

Integrative 2D- and 3D-GIS applications in dynamic suburban and urban landscapes

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Trend Towards Integration in Planning

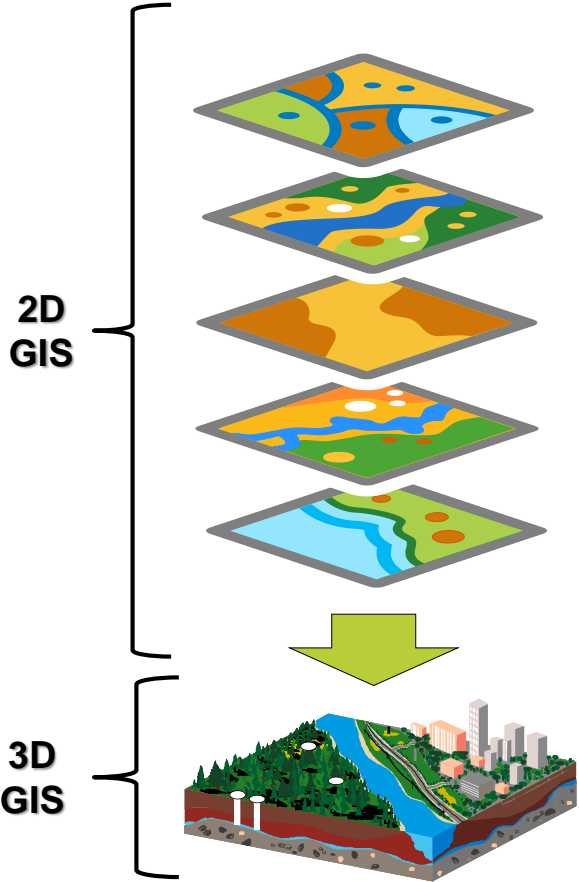
- + Inclusion:
All people of all social groups participate in social life in a self-determined way.
- + Integration (here):
Close interaction across disciplines, working on solutions for a shared problem.
- + Transdisciplinary integration:
With integration of the stakeholders.

Trend Towards Integration in Planning

- + Planning projects on different scales, standard tasks (e.g. bridges) and for individual tasks (e.g. regional development)
- + Interdisciplinary teams more and more required
- + Increase of software solutions, data generation and data availability
- + Progress in interfaces for data transformation between different specialist software
- + → Useful, that integration happens on digital platforms (although not only ...)

GIS and Design → GeoDesign

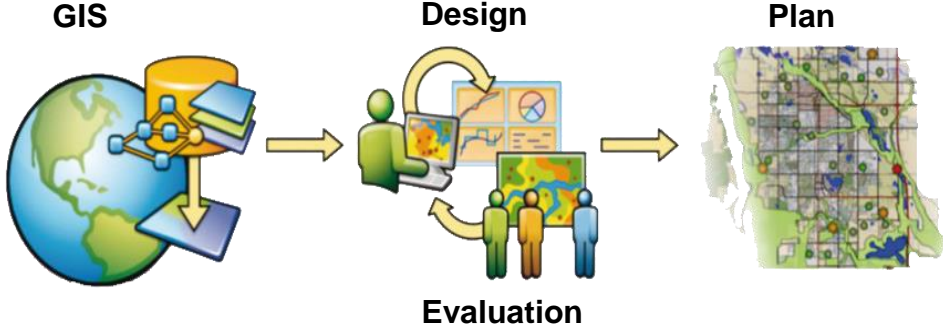
GIS



Planning Process

- Planning
- Spatial Data Compilation
- Data Management
- Spatial Analysis
- Modeling / Visualization
- Assessment Alternatives
- Decision Support
- Implementation Monitoring

GeoDesign



Design framework and supporting technology for professionals to leverage geographic information, resulting in designs that more closely follow natural systems

Integrative 2D/3D-Planning with GIS – MORGENSTADT

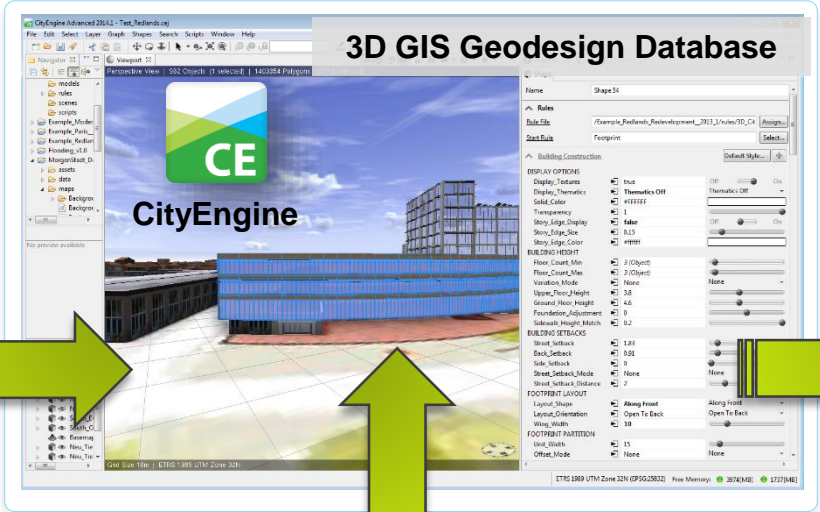


+ GeoDesign Apps & 3D-Modeling for the Smart City Cologne

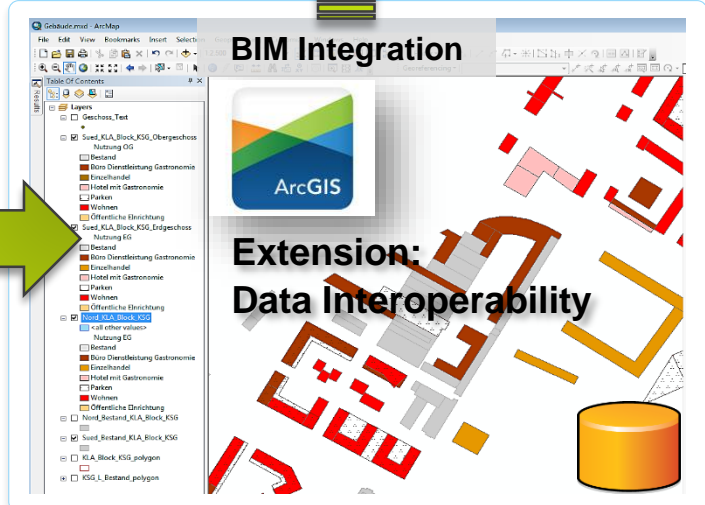
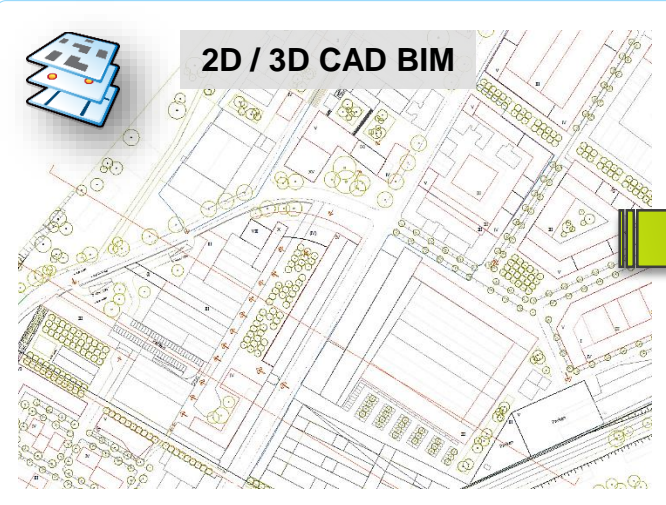
- > 3D-GIS database for analysis & visualization of the district of Mülheim South in its current state, and simulation of future development scenarios



