3D Cadaster for Intelligent Infrastructure
Ton de Vries – Solutions Executive Government
Improve sustainability…

Billions

People

One

Planet
By Sustaining Infrastructure...

Bentley’s mission is to provide innovative software and services for the enterprises and professionals who design, build and operate the world’s infrastructure - sustaining the global economy and environment, for improved quality of life.
**Sustaining Infrastructure?**

*Infrastructure: the improvements made by People to our Planet...*
“Sustainability Index”?  

Infrastructure can increase Economic Capacity...  

Economic Capacity  

Environmental Footprint  

...and can (uniquely) reduce Environmental Footprint!
Responsibility for Sustaining Infrastructure?
Enabling Resilient Development

Economy

Infrastructure Professions

Environment
#1

- Bridges
- Roads
- Rail and Transit Networks
- Power Plants
- Water and Wastewater Utilities
- 3D City Modeling
- Construction Simulation
- Collaboration Services
- Process Plant Operations
- Structural Analysis
3D Cadaster
Semantic Infrastructure

[Diagram showing various interconnected nodes including Education, Buildings, Cadastre, Roads, Transcendence, Agriculture, etc.]

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Geospatial Developments

1990’s  2000’s  2010’s

GIS Mapping  +  Geospatial Modeling  +  Semantic Simulation
Semantic Simulation
Semantic Simulation
Semantic Simulation
Semantic Simulation
Building Information Modeling

GEO  CIVIL  ARCH  STRUCT  MECH  ELEC  PLUMB  FM
GIS + BIM Data Schema

- Object definition
- Object metadata
- Relationships

Common data model bridging both GIS and BIM

Standards

IFC

BIM

LANDxml.org

CityGML

ISO 19152
BIM vs. 3D GIS world

• The BIM/IFC world
  – Detailed 3D building volumetric and advanced surface geometry BIM objects
  – Detailed business data
  – Focus on file based exchange
  – Typically used for modeling *new building design*

• The 3D GIS world
  – Planer surface geometry boundary objects
  – Variable Level of Detail (LoD)
  – Focus on server based (central)
  – Typically used for modeling *existing data*
CityGML Levels of Detail (LoD)

- CityGML Levels of Detail (LoD) for each object
  - LoD 0 - Building footprint on topographic surface
  - LoD 1 - Extruded building footprint with flat roof
  - LoD 2 - Add roof slopes and detail
  - LoD 3 - Add door and window openings
  - LoD 4 - Add interior partitions
BIM/IFC vs. CityGML Modeling

Differing Modeling Paradigms

BIM (e.g., IFC)
Constructive Solid Geometry

3D GIS (e.g., CityGML)
Boundary Representation

Volumetric, parametric primitives representing the structural components of buildings

Accumulation of observable surfaces of topographic features

(C) slide from: Thomas H. Kolbe - joint work with Claus Nagel & Alexandra Stadler
Findings

• It can be done, but...customizations data case specific and are only partially reusable from case to case

• Should only be employed after the use case is defined, the input IFC specifics are known and output requirements are specified
Side note: Information Mobility
Information Lifecycle vs. Information Mortality
Information Mortality...

"Blobs" of closed file formats
Monolithic data structure
Enterprise labyrinth
Information Mortality Waste...

Can’t facilitate the work
Information Lifecycle (!)

- Information Mortality...
- Information Mobility!
Information Mobility (at Work!)

Delivering
Referencing
Reusing
Reviewing
Transforming
Sharing
Updating
Approving
Improving
Validating
Analyzing
Information Mobility Dividends

Quality
Confidence
Teamwork
Alignment
Virtualization
Globalization
 Agility
Responsiveness
Synchronization
Standards for Information Mobility

OGC®
Making location count.

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Thank you!
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