Enhancing a Telecommunication Network Over the Web with Remote Collaboration

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Class Summary

In this class, the German telecom company Kabel BW (the second largest cable operator in Germany and a subsidiary of Liberty Global, Inc.) and Autodesk Consulting present a solution for managing telecommunications infrastructure. The novel network information system (NIS) combining the power of Autodesk® Infrastructure Map Server with a 3rd party telecom infrastructure management system FNT Command, enables Kabel BW to maintain and capture new telecom assets over the web.

It is business critical for Kabel BW to record and manage assets in a fast, process-oriented, location-independent, and efficient way. The class first hand demonstrates how Kabel BW uses up-to-date, location-based telecom information to help the company improve operational efficiencies and meet competitive challenges. For example, customer service agents now answer customer inquiries faster and with more detail, and engineers now devote more of their time and expertise to maintaining and enhancing network infrastructure. As a result, the company has become more responsive to customer needs while saving time and money. The success of the project was based on a close collaboration between Kabel BW, FNT-GmbH, and Autodesk Consulting.
Learning Objectives

During this class, you:

- Understand the business requirements that led a large German cable provider to replace its network information system (NIS)
- Will be introduced to a modern web-based NIS combining an expert GIS with a telecom inventory management system
- Understand base facts about the system architecture and deployment
- Learn first hand about results: benefits, lesson learned and typical application workflows of the new NIS 2.0
Before we begin… Brief intro’s from us…

- **Ulrich Hoffmann**
  - Vice President Network Development, Unitymedia KabelBW GmbH
  - Planning, implementation & documentation of network related projects
  - Network extension & optimization

- **Steffen Wilke**
  - Strategic Project Manager at Autodesk Consulting (AC) in Stuttgart, Germany
  - Started at Autodesk 2008 as AC Software Develop Manager within GIS area
  - Manages projects, often with larger customization and development part
Class Agenda

- Introducing: Unitymedia KabelBW – a leading German cable provider
- The Challenge: Legacy Network Information System (NIS) 1.0
- The Proposal: Collaborating GIS and Telco Expert System
- The Solution: NIS 2.0
- The Technology: A brief glance under the hood
- The Result: Best practice network management at Unitymedia Kabel BW today
Introducing: KabelBW – a leading German cable provider
A big corporate family: Liberty Global

- **Countries**: 13
- **Homes passed**: 33 million
- **Customers**: 20 million
- **RGU (subscriptions)**: 33 million
- **Revenue USD (Q4 2011)**: 9.5 billion

**Map**:
- **The Americas**: Puerto Rico, Chile
- **Western Europe**: Germany, Poland, Slovakia, Switzerland, Austria, Hungary, Romania, Netherlands, Belgium
- **Central and Eastern Europe**: Czech Republic, Hungary, Romania

**Companies**:
- upc
- chello media
- helmond
- unitymedia
- Kabel BW
Unitymedia and Kabel BW
Together active in the most attractive regions of Germany

Access to highly attractive socio-demographic regions

<table>
<thead>
<tr>
<th></th>
<th>NRW/Hessen</th>
<th>BW</th>
</tr>
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<tbody>
<tr>
<td>Population (in million)</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>Households (in million)</td>
<td>11.5</td>
<td>5.0</td>
</tr>
<tr>
<td>% of GDP¹ (in %)</td>
<td>31</td>
<td>14</td>
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Unitymedia KabelBW becomes the second largest cable operator in Germany

<table>
<thead>
<tr>
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<th>Unitymedia</th>
<th>Kabel BW</th>
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<tbody>
<tr>
<td>Homes passed (in million)</td>
<td>8.7</td>
<td>3.7</td>
</tr>
<tr>
<td>RGUs² (in million)</td>
<td>6.4</td>
<td>3.9</td>
</tr>
<tr>
<td>Total revenue 2011² (in billion €)</td>
<td>~1.0</td>
<td>0.6</td>
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¹ Gross domestic product
² Financial figures are based on IFRS Reporting Q4 2011
The basis for our success: A predominant network

High-Speed Broadband network in the whole country

- Backbone Fibre ring connects Hessen, NRW and Baden-Württemberg
- 214,000 km coaxial- and more than 12,000 km fiber cable
- 75% network coverage
- 12.5 million accessible households
- Capable broadband services up to 150 Mbit/s
The Challenge:
Legacy Network Information System (NIS) 1.0
Legacy system – a short history