MORGENSTADT – Processing Workflow



3D Rendering



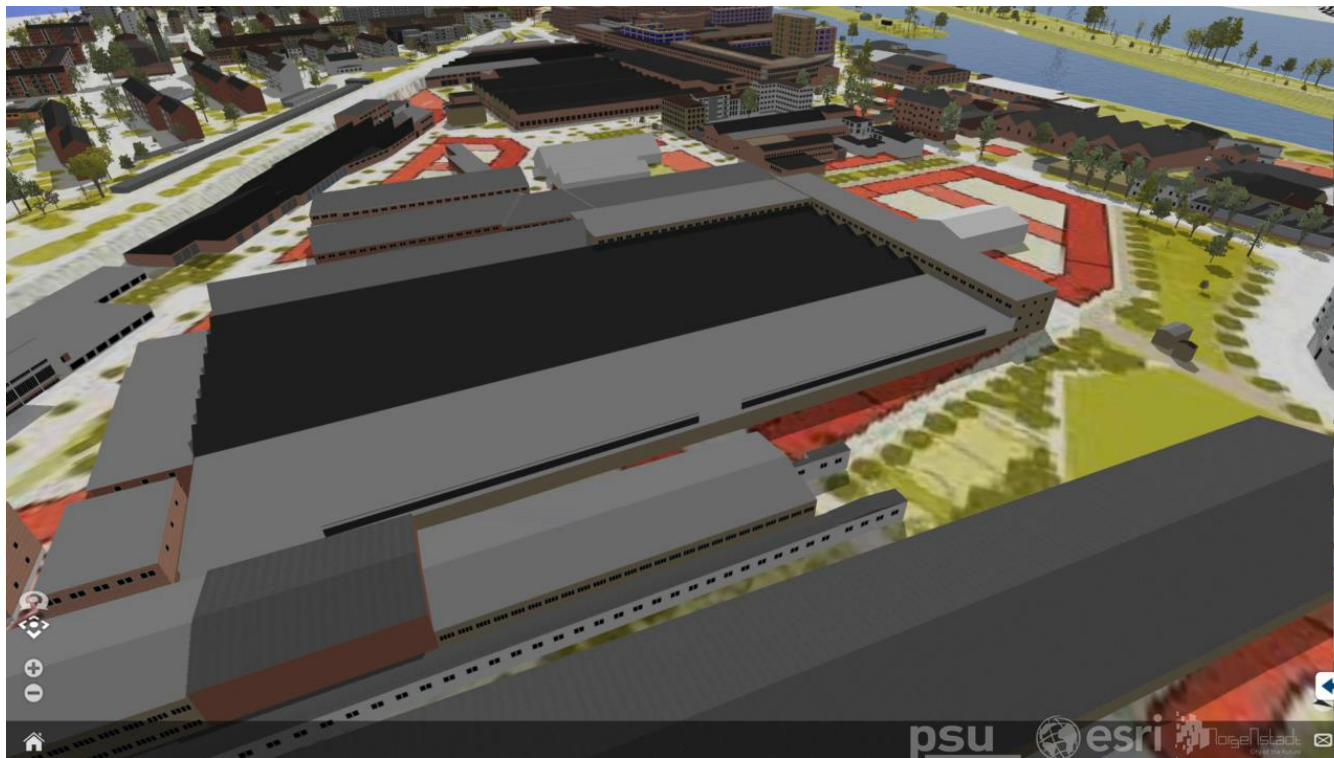


MORGENSTADT – 3D Scenarios

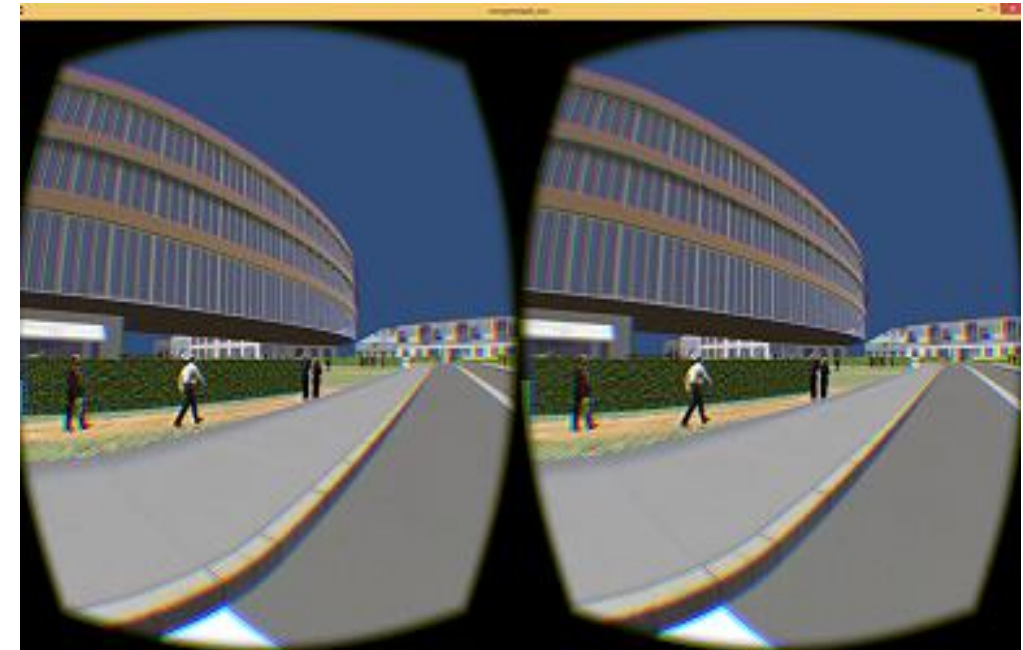


MORGENSTADT – 3D Scenarios

+ 3D CE WebScene: status quo x future scenarios



