Austrian Federal Railways infra:geodata

OVERVIEW

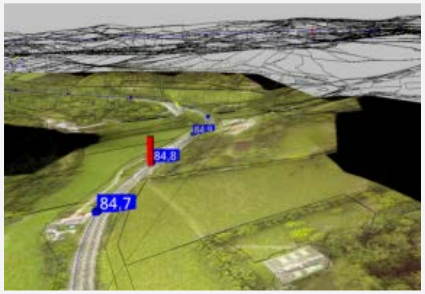
- The Austrian Federal Railways (German: Österreichische Bundesbahnen, ÖBB) is the national railway system of Austria
- The ÖBB group is owned entirely by the Republic of Austria and is divided into several separate businesses that manage the infrastructure and operate passenger and freight services

CHALLENGES / OPPORTUNITIES

- big data: huge heterogenous data collections, file system storage, no spatial access
- mission management: quality assurance, historiography
- minimize acquisition expenses: automation of processing steps, avoidance of multiple surveys

SOLUTIONS

- Oracle Database 12c Enterprise Edition
  - Spatial Option with Pointcloud and GeoRaster,
- Oracle Fusion Middleware 11.1.1.7
  - MapViewer



RESULTS

- Direct and uniform access to pointcloud data
- Lowering costs of geodata usage by service access
- Consolidation of raster, vector and pointcloud data in a central repository
- Increase of quality using metadata
- Lowering process costs using homogenous processes

May 2014

Oracle Spatial Summit

ORACLE

May 21, 2014
Walter E. Washington Convention Center
Washington, DC USA

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Software Development
Manager, IQSOFT

End-To-End LiDAR Data Processing at Austrian Federal Railways Infrastructure AG

Program Agenda

- Austrian Federal Railways
- IQSOFT
- from challenges to an end to end process
  - requirementts definition
  - data collection
  - data storing
  - result calcualtion
  - data delivery

ÖBB

IQSOFT
DIE ZUVERLÄSSIGE GRÖSSE
IN SACHEN INFORMATIONS-TECHNOLOGIE

Austrian Federal Railways

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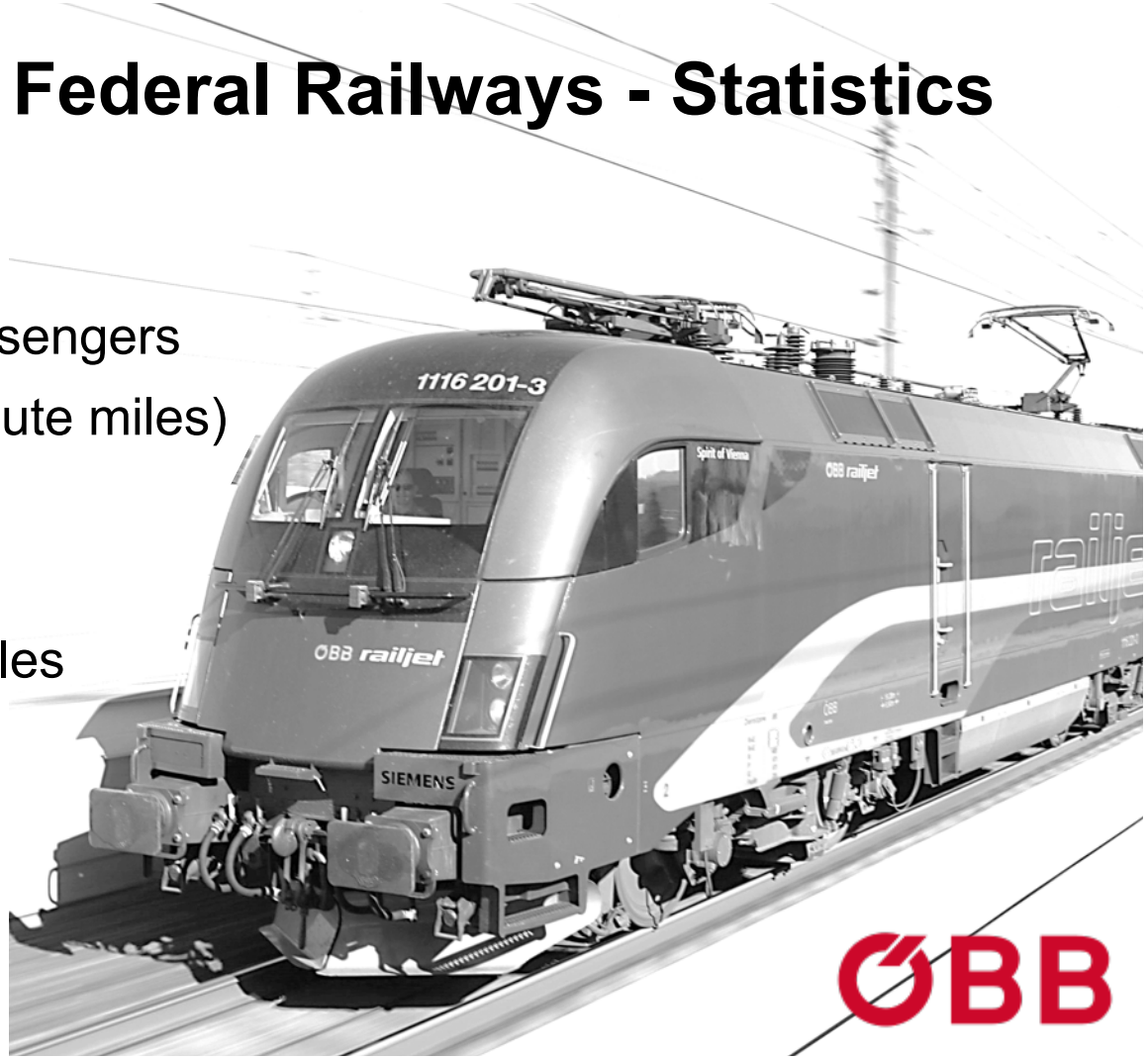
Austrian Federal Railways - Statistics

