Background for selecting LandXML as the preferred format for Infra in Finland

Nordic openINFRA Workshop in Oslo focusing on LandXML
7.6.2012

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Inframodel (IM) history

BACKGROUND FOR SELECTING LANDXML

LandXML v1.0
17.7.2002

LandXML v1.1
21.7.2006

LandXML v1.2
15.8.2008

Pre-study

Inframodel

Inframodel 2

IM v1.0
26.3.2006

Road Admin.
Inframodel guideline
27.10.2007

Update

IM v1.2
20.3.2010

InfraFINBIM

5.6.2012
Infra Technology Programme 2001-2006 - Pre-study

- SKOL (The Finnish Association of Consulting Firms) / SITO 2001
- Current situation – standardization projects – development
- De facto formats in Finland
- OGC, OpenGIS, STANLI, GEOSIS, IFC, GDF, CIRC, OSYRIS, OKSTRA, OpenDesign...
- LandXML?

- Significant benefits from the harmonization of data transfer
- An common infra product data model big effort
- Best tool for infrastructure design?
Infra-related standards – general information map

Source and reference data

- OGC, ISO19100 series standards
  - Basic methods and formats (services, GML)
  - Catalogue information
  - Metadata

- KuntaGML/KRYSP
  (Finnish adaptation of GML for cities and municipalities)
  - Land survey, maps
  - Town and city plans

- INSPIRE

- National Finnish Infra-format
  - Soil investigation information

Design objects, structures

- LandXML
  - Civil engineering data
  - Infra structures
  - Networks

- Inframodel
  (Finnish adaptation of LandXML)
  - Transport networks
  - Roads and streets
  - Railways
  - Waterways
  - Areal structures
  - Water supply and sewerage
  - Header information, base information

- IFC / Bridge extension
  - Bridge structures
  - Buildings
  - Spaces
  - Structures
  - HVAC and mechanical design
  - BOM
  - Cost
  - Scheduling

buildingSMART / IFC Connected structures
Inframodel

- Development of data exchange between softwares in infra design
- Actors VTT, Sito, Tekla, Viasys(Vianova)

- Harmonization study
  - Map information
  - Soil investigations
  - Terrain and subsoil model
- LandXML 1.0 requirement specifications and feasibly study
  - Metadata
  - Geometry, pipenetworks
  - Road / railway model
Inframodel - results

- Harmonization
  - Infra-format for soil investigations
  - Some other guidelines

- LandXML recommended to the data exchange format
  - Fullfill partly the demands
  - Possibility to expand (feature)

- Postpone the start of the common product data model

• “A specialized XML data file format containing civil engineering and survey measurement data commonly used in the Land Development and Transportation Industries”
• An existing, worldwide, open organization
• A non-proprietary data standard
• Driven by an industry consortium of partners (Autodesk, Bentley, Trimble, Topcon, Leica…) 
• February 2006: 35 countries and 495 representatives from 400 member companies/government agencies
• Active development (www.LandXML.org)
• XML based
• Possibility to expand
• Possibility to influence?
Inframodel2 - goals

- To improve data exchange between design softwares
- To bring LandXML-transfer format in the use
- Open documentation of Finnish practice
- Implementations in three design softwares: Sito/CityCad, Tekla/Civil, Vianova/Novapoint
- A plan for the maintaining and further development
- Common requirements of design
- Definitions by Sito, Tekla, Vianova; documentation by VTT
- Total cost 600 000 € (public/private 50/50% & Tekes)
2.3 Triangular mesh surface

Surfaces are described as triangular meshes. Each surface is defined in terms of boundaries, exterior features and holes.

The triangular mesh is defined in three parts: first by describing the vertices of the triangular faces, then individual faces and a assigned individual names within the same <Surface> element. The mesh description is done by referring to the names of the

Surface mesh

The surface is delimited by the outermost edges of the mesh.

Triangle vertices + Faces are defined

The surface type surftype is set to "TIN" when describing a triangular mesh. The precision of the mesh model depends on the area2DSurf, 3D surface area area3DSurf and the elevation maximum elevMax and elevation minimum elevMin.

Attributes of the <Definition> header:

- surftype: surface type (TIN, grid, etc.)
- area2DSurf: 2D surface area in surface area units, e.g. [2450.510000]
- area3DSurf: 3D surface area in surface area units, e.g. [2450.510000]
- elevMax: elevation maximum elevation, e.g. [64.372000]
- elevMin: elevation minimum elevation, e.g. [56.4310000]
Inframodel – why extensions?

- Mechanism provide by LandXML (Feature)
- Type coding system and type coding
- Plan data
  - Phase, subproject
- Stringline model
  - Describing construction layers
- Crosssection parameters
  - Between design - design
- Pipenetworks: struct and pipe properties
After Inframodel2

- Piloting project
- Inframodel guidelines
- Upgrade to LandXL 1.2 (documentation)

- InfraTM & InfraFINBIM
  - InfraBIM modelling guidelines
  - InfraBIM classifications and coding systems
  - New steps in BIM activation, pilot projects
  - Inframodel3 (LandXML1.2 etc.)
  - buildingSmart
Experiences

• Benefits
  - Metadata, pipenetworks, surfaces
  - Road model from design to construction
  - Co-operation between different organizations

• Challenges
  - Road model from design to design
  - LandXML <> Inframodel extents (international / national)
  - Active use is the best way to develop
  - Organizing the further development and maintenance
  - Need for InfraBIM guidelines / classification and coding systems
Thank You!
Comments? Questions?


Pre-study  Inframodell  Inframodell 2  IM v1.0 26.3.2006  Road Admin. Inframodell guideline 27.10.2007  IM v1.2 20.3.2010


InfraFINBIM