+ 3D Tour: Visualization with Oculus VR, AR apps



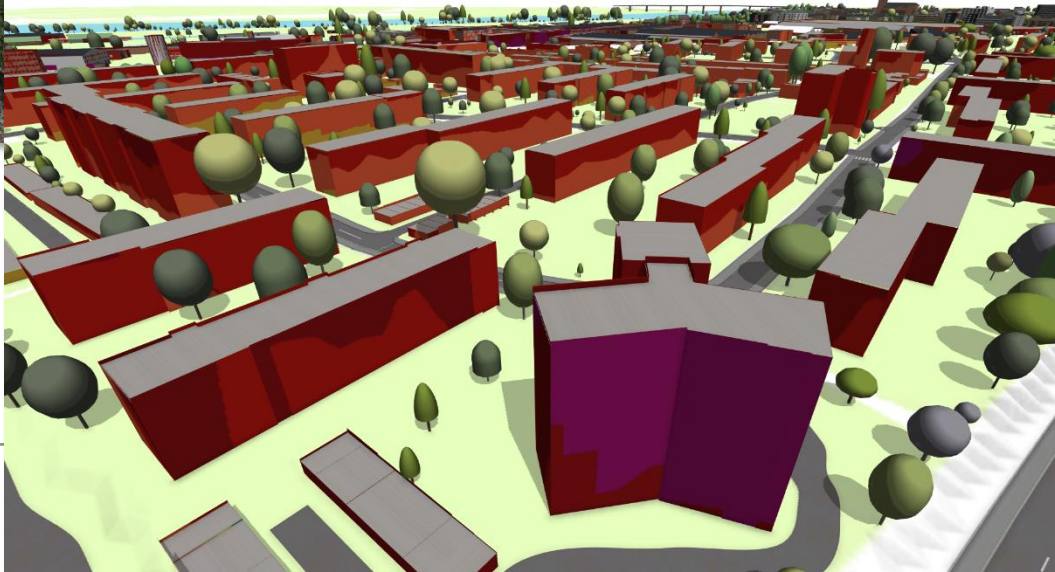
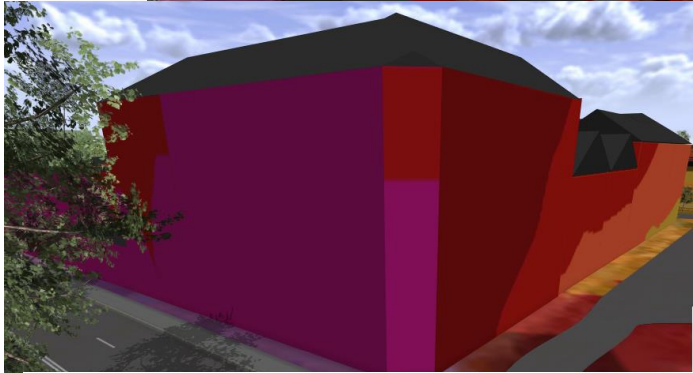
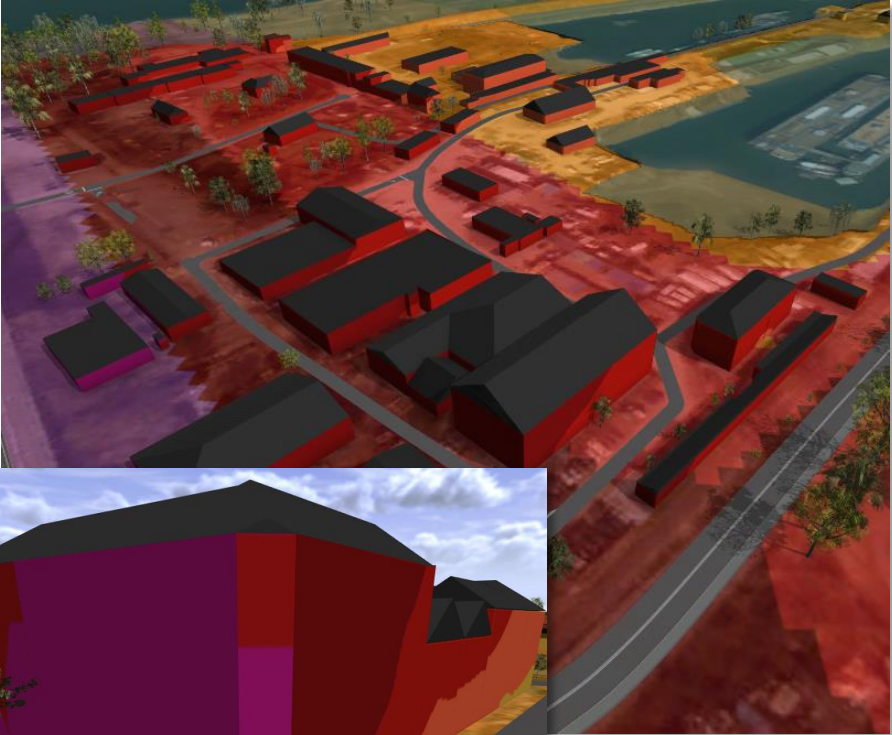
MORGENSTADT – 3D Flood