- carried 464 million passengers
- ~ 5,700 km (~ 3,500 route miles)
- 10,780 km of track
- 1,230 locomotives
- 3,136 passenger vehicles
- employed 42,893

ÖBB Infrastructure Corp.

- employed 17,612 staff

Source: Annual Report



Solutions for your Success

Dynamometer Wagon

Orthophotos/ALS

Facility Management

Services IQSOFT Solutions

System Integration

Geo Apps

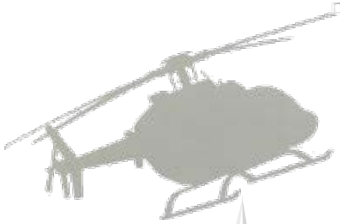
Track Geometry

Business Intelligence

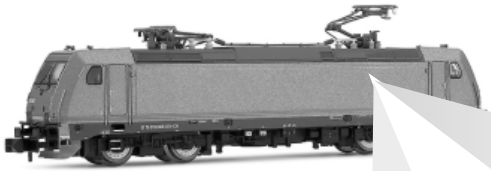
IQSOFT
DIE ZUVERLÄSSIGE GRÖSSE
IN SACHEN INFORMATIONS-TECHNOLOGIE

Challenges

- big data
  - huge heterogenous data collections
  - file system storage
  - no spatial access
- mission management
  - quality assurance
  - historiography
- minimize acquisition expenses
  - automation of processing steps
  - avoidance of multiple surveys



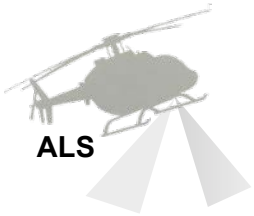
ALS Airborne Laser-Scanning

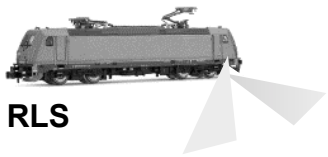


RLS Railborne Laserscanning

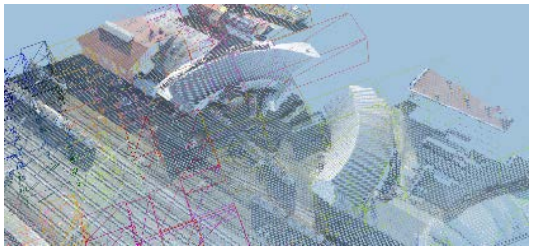
•TLS Terrestrial Laser Scanning

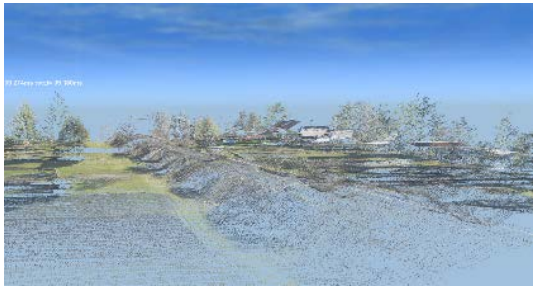
R&D Project Vision





from
LiDAR Mission
to
Linear Asset Management





Increase Efficiency & Transparency

LIDAR

- Requirements
- Delivery
- Storage
- Processing
- Analysis
- Object Recognition
- Visualization

workflow metadata

lifecylce metadata

automation

Making Available …

data acquisition

- Digital Aerial Images
- Digital Orthophotos
- Pointclouds
- Trajectories
- Digital Terrain Models
- Mission Report
- …

