BIM AND GIS
DIGITAL TWIN IN DIGITAL ENVIRONMENT

+ Requirements for sustainable infrastructure increase

+ Adverse history of infrastructure projects – impact, costs, time, quality require substantial improvement

+ Fragmented view on project components and lack of cooperation inhibit holistic management

+ Link of BIM and GIS is basic requirement for cooperation
GIS-WORKFLOWS IN INFRASTRUCTURE LIFECYCLE

Plan, Design

- GIS integrates BIM-models in 3D geospatial environment
- GIS combines BIM-models in local context with Web-services by web-platforms
- GIS provides spatial data for collaboration of AEC professionals and specialists

...  
- 3D-CAD-BIM-models in GIS
- location & impact
- scenarios and alternatives
- detailed design

Build

- preparation schedules
- construction progress
- collaboration platform
- survey
- monitoring

Operate

- asset management
- maintenance
- sensor data / IoT
- remote sensing
- Objektdaten
- emergency plan
- evacuation
BIM AND GIS AUTHORING SYSTEMS

+ Digitization
+ Integration BIM and GIS
+ Digital Transformation
+ Workflows – overcome system limits
BIM AND GIS - DIGITAL TRANSFORMATION

GIS & BIM Integration
Content
Advanced Analytics
Location intelligence
Situational Awareness
Digital Workflows
INTEGRATION OF 3D CAD-BIM MODELS IN ARCGIS WITH FME

BIM compliant 3D models

Architecture Software

Export

IFC / RVZ

Other BIM and Engineering Software

ArcGIS Data Interoperability Extension

ArcGIS Pro

CityGML, DAE, 3DS, CAD...

ArcGIS Data Interoperability Extension

Automatisierter Prozess mit Prozessdokumentation

BIM Models in Geodatabase

Ready-to-use Data und Web Services für alle Klienten

Andere 3D Modelle

ArcGIS Desktop

Web Client (JS API)

ArcGIS Earth

Attribute Mapping und Filterung

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DIRECT READ OF 3D BIM MODELS (REVIT) WITH ARCGIS PRO

BIM compliant 3D models

Architecture software

Autodesk Revit

Other BIM and engineering software

Web Client (JS API)

ArcGIS Pro

ArcGIS Earth
Participants in Infrastructure Lifecycle

Participants – public and private

- Building owner
- Project developer
- Environment assessment engineers
- Construction engineers
- Architects
- Project managers
- Construction companies
- Approvers
- Operators
- Facility managers
## BIM & GIS Cooperation Model

- Cooperation of specialists
- Common data base
- Integration of object models in spatial data
- Integration of workflows
- Use cases:
  - Mobile access to any relevant data (plans, documents)
  - Virtual and augmented reality on site
  - Clash detection on site
  - Geotechnics (subsoil)
  - Monitoring

<table>
<thead>
<tr>
<th>Geographic Information</th>
<th>BIM-GIS Collaboration Workspace</th>
<th>BIM Information</th>
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| - Basic requirement: Coordination of common BIM-GIS data basis and technical agreements | - Implementation of virtual workspace for spatial and digital collaboration (platforms, workflows, entitlements, etc.)
- Defining required spatial data depending on project needs
- Decision-making procedures | - Basic requirement: Coordination of common BIM-GIS data basis and technical agreements |
| - Integration procedures for BIM models in GIS
- Provision of GIS platform
- Integration procedures for BIM models in GI (methodology) | - Concept and Implementation of BIM-GIS collaboration in relation to Infrastructure Lifecycle and the tasks to be processed
- Technical requirements
- Agreements for integration of BIM models in GIS and use of GIS data in BIM-modelling | - Provision of BIM models in IFC
- Way and extent of data integration |
| - Provision of geospatial data for the area or extension of planned infrastructure (Desktop, web, mobile) | - Geographic localization of BIM model by integration and geographic coordinate system
- Site impact analysis of planned infrastructure [detection of potential conflicts]
- Compensation measures for temporal and permanent land use | - BIM use case: Plan & Design of a road, waterway, bridge, tunnel, rail or building infrastructure |
| - Supply of spatial data on web platform for mobile use, including UAV, VR and AR | - Clash detection of planned infrastructure with other uses or properties
- Documentation of building inspection, comparison and alignment (local and track building) | - BIM use case: Clash detection and provision of BIM model on platform for inspection on site |

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BIM UND GIS – AUTHORING SYSTEMS

- Left: 3D GIS-System
- Right: 3D CAD/BIM System

https://oertac.github.io/BIM_Berlin/
Özgür Ertac 2018
BIM UND GIS - AUTHORIZING SYSTEMS

- Left: 3D GIS-System
- Right: 3D CAD/BIM System

https://oertac.github.io/A99-slides/
Özgür Ertac 2018
BIM-GIS INTEGRATION SHIP LOCK

BIM Object from Microstation (DGN) in IFC Format – integration with FME

Ship lock underwater

WSV - Neubauamt Hannover, 2017
INTEGRATION OF BUILDING FROM LASERSCAN

- Laserscan
- Daten-provisioning in CAD
- Data migration
- Data integration
BIM-GIS INTEGRATION – FOR IMPACT ASSESSMENT OF BRIDGE

Integration of BIM Object of a bridge (project A 99) from Autocad (IFC-Format) in ArcGIS

SSF Ing. und PSU, 2016/2017
STRATEGIC PARTNERSHIP OF AUTODESK AND ESRI

+ **Autodesk – Esri Partnership**
  > since November 2017
  > common Software-Development

+ **BIM and GIS**
  > Seamless use of object models in ILC
  > Integration of IoT (Sensors)
  > Improved cooperation in BIM-GIS-Projects
  > Reliable costs and deadlines
  > Better risk management

Jack Dangermond President Esri Inc. - Andrew Anagnost CEO Autodesk, Nov. 2017
AUTODESK AND ESRI LINKS

+ InfraWorks ArcGIS Connector (online); Autodesk Connector for ArcGIS; Video with example from Min 31:35-47:00
+ Video short [https://www.youtube.com/watch?v=wnLSaa-V2ok](https://www.youtube.com/watch?v=wnLSaa-V2ok)