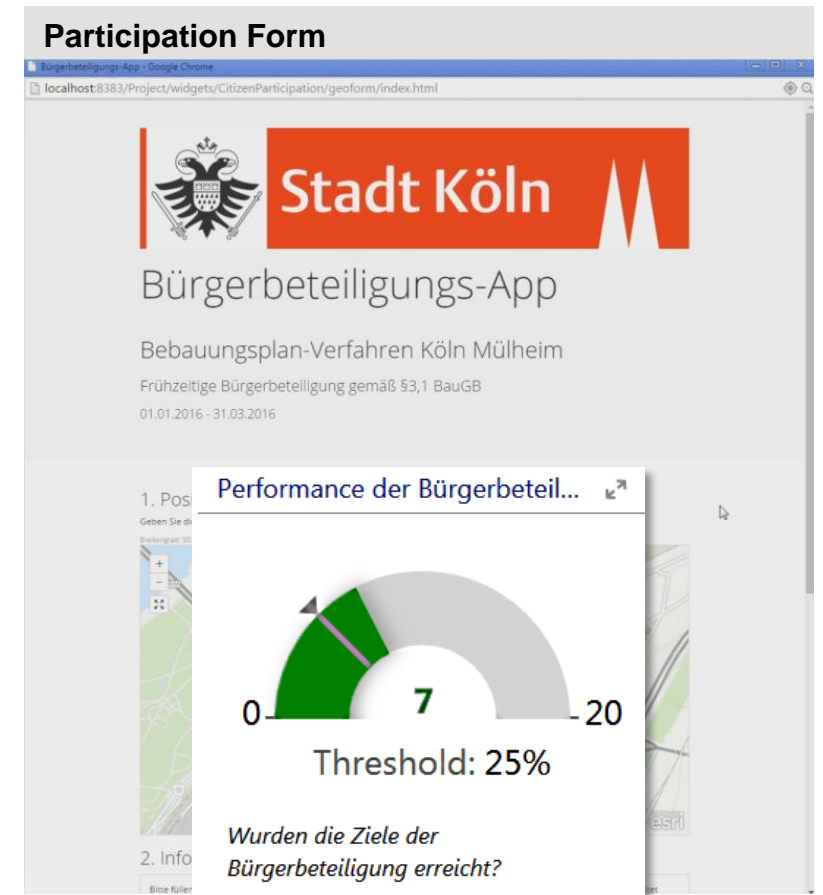
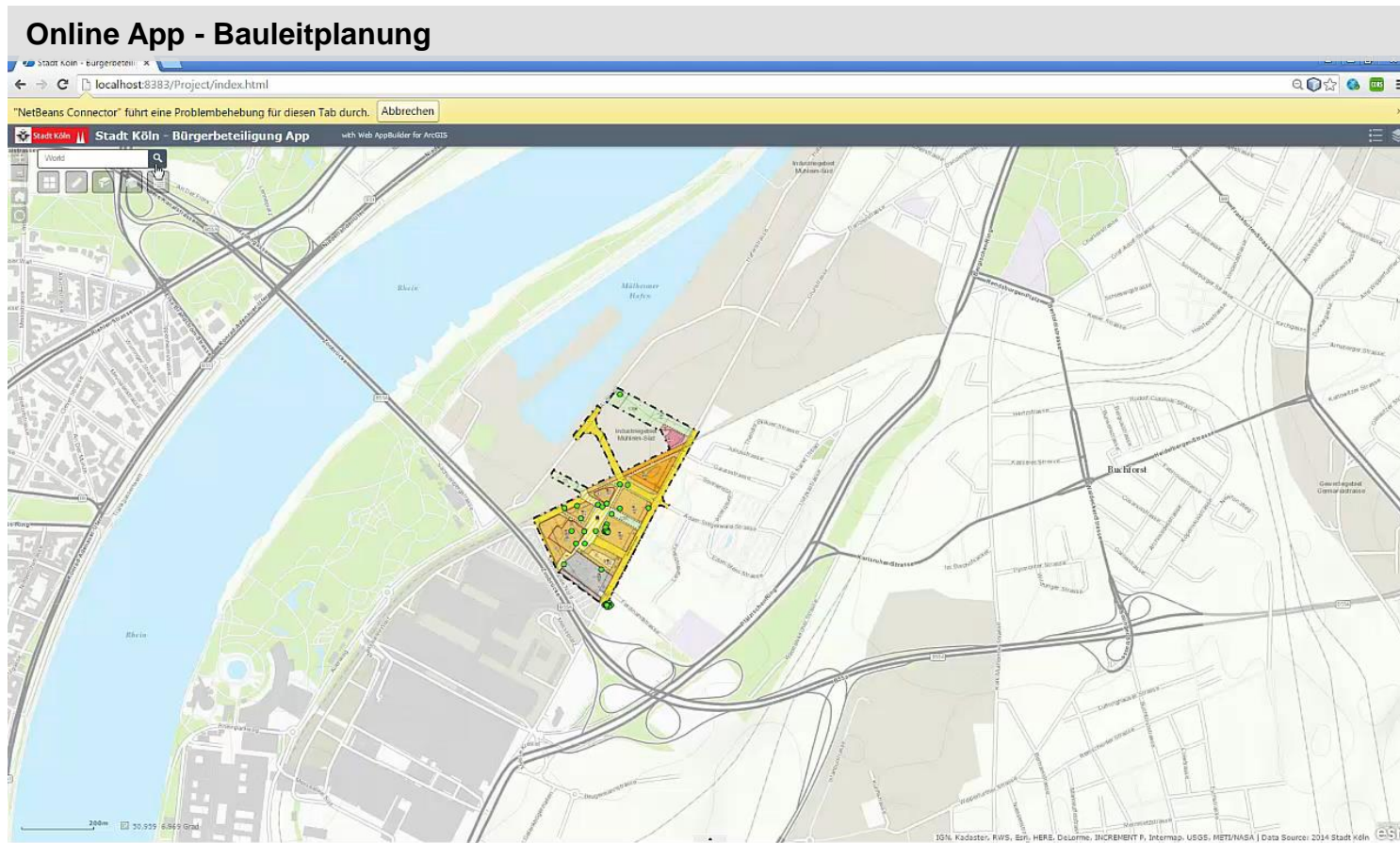
MORGENSTADT – 3D Traffic Noise



Traffic noise by night



MORGENSTADT – Online Citizen Participation Application



Integrative 3D-Planning with GIS – A99 Federal Motorway Expansion

- + Pilot Project of the Federal Ministry of Transportation and Digital Infrastructure (BMVI)
Eight-lane expansion of Autobahn A99 in the Munich Region
Replacement of the bridge structure 27/1 over the railway line 5556



