The Digital Twin of the future
For Telecom providers

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Who/what is KPN

- Incumbent Telco of the Netherlands
- Tier 1 telecom operator
- Employees: 12,248 (fte, 2019)
- Provider of nation-wide telecommunications and ICT solutions
- Provider of worldwide wholesale network services
- KPN stands for ‘Royal PTT Netherlands’
Inventory Management with and without GIS

NWA roadmap
Physical & geographical

Physical asset data

New Networks (SDH/ATM)

NeAD

Connexx

OTA

BRIT

NIM 04

1992

1985

1997

2001

2004

2004

2018

Geographical info

Vector (xy)

Raster

Paper

Paper

Paper

Paper

NEAD

2001

2004

2009

2015

2015

1995

2016

GEOS FOW 2.0

Q1 2022

Q1 2023

Q1 2024

GEOS DOCs (DOCS)

GEOS DOCs (DOCS)

GEOS DOCs (DOCS)

GEOS DOCs (DOCS)

GEOS DOCs (DOCS)

GEOS DOCs (DOCS)

Patching (patches)

KTI (NAFI N fiber)

Archibus (interface)

Cocoon (FTH)

GIS RI- (demarcation)

BAYNAS (SDH Upgrade)

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Software to support the main processes in a telco provider

Main telco processes to support with **Operational Support Systems:**
- Delivery management
- Service and performance management
- Capacity management
Operational Support Systems (OSS)

- Service Catalog
  - Inventory management
    - Logical Network
  - Physical Network
- (GIS) Inventory management
- Fault management
- (DSLAM) Port activation
- Discovery engine
- Ticketing system for service

Interfaces for:
- Import data from GPS Poles
- Land based data from Cadaster
- WFS
- WMS
- REST/JSON (interfacing to Fault Management and Inventory Management for logical networks)
Why a digital twin for a telecommunications network

1. Rapid expansion of telecommunication infrastructure
2. Need for effective and efficient management of the infrastructure
3. Minimize downtime resulting from cable damage and equipment failure
4. Increased market competition
5. Support of main processes like service management, delivery management and capacity management
What must a GIS digital twin do

1. **Represent all network features in the form of maps or detail windows**
   - Fiber features (ducts, cables, splice enclosures, PON splitters, ODF, etc.) OSP and ISP
   - Copper features (coax, ethernet and twisted pair cable, MDF, etc.) OSP and ISP
   - Microwave paths
   - Mobile features (antenna's, towers, mobile sites, etc.)

2. **Captures all relevant data of the features**
   - If data is not used in a process, it's not relevant

3. **Fault localization**
   - To determine the location of a cable cut

4. **Required information is easy and fast accessible**

5. **Report generation**
   - Cable usage
   - Fiber/wire End to End reporting
   - Overview of port capacity in ODF
   - Etc.

6. **Standard interfaces available (WFS/WMS, REST/JSON)**
   - Interfaces for exchanging data with other (OSS) information systems
What **should** a future GIS digital twin support

**Functionalit**
1. Import possibilities for GPS routes/points
2. Import functionality for data from third parties (CAD data, MS ACCESS, Excel, etc.)
3. Auto import of land-based data
4. Auto routing functionality over fibers
5. Auto routing functionality for new (FTTH) networks based on land-based data
6. Auto detection of data pollution
7. Auto reporting of lack of fiber capacity between two PoP’s
8. 100% Web technology, accessible with WMS/WFS
9. Data available on tablet and smart phone
10. Augmented reality
12. 3D building data
Auto routing functionality for new (FTTH) networks based on land-based data

System generates automatically an FTTH network.

Place PoP (Streetcabinet)
An engineer gets an assignment to put a new cable in the ground. He and his team are getting a high-level plan for the location of the new cable. They achieve to get the cable in the ground. The engineer makes some notes where the cable is been buried. Then he sends the new drawing to the back office. The back office sends the drawing to the location where the information will be registered in the Digital Twin.

### Old way

### New way

An engineer gets an assignment to put a new cable in the ground. He and his team are getting a high-level plan for the location of the new cable. They achieve to get the cable in the ground. The engineer uses his GPS pole to measure the GPS coordinates of the cable. This data is directly loaded into the Digital Twin.
Service Desk

The Digital Twin robot for service
What **should** a GIS digital twin also support

**Application Maintenance**
1. Support for automatic (regression) testing
2. CI/CD support
3. SAAS
4. Application dashboard
5. New releases automatically upgraded
6. Extended user management
7. Optimal performance
8. Single Sign On
Conclusion

Most important for a future Digital Twin for Telco’s:

1. **Reliable data**
   As less involvement of humans as possible.

2. **Automation, automation, automation**
   Automation of network design, automation of landbase data updates, automation of testing, automation of capacity reporting etc.

3. **Standardized interfaces to other OSS**
   Standard interfacing to the most used OSS in the telecom industry like Amdocs, Granite, ZSmart, NetCool.
The End

This is NOT the End of this presentation but (hopefully) the start of a new generation of Digital Twin systems for Telecom Providers.