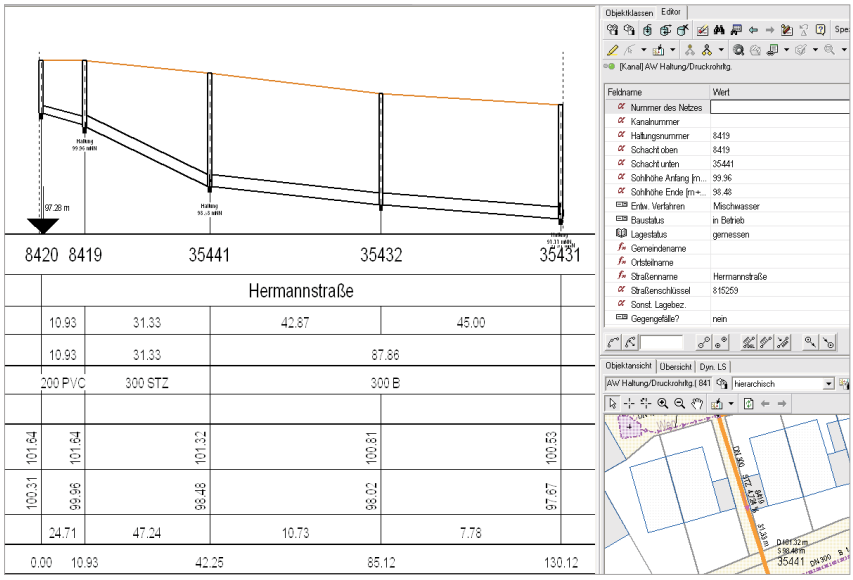
Support of working procedures

The Wastewater NRM permits on-going support of everyday procedures based on intuitively used tools. These include:

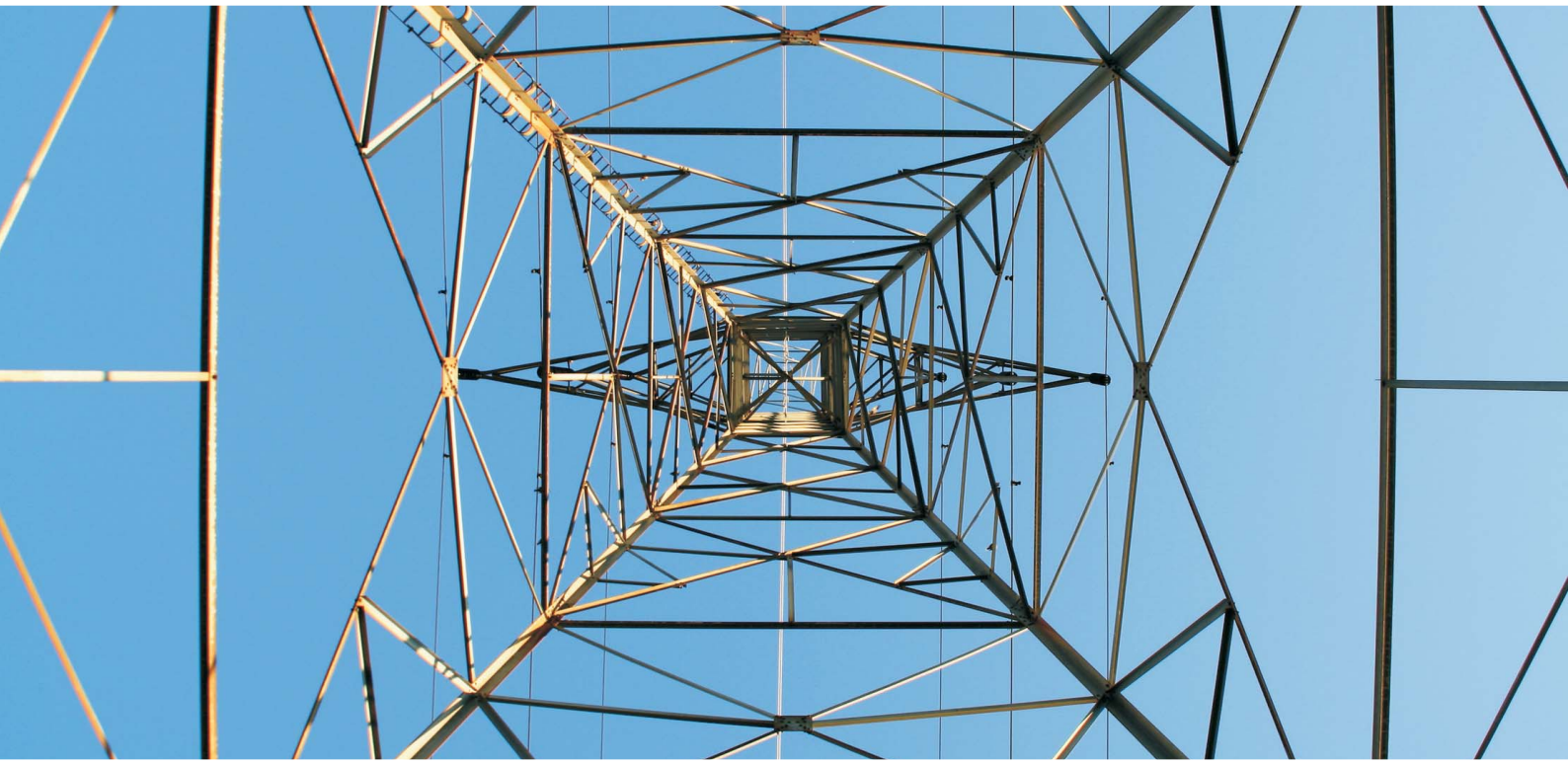
- Documentation and information
- Preliminary, draft and construction site planning
- Setting up servicing/maintenance maps by management of maintenance and inspection intervals
- Maintenance monitoring
- Monitoring indirect discharge (where does hazardous effluent flow to? Where has it come from? What risk is involved?)

Well-designed interfaces are available to integrate standard calculation engines and assessment procedures. Workflow management solutions may also be incorporated. In the latter case, the Wastewater Network Resource Manager provides centralised management of data from the following sources:

- Hydraulic sewer network calculation in accordance with EN 752
- Optical inspection according to EN 13508-2
- Commercial calculation systems
- Operational systems
- Office products



Upward compatibility between different software releases



Company Overview

Mettenmeier is a software consultant, service and solution provider, with corporate headquarters in Paderborn, Germany, supporting clients in the gas, water and electric industries. We are dedicated to enabling the operators of utility assets to plan and manage their networks more successfully. As one of Europe's leading GIS specialists our ability is to rapidly implement and deploy successful enterprise-wide business solutions.

Partner Network

Mettenmeier teams up with other solution providers to help extend the market reach of Smallworld NRM through familiarity with local standards and industry knowledge. Through building a team of developers and consultants, Mettenmeier and its partners deliver proven, cost-effective standard solutions for large, complex networks.

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