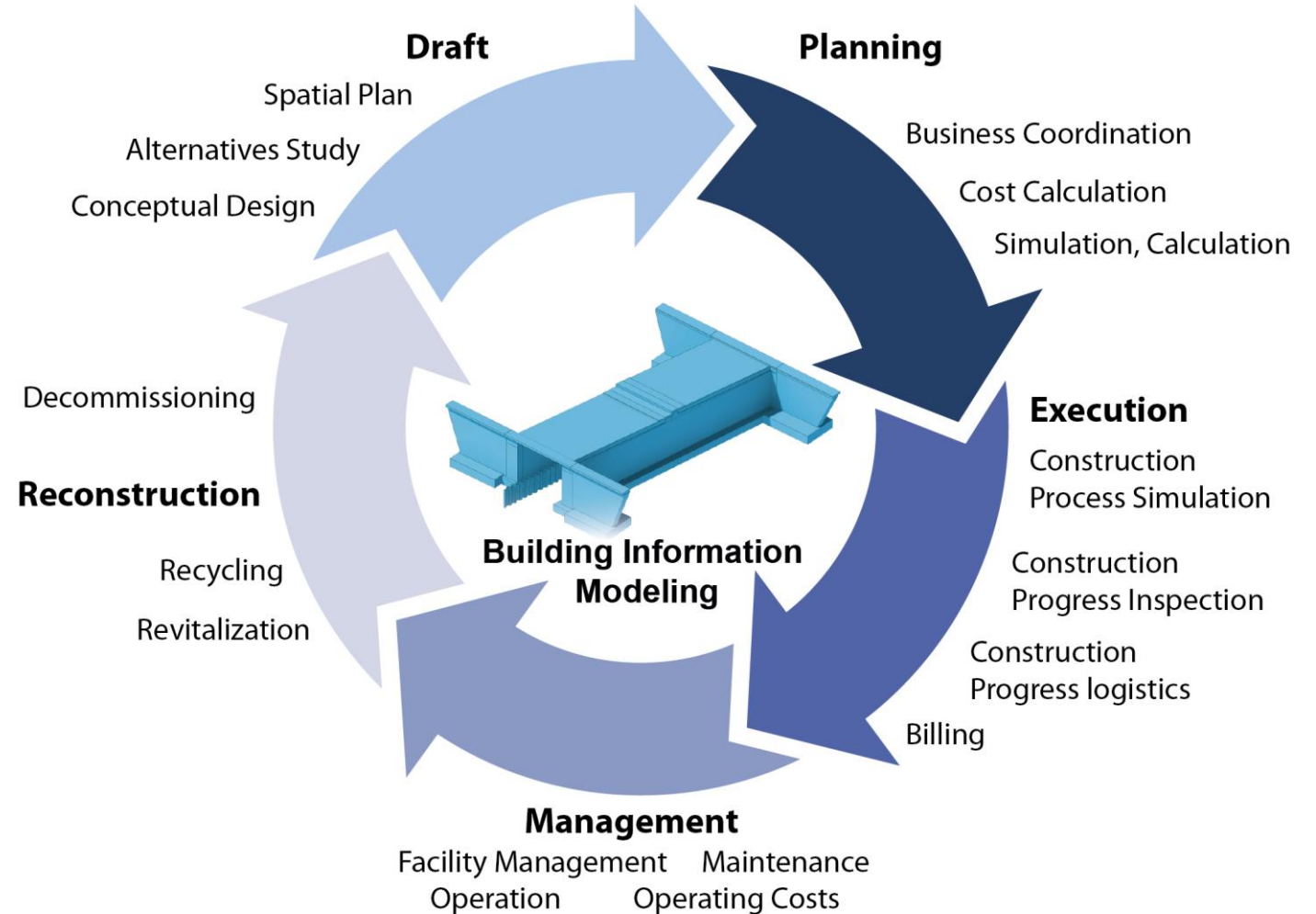
SSF Ingenieure

Autobahndirektion
Südbayern



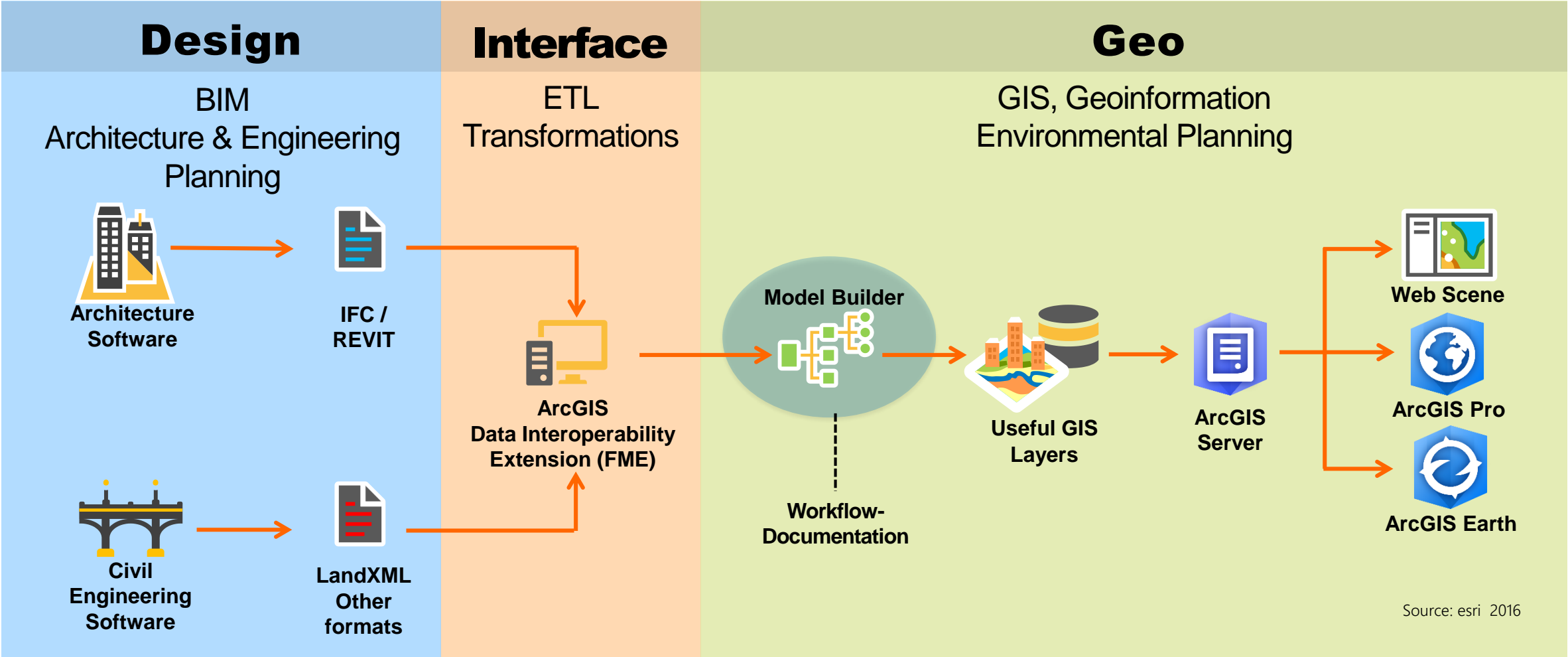
A99 Expansion – BIM (Building Information Modeling)

+ „BIM is based on the idea of a continuous use of a 3D digital CAD building or infrastructure model over the entire life-cycle of an engineering or architectural construction project – from design to planning, execution, operation and decommissioning of the project”

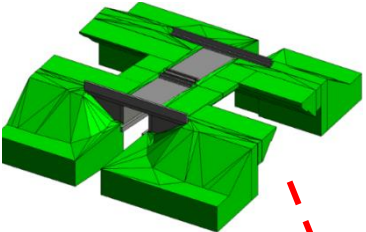


Source: Borrmann et. al, 2015

A99 Expansion – Integrating BIM and GIS → ETL Workflow



A99 Expansion – Integration of BIM and GIS Data



BIM Planning Data

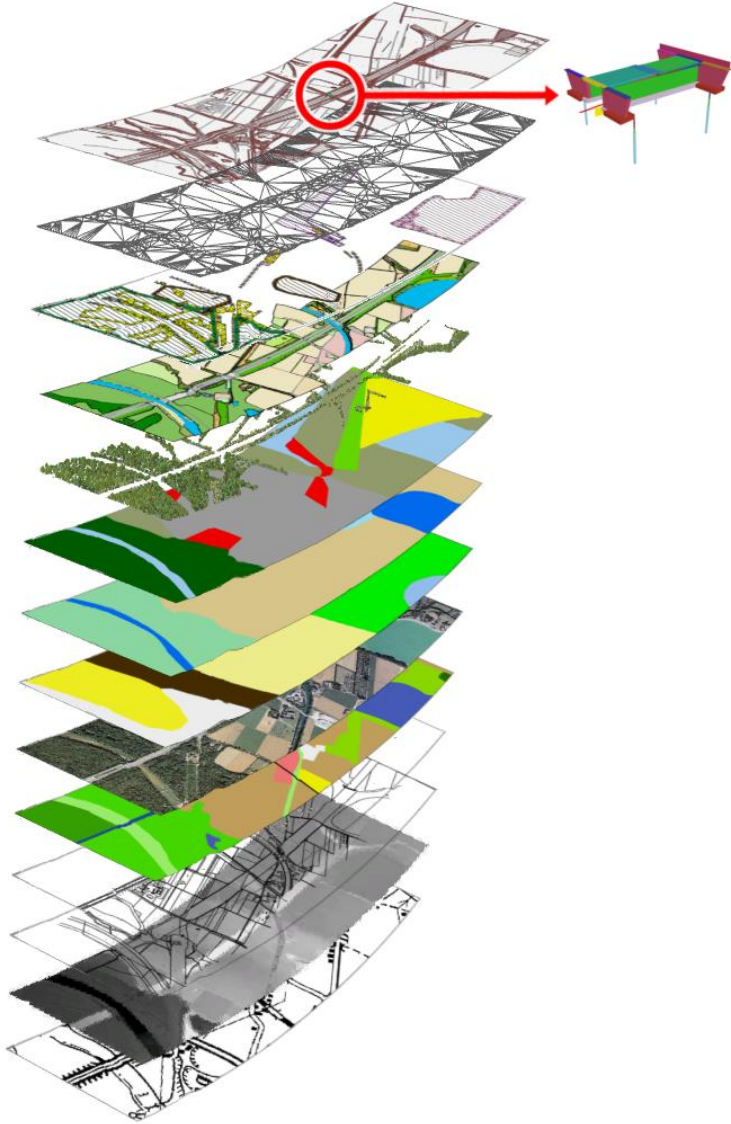
- BIM Data
- TIN Survey Data

GIS Environmental Data (selection)