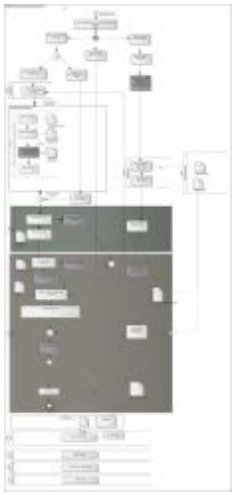
Automatic Processing

- CSW catalog
- Object Recognition
- Pointcloud Extraction
- …

results

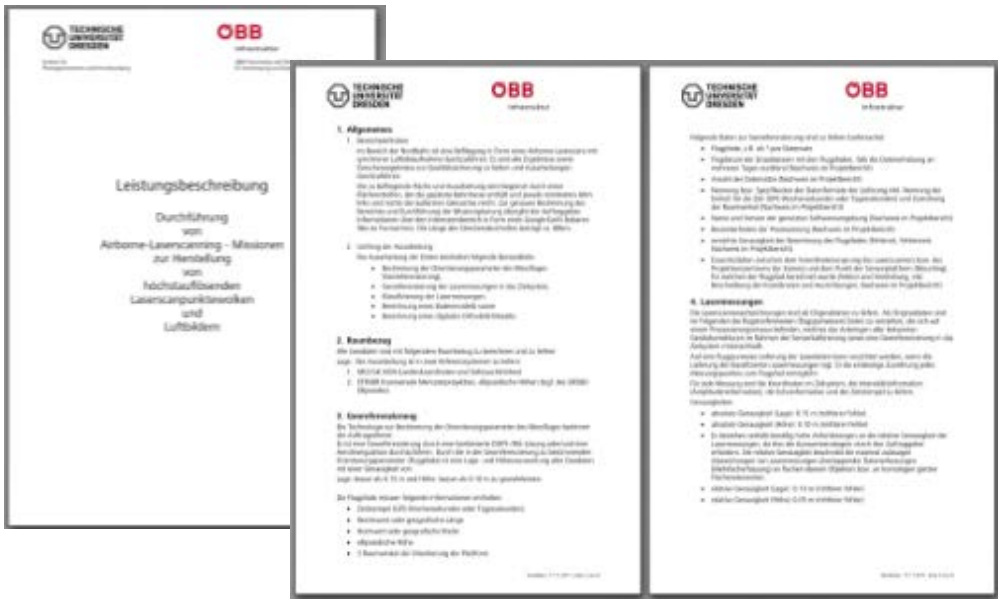
- mission data
- GIS objects
- 3D visualization

Process Flow

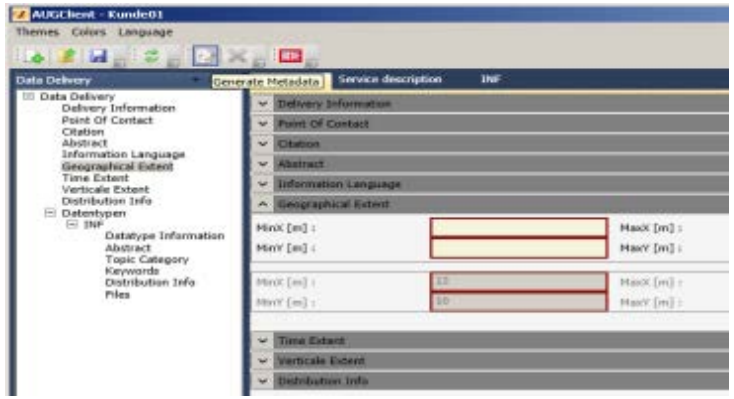


- user request
- process flow
- handover results

Requirements Definition



Requirements Definition Template

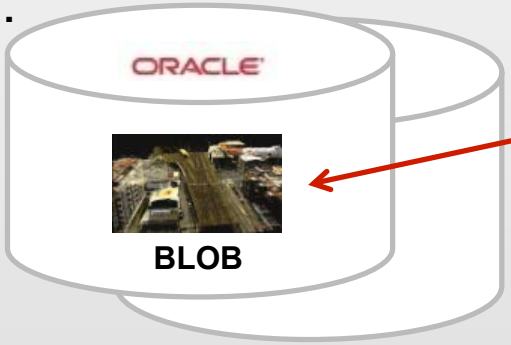


Define ISO conform Metadata

Geodata & Metadata Store

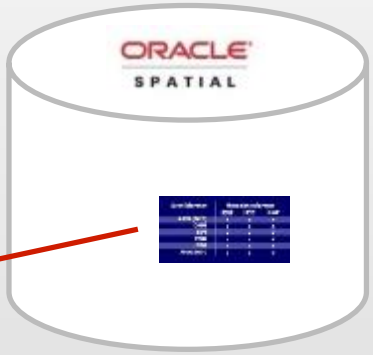
Geodata Store

- Digital Aerial Images
- Digital Orthophotos
- Pointclouds
- Trajectories
- Digital Terrain Models
- Mission Report
- …



