Smart City Standards Workshop: *Representation and Visualization for Smart Cities*

WEB 3D
2020 SEOUL + ONLINE

Hosts: Peter Ryan & Don Brutzman

Smart City

- ISO Smart City concept integrates information and communications technology (ICT) and physical devices connected to network (the Internet of Things or IoT) to optimize efficiency of city operations and services for its citizens and managers.

- An international *Smart City* uses transformative power of data and technology to support management and integration of many physical, digital and social systems, thus enhancing its capabilities.

Workshop Themes

- Introduce Smart City and Smart City concepts such as smart energy management, surveillance, traffic management, smart health, smart buildings, and smart home

- Identify types of data and information required to represent and visualize a Smart City

- Present a range of information presentation and visualization techniques supporting Smart City data

- Focus on application of standards to cross-cutting use cases for compelling Smart City challenges and needs

- Provide examples that demonstrate the power of "mashup" information analysis using interactive visualization to gain insights

Standards Organizations

- **ISO/IEC JTC 1/WG11:** *Smart Cities*
  - ICT aspects

- **ISO/IEC JTC 1/SC24:** *Computer graphics, image processing and environmental data representation*
  - Representation and visualization

- **ISO TC268:** *Sustainable Cities and Communities*
  - Management guidelines

- **IEC SyC:** *Smart Cities*
  - Electrotechnical aspects

- **OGC**
  - 3D City modeling - CityGML

Workshop Presentation Agenda

Standards Session 2

- Peter Ryan / Don Brutzman, *Workshop Introduction*

- Peter Ryan (Australia, ISO/IEC JTC 1/SC24), *Representation and Visualization for Smart City*

- Myeong Won Lee (Chair SC24) and Seung-Pyo Lee (Univ of Suwon, Korea), *Health Information for VR Smart City*

- Dapeng Zhang (China WG11), *Smart City Reference Framework*

- Michael Mulquin (UK, IEC SyC Smart Cities) and Chunlan Guo, *Defining the requirements for 3D visualization standards in City Information Modelling, Part 1*
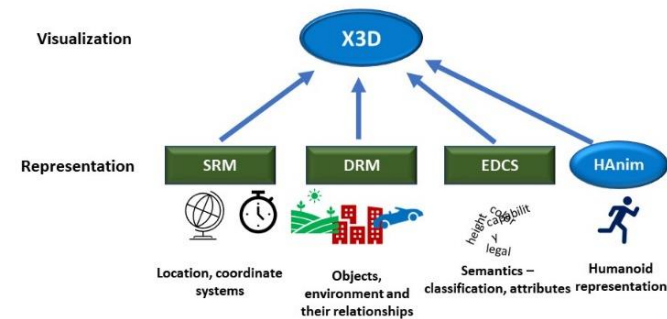
Standards Session 3

- Don Brutzman (US, Web3D), Visualizing Data and Metadata: X3D Graphics Standard for Smart City Information Portrayal

- Michael Mulquin (UK, IEC SyC Smart Cities) and Chunlan Guo, *Defining the requirements for 3D visualization standards in City Information Modelling, Part 2*

- Mark Fox (CA, WG11), *Smart City Data Model*

- Volker Coors (Hochschule für Technik Stuttgart, Germany), *OGC 3D Portrayal Service and the OGC 3D Container Pilot*

- Discussion

Representation & Visualization of Smart Cities
Peter Ryan

- ISO/IEC JTC 1/SC24, Australia

- Standards for Smart Cities

- Kinds of data to represent and visualize

- Key SC24 standards – SEDRIS, HAnim, X3D

- Relationships among SC24 standards and capability to model / visualize Smart City

- Use cases – environment, transport, tourism, indicators, health

SC24 Standards for Smart Cities

Visualization — X3D

Representation — SRM | DRM | EDCS | HAnim

Location, coordinate systems | Objects, environment and their relationships | Semantics – classification, attributes | Humanoid representation

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Health Information for VR Smart City
Myeong Won Lee and Seung-Pyo Lee

- ISO/IEC JTC 1/SC24 and U of Suwon, Korea
- Smart City needs remote access to health info
- Health info sensors monitor health / safety
- Model for 3D health system
  - XML schema for 3D VR environment, 3D human models, sensors, health representation
  - Implemented using X3D, Hanim, Unity simulation engine
- System enables real time health information monitoring in virtual environment of real people via their avatars

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Smart City ICT Reference Framework
Dapeng Zhang

- ISO/IEC JTC 1/WG11: Smart Cities, China
- Smart City ICT framework ISO/IEC 30145
  - Part 1: Business process
  - Part 2: Knowledge management
  - Part 3: Engineering
- Smart City Indicators ISO/IEC 30146
- Task Force implementation and use cases
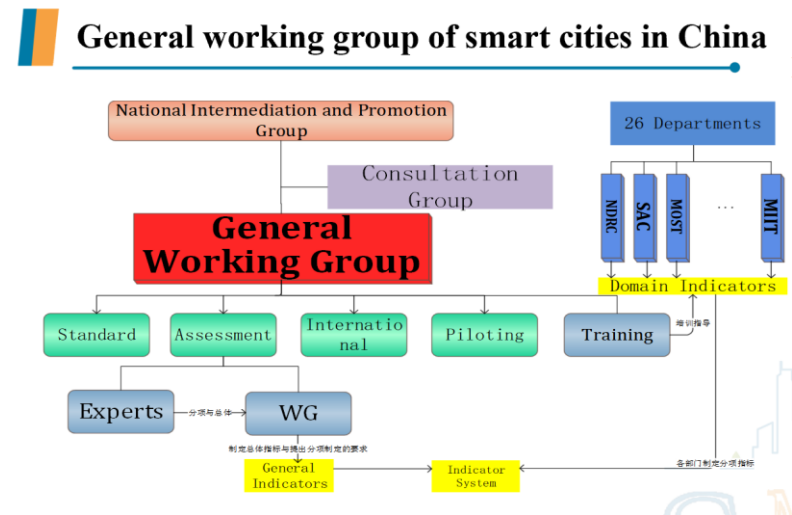
General working group of smart cities in China