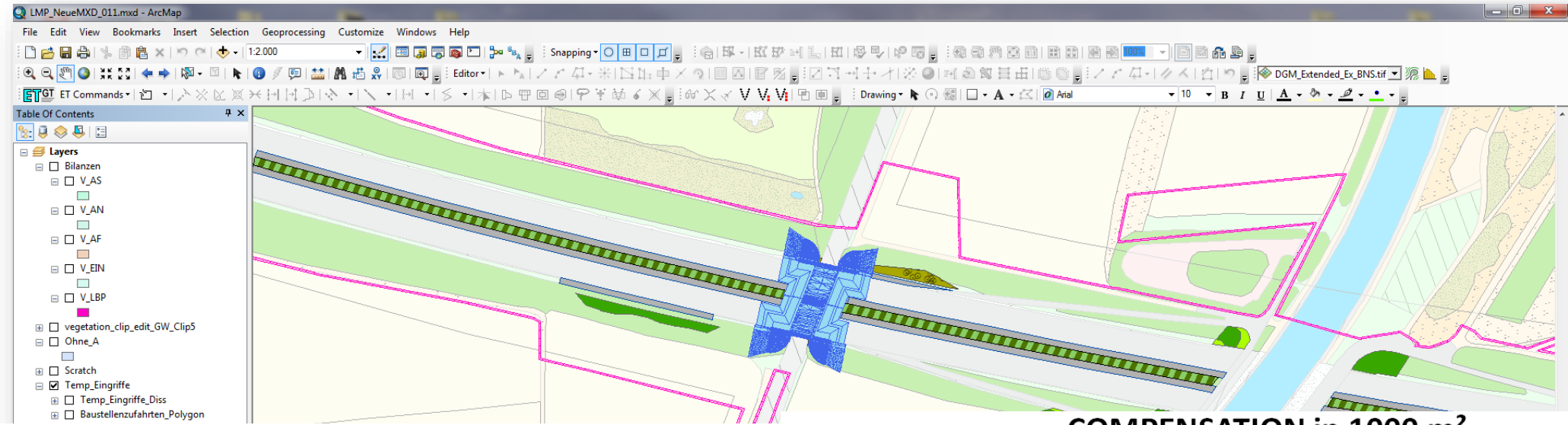
- Nature and Species Protection
- Biotope / Habitat Types
- Vegetation Structures
- Land Use Suitability
- Soil
- Geology

GIS Base Data

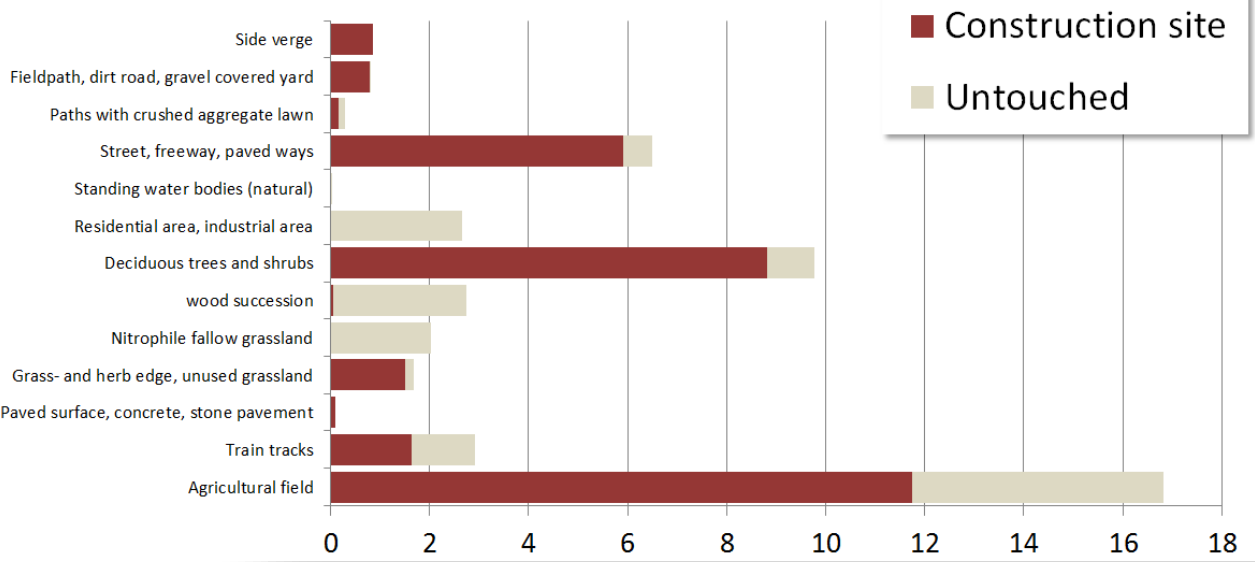
- Digital Orthophoto
- Actual Land Use
- 3D Buildings
- Real Estate Cadaster (ALKIS)
- Digital Terrain / Surface Model
- Topographic Map



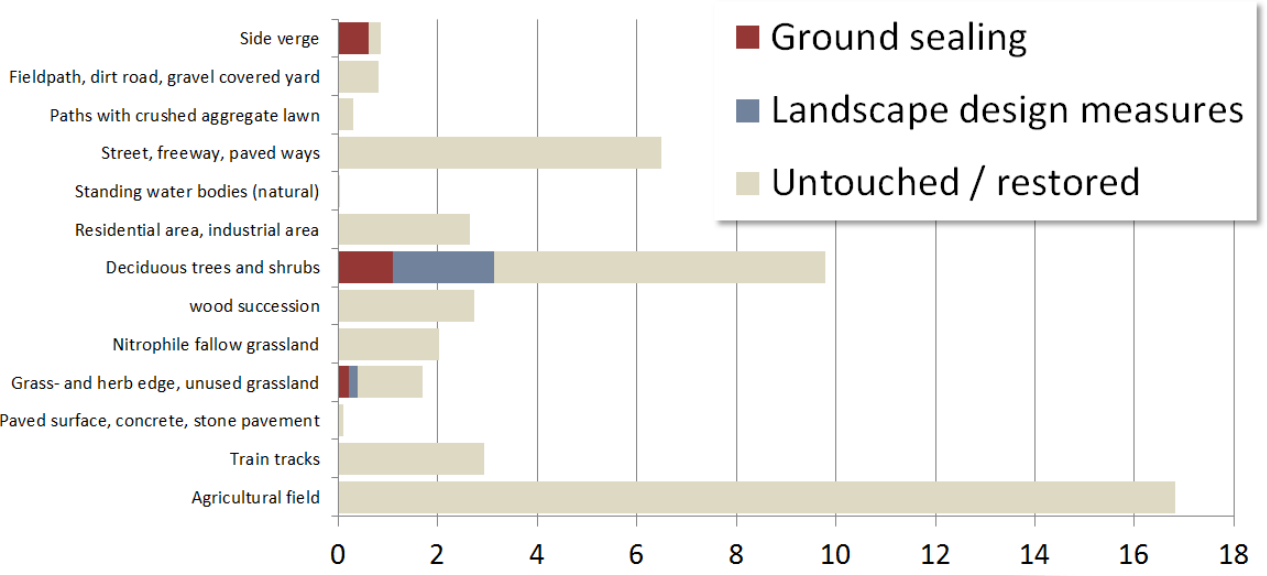
A99 Expansion – Impact Assessment of the Bridge (LBP)