BLOB

Metadata Store

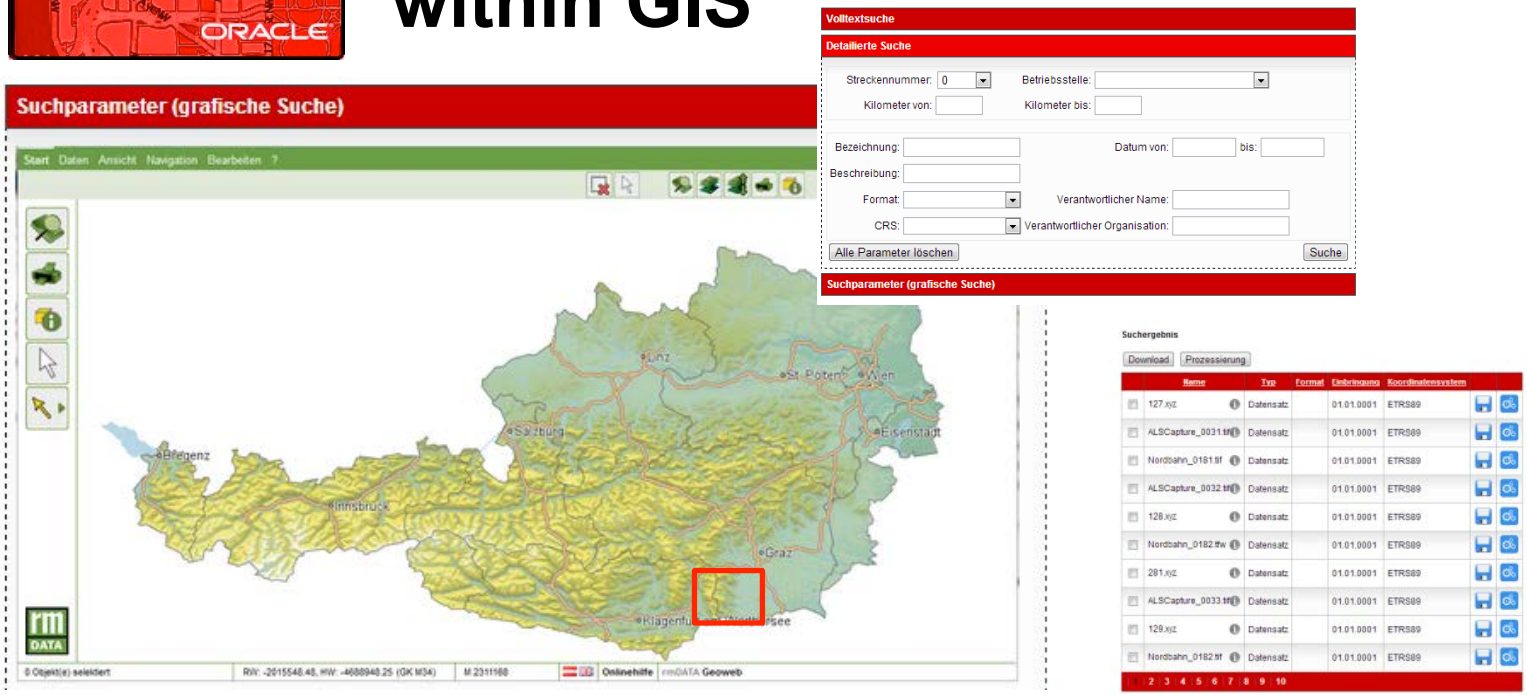


CSW
Catalog-Service

Up/Download
Service

requirements definition | data collection | **data storing** | result calculation | data delivery

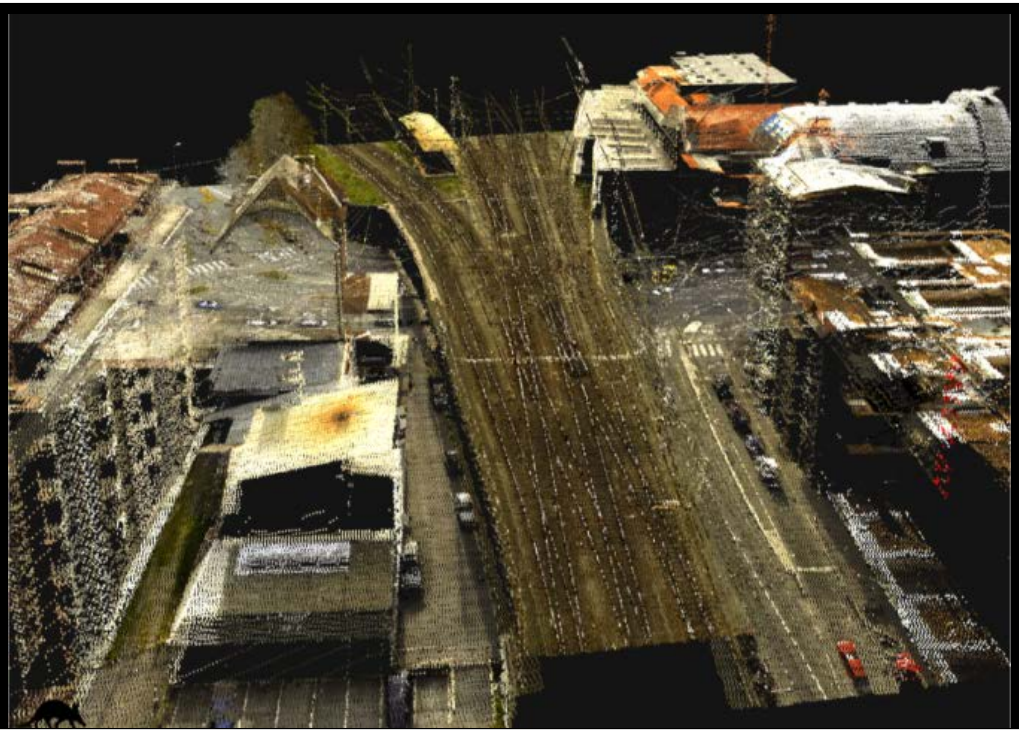
CSW Catalog Integration within GIS



- Searching CSW and
- download from geodata store

Object Recognition

automated processing



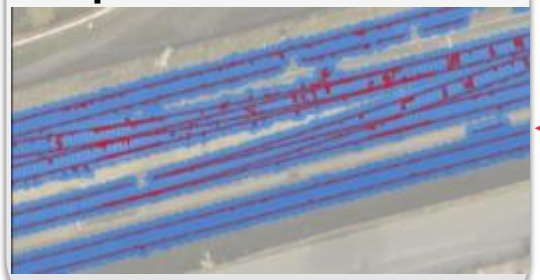
- remote sensing delivers railway corridor recordings
- automated processing with innovative methods of object recognition is applied to

requirements definition | data collection | data storing | **result calculation** | data delivery