Defining the Requirements for 3D Visualization Standards in City Information Modelling
Michael Mulquin and Chunlan Guo

- IEC SyC Smart Cities, UK and China
- SyC committee analyses systems and advises on electrotechnical standards requirements
- City Information Modelling (CIM) – relation to: BIM, GIS, IoT, Cloud, Big Data & AI
- 3D Visualization for Development Applications use case (urban projects)
- 3D Visualization critical for CIM
    - Standard formats, platform for geo visualization, legislation for mandating 2D/3D models for urban developments
- CIM application areas – many, eg urban planning, waste, project management, utilities, transport, energy, climate
- CIM use case collection & analysis project to scope out stds requirements

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Visualizing Data and Metadata: X3D Graphics Standard for Smart City Information Portrayal
Don Brutzman

- Web3D, Naval Postgraduate School, US

- Smart City concepts, TORs, relationships, constraints

- X3D and Web3D consortium

- D3-X3D library

- X3D eng and geospatial use cases – 3D Blacksburg

- Metadata visualization in X3D

- Potential use case: contact tracing in 3D (Covid-19)

https://web3d.siggraph.org/wp-content/uploads/2020/11/X3dSmartCityInformationPortrayalVisualizing DataAndMetadataBrutzmanWeb3dConferenceNovember2020.pdf

Ontology-based Standards for Smart Cities
Mark Fox

- U Toronto, School of Cities, WG11, Canada
- Ontology can provide a precise, unambiguous representation and interpretation (semantics) of information and knowledge commonly shared across city services
- Example of city resident – different for different cities, eg Toronto, Beijing, Mumbai
- Ontology applications:
  - data integration, automated classification, automated deduction model checking
- ISO/IEC 5087 framework – foundation, city, service levels
- City Data Model project – global collaboration

https://web3d.siggraph.org/wp-content/uploads/2020/11/FoxSmartCityDataStandards.pdf

OGC 3D Portrayal Service and 3D Container Pilot
Volker Coors

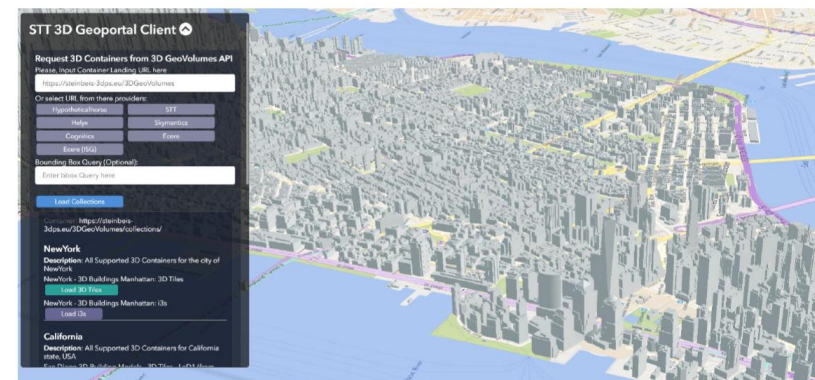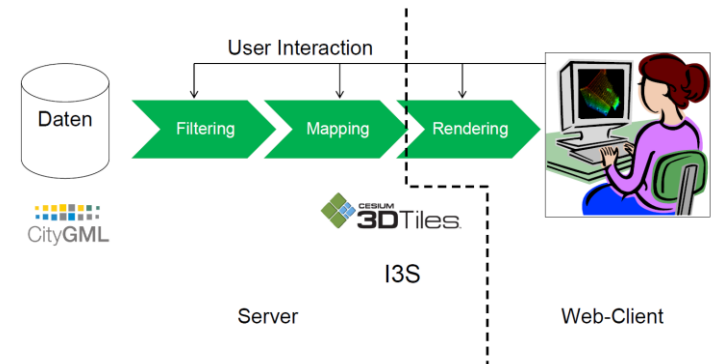- U Applied Sciences Stuttgart, OGC, Germany

- OGC 3D Portrayal Service
  - Query system for 3D
  - Use any 3D format: X3D, glTF, OGC 3D Tiles, KML, I3S

- OGC 3D Container Web API
  - Access 3D model formats
  - Multiple servers/3D formats

https://web3d.siggraph.org/wp-content/uploads/2020/11/SCS_Workshop_3D_Standard.pdf

Summary

- Different Standards Development Organizations contribute to effort provide differing perspectives:
  - ISO WG11: ICT aspects
  - IEC: electrotechnical systems
  - OGC: geospatial focus
  - ISO SC24: visualization

- Collaborate via wiki?
- Regular Web3D event?
- More regular contact among groups needed
- Start report on this