IMPACTS in 1000 m²



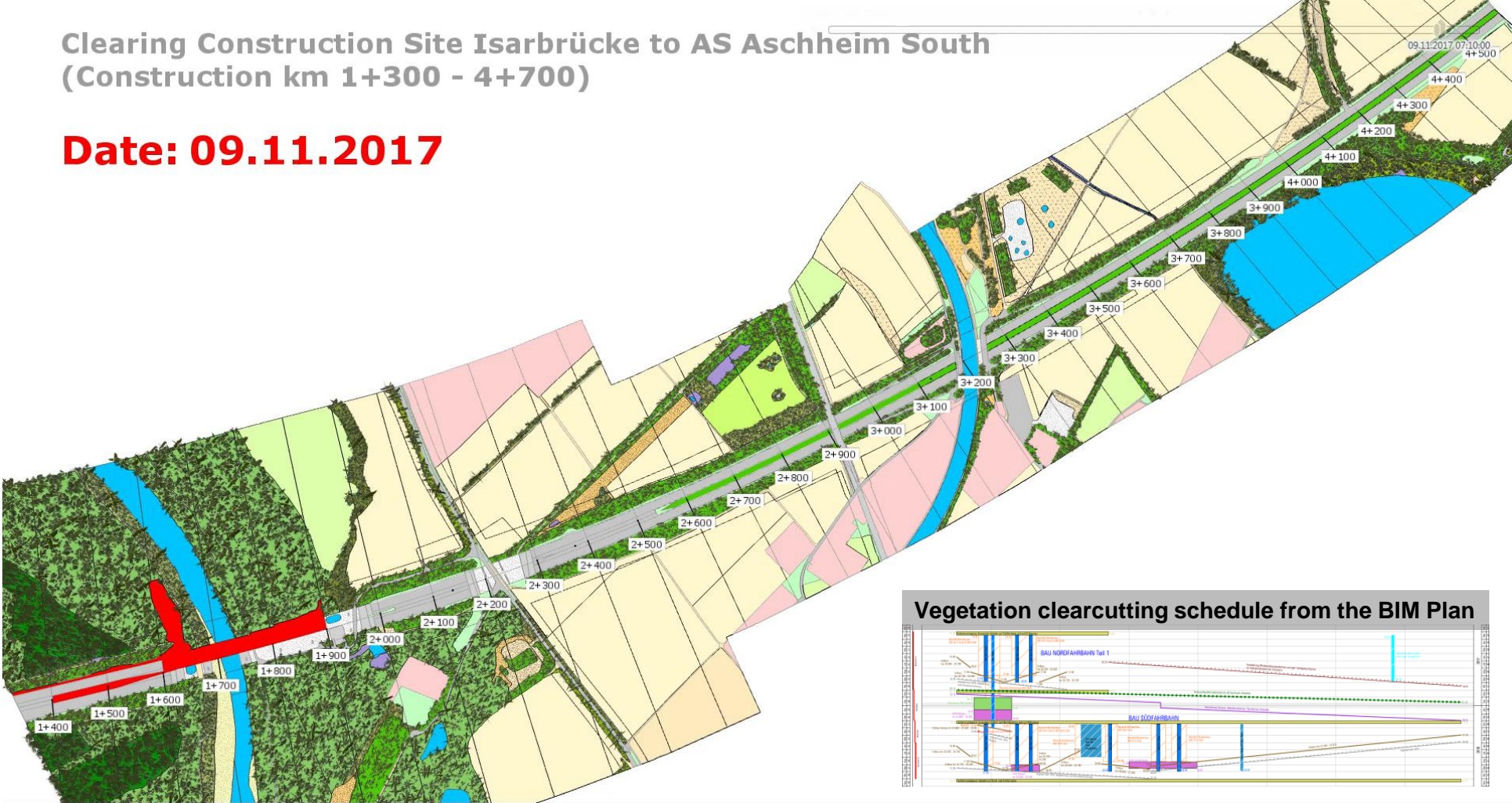
COMPENSATION in 1000 m²



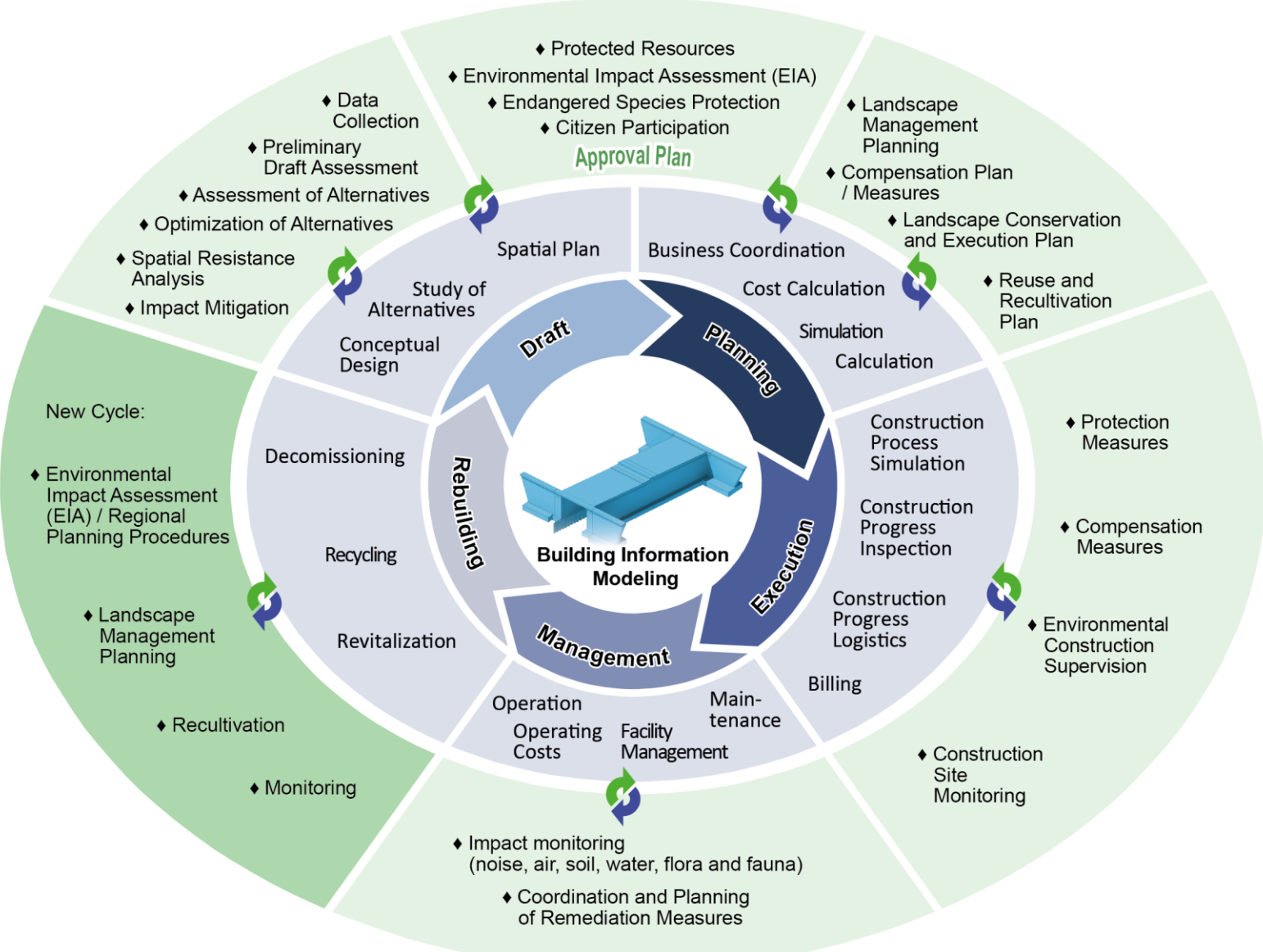
A99 Expansion – Impact Assessment of Clearcutting Plan