Object Recognition

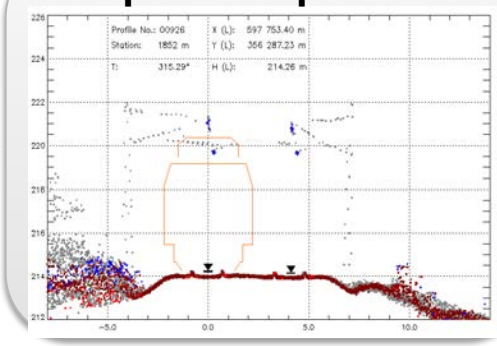
example: track axis/pylon

process mask

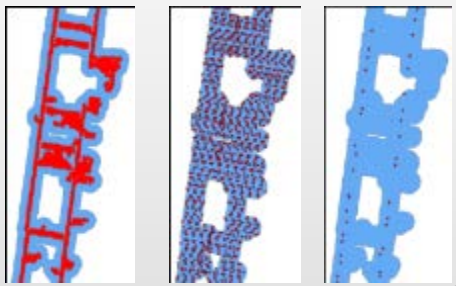


recognition

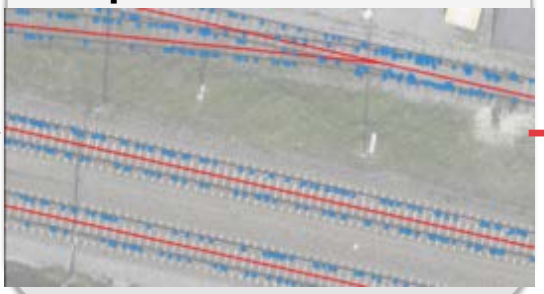
process profile



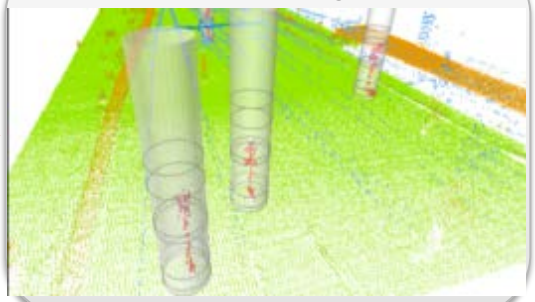
classification



process Ransac



process pylon



requirements definition | data collection | data storing | **result calculation** | data delivery

Integration with existing data

e.g: railway track

orthophotos

pointclouds

geodetic
site plans

geodata

inventory

extraction &
recognition

Object A: track
residing in
rail geometry db

metadata A

Object B: track
result from
recognition

metadata B

Object C: track
extracted from
geodetic site plans

metadata C

fusion

Object: track

„One Truth“
„Golden Record“

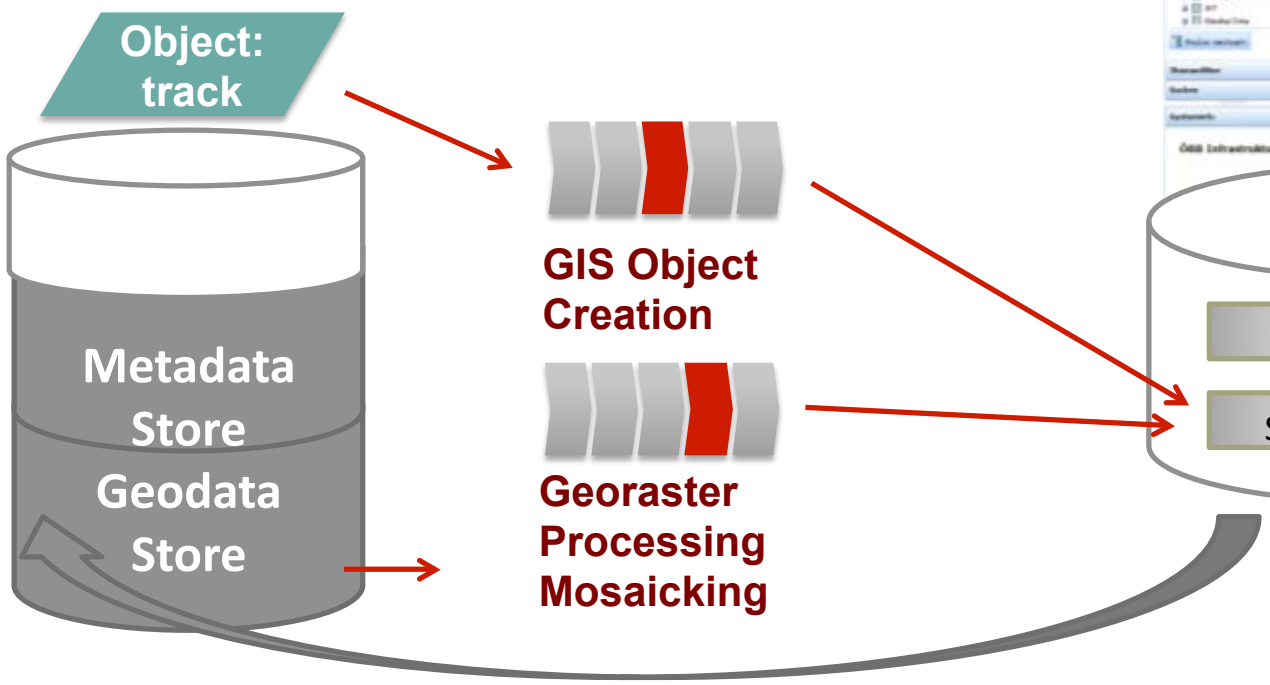
assets

buildings

track geometry

requirements definition | data collection | data storing | result calculation | data delivery