- Focused on **coax network** (especially in-house networks)
- **Raster maps** and schematic drawings
- **As built** documentation
- **No inventory** data
- **Only outside** plants
- **Desktop** workplace
Why a new system was necessary

- E2E digitization, planning and documentation
- Physically and logically network view
- Web-based access for planning and documentation
- Tools for quality assurance and reporting
- Online/Offline solution for field service
- Special feature for planning & troubleshooting
- Versioning capabilities (planning vs documentation)
- Integration in existing systems architecture
Main business requirements for the new system

- One system for different type of users: Experts and casual user
  - Expert User – NIS is his main working tool
  - Casual User – NIS is only one tool in his workflow repository

- Support of the existing IT environment incl. interfaces (Oracle Spatial DB, Windows OS, LDAP, CITRIX)

- Configurable standard system (**keep close to standard**)

- Performance, scalability & maintainability

- Support of **main processes** (planning, documentation, fault clearance)

- Renown, locally based supplier
The Proposal: Collaborating GIS and Telco Expert System
Tight integration vs collaboration of systems

**GIS with Telecom module**
- Data & architecture consistency
- GUI integration, one-system feel
- One-size-needs-to-fit-all problem
- System development interlocked

Use if workflows heavily interconnect areas

**Coupled systems**
- Systems fit application area
- Systems can develop independently
- Different GUI paradigms
- Careful interface design and data consistency enforcement

Use if workflows need special features but cross boundary traffic is localized
Requirements | Workflow landscape

Broad use
Expert to casual user

Specialized workflows
Telco only workflows
GIS connected to Telco
Telco connected to GIS

Connection via trench objects
Nodes containing equipment
Trenches containing cables
The Solution: NIS 2.0
Solution | Interfacing GIS and Inventory System

- Autodesk Infrastructure Map Server as expert GIS System
  - Serving all geo-construction and geo-information requirements

- FNT Command as expert telecom management and inventory system

- Thin integration layer
  - Trench objects (nodes and segments) are the only interoperability objects
FNT GmbH
Facility Network Technology
Solution for IT, Facilities & Telco infrastructure

Founded: 1994
Employees: >160

Company Headquarter: Ellwangen/Jagst near Stuttgart
Headquarter US: New Jersey
Branch Offices: Berlin, Bremen, Düsseldorf, Munich, Wolfsburg
Certification: DIN EN ISO 9001, ITIL, SERVIEW Certified
Member of: itSMF, TM Forum, FTTH Council, BREKO, BITKOM
Exemplary references //

// German stock exchange (DAX30)

// Telco, Cable & Broadcasting

- IT, Broadcast and plant documentation
- HFC, Fiber and SDH network
- Copper, Fiber and SDH network
- Fiber, SDH and Gigabit Ethernet network
- Fiber, SDH and Radio network
- SDH backbone, MPLS and Tetra network
- Fiber, SDH and Gigabit Ethernet Network
- Copper, Fiber and SDH network
- SDH, Broadcast, Radio and Satellite network
- Fiber and Tetra Infrastructure
The software suite Command represents a modern Network & Service Resource Management forming the cornerstone of a future-proof OSS / IT environment.
Autodesk Infrastructure Map Server (AIMS)

- Flexible web-based enterprise GIS mapping software
- Data stored in Oracle DB
  - Open, configurable DB structure, data access via DB interfaces
  - Versioning (planning jobs)
- Map Server – generating and serving maps
  - Highly configurable, flexible layouts
  - Rich API
- Multiple front ends possible
  - Web based editing and construction
  - Browsing and information
  - Off-line client using exported GIS content
Interface AIMS and Command

- AIMS is leading system - “owns” trench objects and jobs
  - Trench objects can only be created and deleted in GIS
  - Job concepts in AIMS and Command are connected – planning and documentation are consistently separated
- Command manages entire network inventory
- AIMS shows stylization dependent on inventory data
Simplified scalable GIS Information

- Browser application providing users a scalable, light-weight web tool to view and query datasets and provide an interface to the FNT Command application.
- Printing, Plotting, Redlining
- Reuse of NIS customization components
Off-line solution