Clearing Construction Site Isarbrücke to AS Aschheim South
(Construction km 1+300 - 4+700)

Date: 09.11.2017

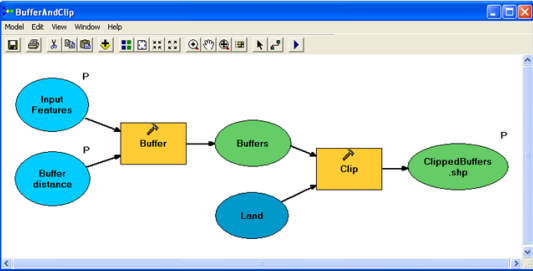


A99 Expansion – Integrated BIM + GIS Cycle for Landscape Planning

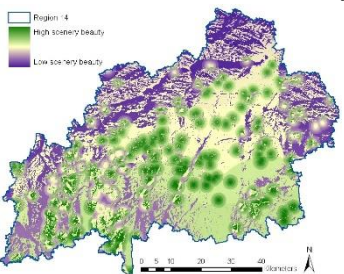
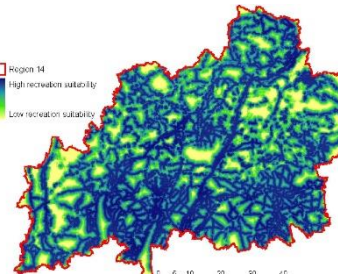
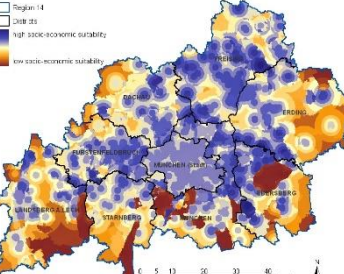
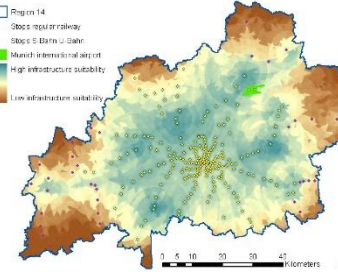
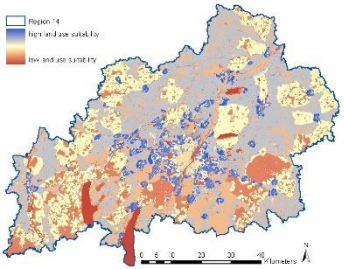
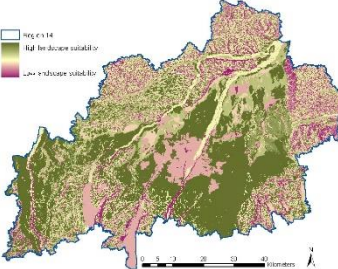
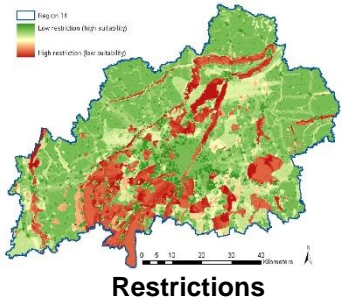
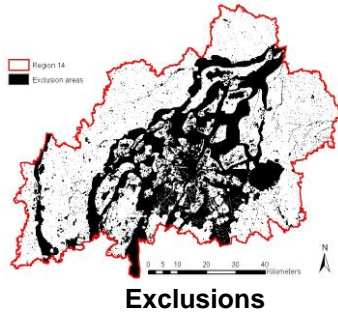
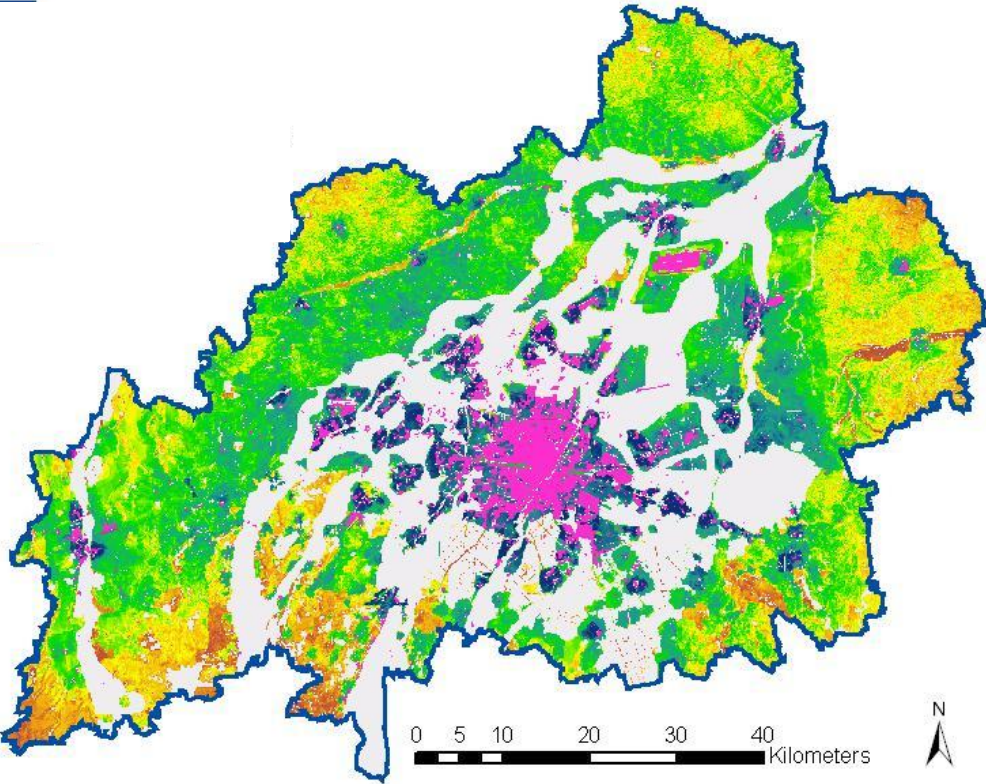


Source: Schaller et al., 2016, modified from Borrmann et al., 2015

GIS-Based Modeling for Settlement Suitability in the Munich Region



- Region 14
- Current settlement
- Excluded areas
- High settlement suitability
- Low settlement suitability



Thank you for your attention !

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