Transfer to GIS

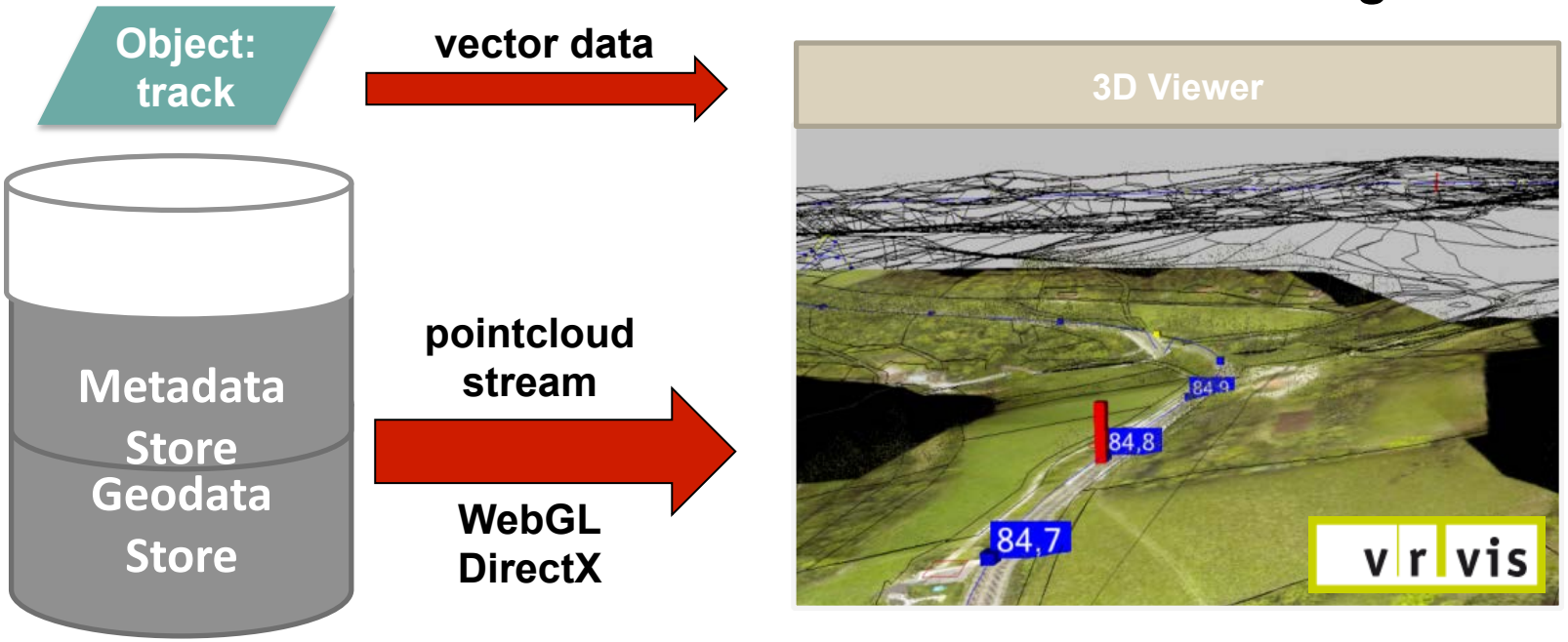


references mission data & processing

requirements definition | data collection | data storing | result calculation | data delivery

Interactive 3D Visualization System

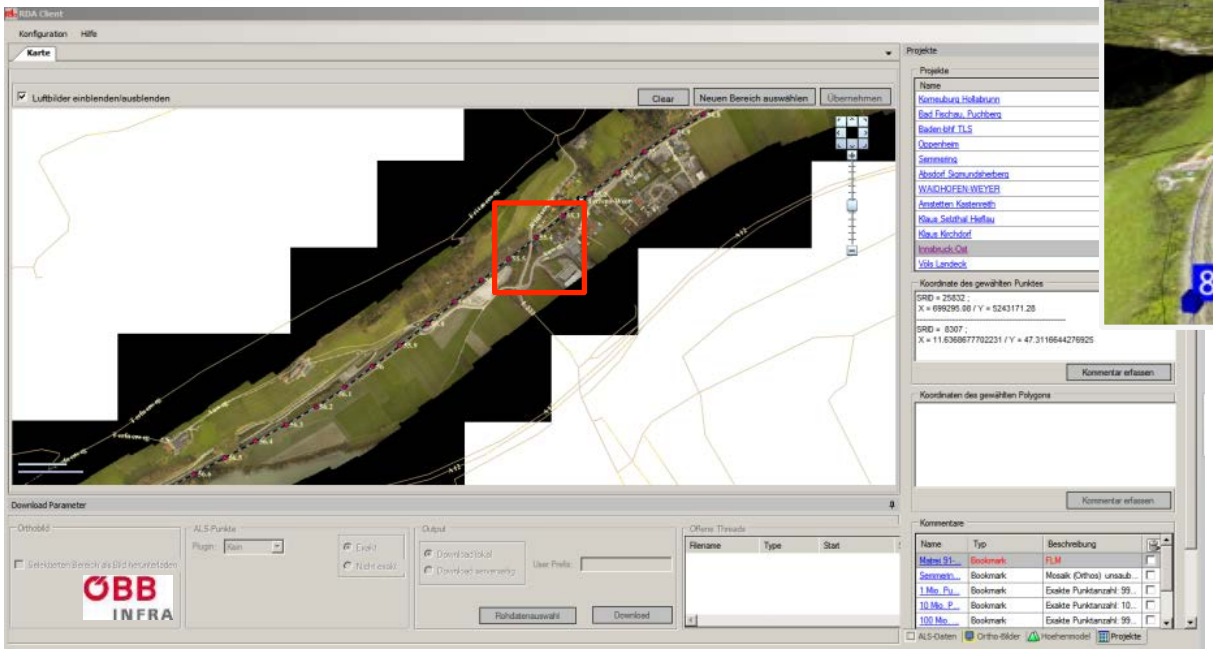
- Seamless Navigation
- Absolute Coordinate System
- Vector Data and Label Integration