- Provide field engineers with off-line solution
- Basic network and inventory information
- Search for location, equipment
- Redlining
- Export map & signal plans (netspider) to off-line DB
The Technology:
A brief glance under the hood
Thin functional interface via SOAP
- Trench object management
- Job management

Use of standard web APIs
- Zoom and highlight

Thin data interface via DB views
- Mass data exchange

Only trench objects redundant
- Systems connected via trench objects
Custom component example: Single Sign-in

- Single NIS sign in – authenticates AIMS and Command
- Unified NIS user and user group administration
- Use Active Directory Information

An Admin-Tool for managing NIS users and roles was created and integrated in TB Administrator
System deployment

Scalable
Maintainable
High-availability
Upgradable
Separate hardware from software
Separate components
The Result:
Best practice network management today
NIS 2.0: Data and Facts (August 2012)

- 40,034 amplifier
- 502 user
- 1,383,853 Termination points
- 6,798 km fibre cable
- 2.6 million parcels in cadaster maps
- 18 million tile’s of cadaster maps
- 2,082,000 nodes
- 2,010,000 ducts/trenches 177,566 km
- 72,047 jobs/173 per day
- Database volume: 192 GB
NIS 2.0: Benefits (functional)

- A consistent planning and documentation system
- Interfaces between Inventory and GIS
- Web solution – full construction and information capability
- Simple import/export via excel, csv and the common GIS formats
- Special feature for planning, documentation & field services
- Topical maps
- Automated quality assurance
NIS 2.0: Benefits (financial)

- **WebGis** for digitization – 50 % cost reduction with international service provider
- **Automated online information** – faster information at lower costs
- **Process- automation** increase the efficiency of the daily business
- Complete and current management of assets
- **Extendible and further potential for process automation**
Workflow: Network digitization

Starting point:
scanned, raster maps
schematic drawings with
length specifications and
property data

Target:
precise digitalization
with additional attributes (i.e. year of hauling)
Workflow: Network digitization

Start in GIS subsystem
Workflow: Network digitization

1. Setting of construction points
2. Digitization of nodes
3. Digitization of ducts & trenches
4. Additional attributes
Workflow: Network digitalization

1. Setting of construction points
2. Digitization of nodes
3. Digitization of ducts & trenches
4. Additional attributes
Workflow: Network documentation

1. Setting of construction points

2. Digitization of nodes

3. Digitization of ducts & trenches

4. Additional attributes
Workflow: Network documentation

1. Setting of construction points
2. Digitization of nodes
3. Digitization of ducts & trenches
4. Additional attributes

Jump into Telco subsystem
Workflow: failure localization

Starting position:
- Cable disruption in the fiber network
- OTDR measurement

Task:
- Calculation exact position of disruption
- Creation of plans
Workflow: localization of point of interference

- Signal tracking
- Consideration of parameter which influence the length (Helix factor, Drill etc.)
- Highlight of the affected cable as well as the closest objects in the telco system
- Distance information of the point of disruption from closest objects

Start in Telco subsystem
Workflow: localization of point of interference

- Jump from inventory to the GIS
- Exact position of point of disruption
- Plot site maps for civil engineering partner
- Detection of owner with necessary details

Jump into GIS subsystem
NIS 2.0: Lessons learned

- Use well founded **specification**- but not too detailed
- Step-by-step extension of functionalities- **iterative project execution**
- System configuration needs careful optimization and **takes time**
- Each solution depends on existing IT infrastructure – simple things can be difficult to manage
- GIS systems focused on experts– **too complicated** for the casual user
- **Process support** is often more important than functionalities
- The benefit is in **data usage**, not capture – utilize the added value
Future improvement and enhancements

- Easier **user interface** adopted to casual user
- Broad support of business processes and **process automation**
- **Mobile integration** – Support new generation of mobile end devices
- GIS as **cloud service**
- License-free viewing of information
- Improvement of **web technology** (speed, scalability)
- Market place for special GIS add-ons (Apps)
Take home messages

- A NIS interfacing Autodesk AIMS with an expert telecom management system provides a modern backbone for a cable provider company

- The system is able to support a broad range of use: from expert construction to casual information and reporting

- Web enabling and system collaboration architecture uncovers benefits of modern technology, such as remote collaboration, integration into changing system landscape, potential to access mobile and cloud technologies