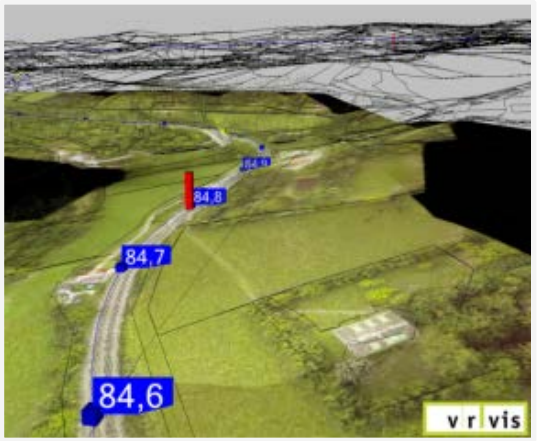


requirements definition | data collection | data storing | result calculation | data delivery

Quality Management

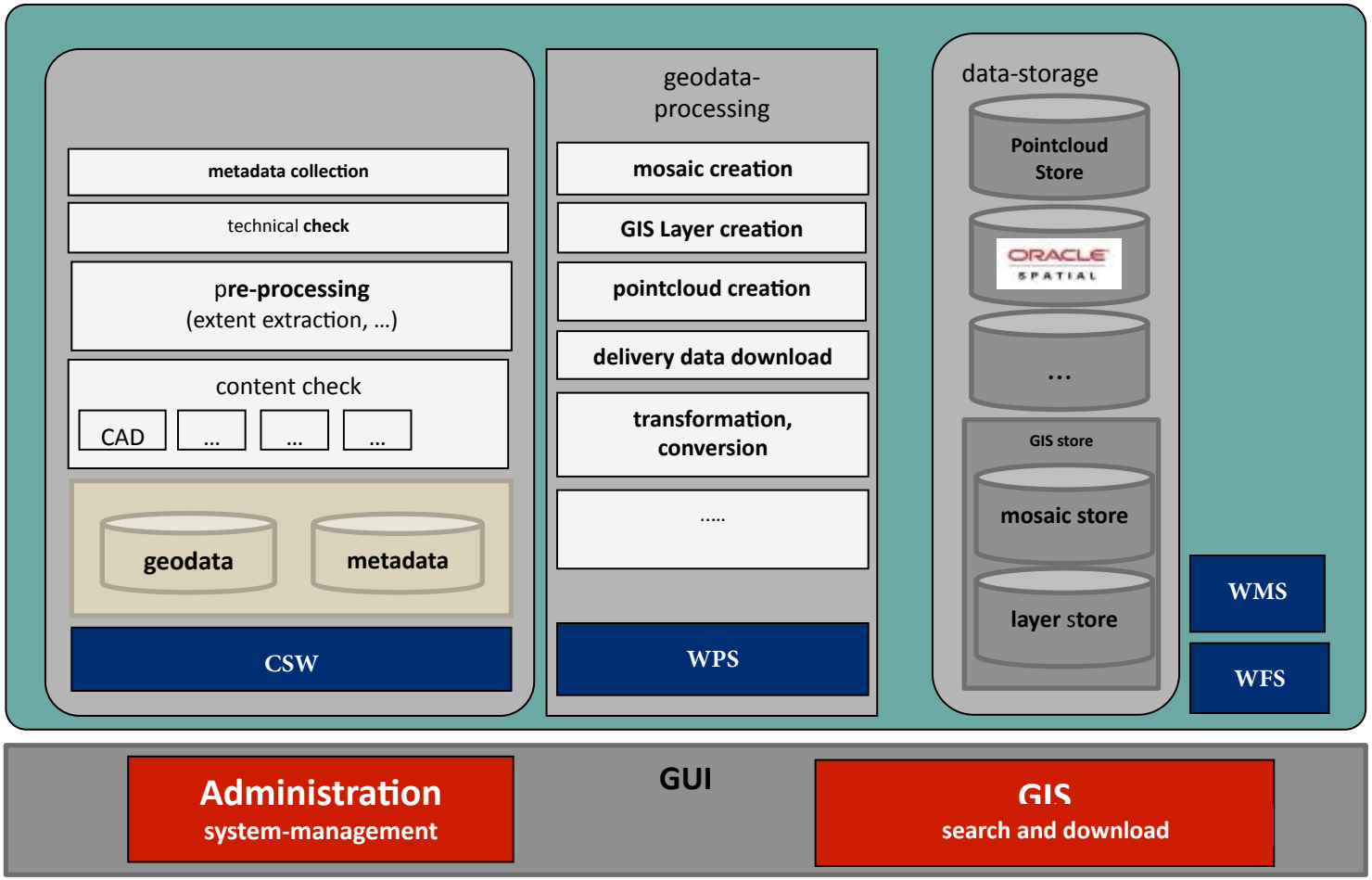
and Feedback Service





requirements definition | data collection | data storing | result calculation | **data delivery**

Solution Overview



OGC
Making location count.

Oracle Spatial

Statistics per 100 km:

number of points
1,7 Mio. points

storage on filesystem
ca. 750 GB

storage in geostore
ca. 400 GB

storage of Oracle Spatial objects
SDO_ PC & Georaster ca. 400 GB

resolution of raster
5 cm

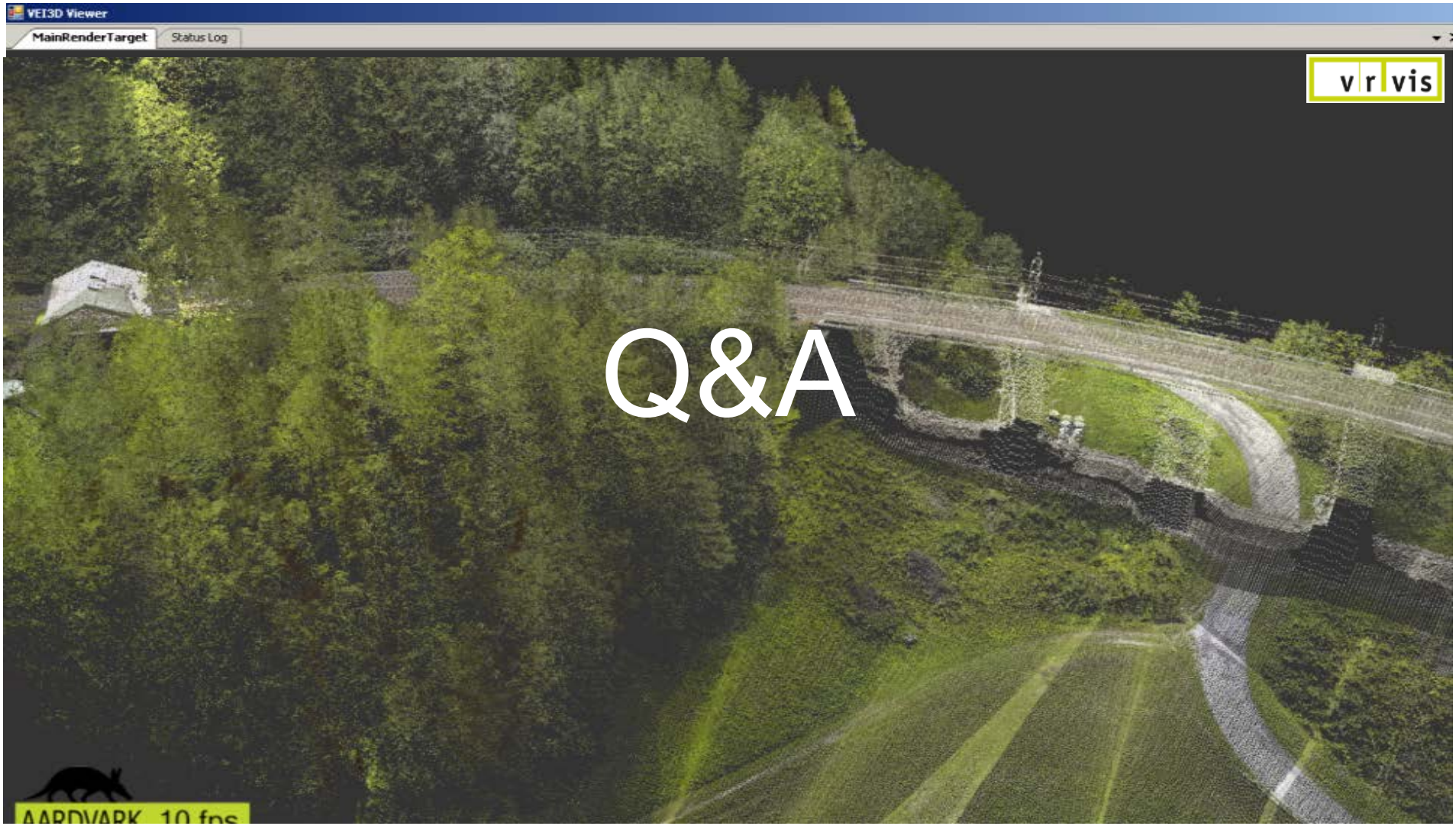
density of points
15 Punkte pro m²

Oracle Spatial Objects in use:

- Oracle Pointcloud
- Oracle Mosaic
- SDO Geometry
- SDO Georaster
- Custom Coordinate Systems

Summay

- Optimize railway planning, construction and maintenance
- Stores and processes more than 8 billion points of objects along railway tracks
- Enables LiDAR data to be viewed with existing infrastructure vector data
- Provides comprehensive metadata about railway tracks trough CSW
- Delivers Data through open WebServices


VEI3D Viewer
MainRenderTarget
Status Log
vrvis
Q&A
AARDVARK 10 fps