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Report from the Host:
Construction IT Committee,
Japan Society of Civil Engineers (JSCE)

Activities in the Sub-Committee on Cyber and Real Infrastructure Model

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1. Introduction

- The Sub-Committee (SC) on Cyber and Real Infrastructure Model is one of the 7 SCs of Construction IT Committee of JSCE.
- Started from September 2006.
- Expected period is 2 years. May be extended.
- Consists of 14 members including Leader and Sub-Leader.
- Members are from universities, general contractors, design consultants, governmental agencies, etc.
- Regular meetings every two months and occasional special meetings.
- Collaboration with JACIC, IAI Japan, and CSTB of France.

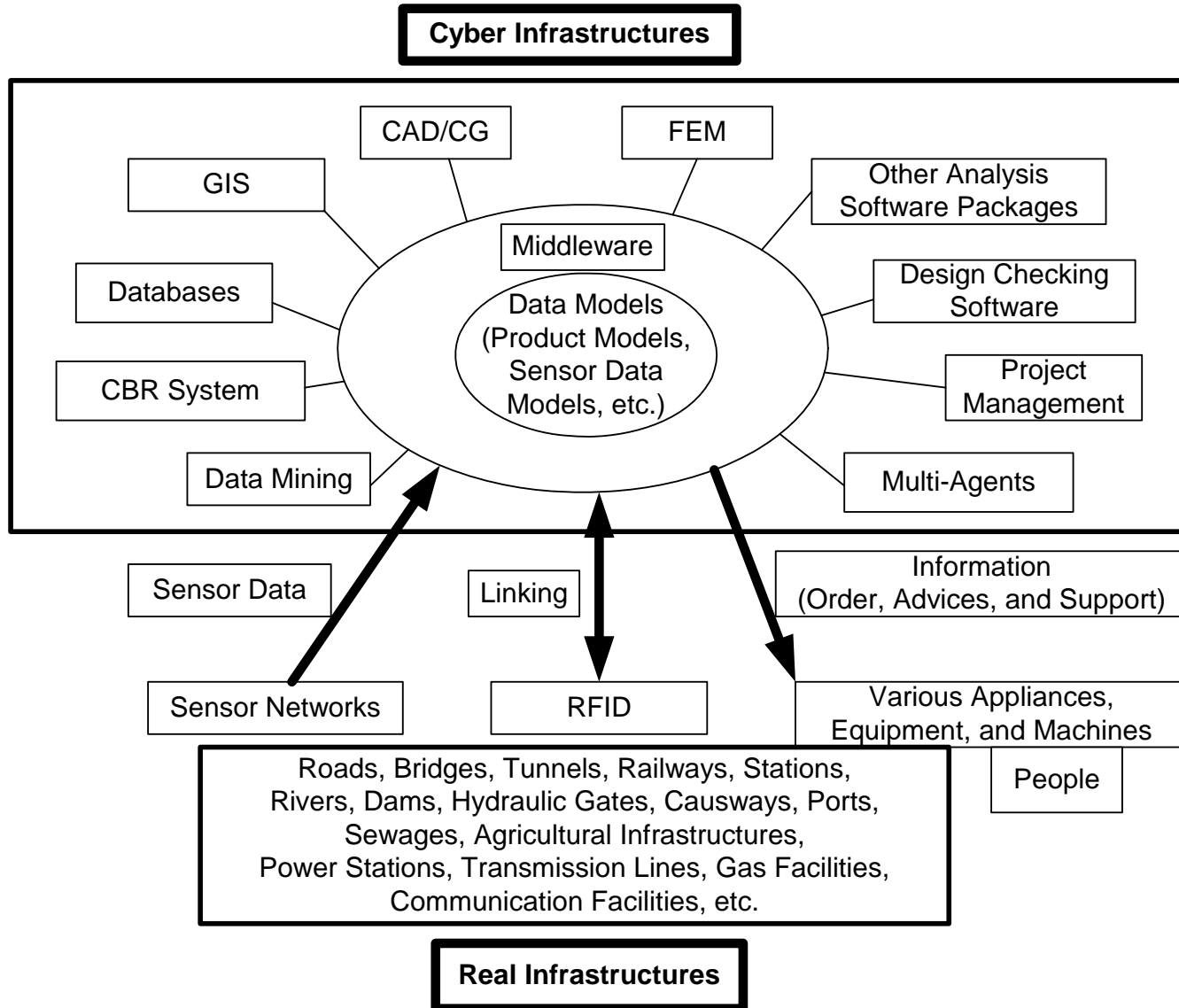
2. Objectives

- Development and progress in computers and IT have made a “Cyber World”, e.g., “Second Life”.
- In Cyber World, the user can create natural and urban spaces and civil infrastructures and perform various simulations, including structural analysis, hydraulic analysis, transportation simulation, 4D construction simulation.
- Cyber World is expected to enhance the efficiency of plan, design, construction, and O&M of civil infrastructure systems.
- You may call upon open discussions with users, stakeholders and opinion leaders in Cyber World.
- It may become an information and communication **infrastructure** for users and stakeholders to get support from it as well as to provide their information to it for better mutual understanding with the owners.
- **Cyber Infrastructure.**

- At the same time, we have to realize that civil infrastructures are actual things in the Real World.
- **Real Infrastructure.**
- Indulging in Cyber Infrastructure and separating Cyber and Real Infrastructures may be meaningless.
- Thus, linking, integrating, and fusing these two infrastructures by surveying, sensor networks, RFID, etc., is essential.
- Further, if Cyber Infrastructure can provide people and various equipment in Real Infrastructure with information, guide, and support, it will enable us to reach safe and secure societies and better quality of life.
- **Integration of Cyber and Real Infrastructures** will help us to *create new VALUES*.

- The SC on Cyber and Real Infrastructure Model (CaRIM) has been investigating the following:
 - Information Infrastructure Model needed to create Cyber Infrastructure
 - Sensors and related technologies in Real Infrastructure
 - Technologies needed to link and integrate Cyber and Real Infrastructures.
- The goal of the SC on CaRIM is to propose and suggest the visions, importance, roles, benefits, values, methods, and issues of the new proposed model CaRIM not only to JSCE but also to the world.

Cyber and Real Infrastructure Model



3. Activities

- Collecting information related with CaRIM
- Developing the model and vision of CaRIM
- Developing a prototype of a sample CaRIM
- Demonstrate the methodology
- Suggesting creation and enhancement of values by CaRIM

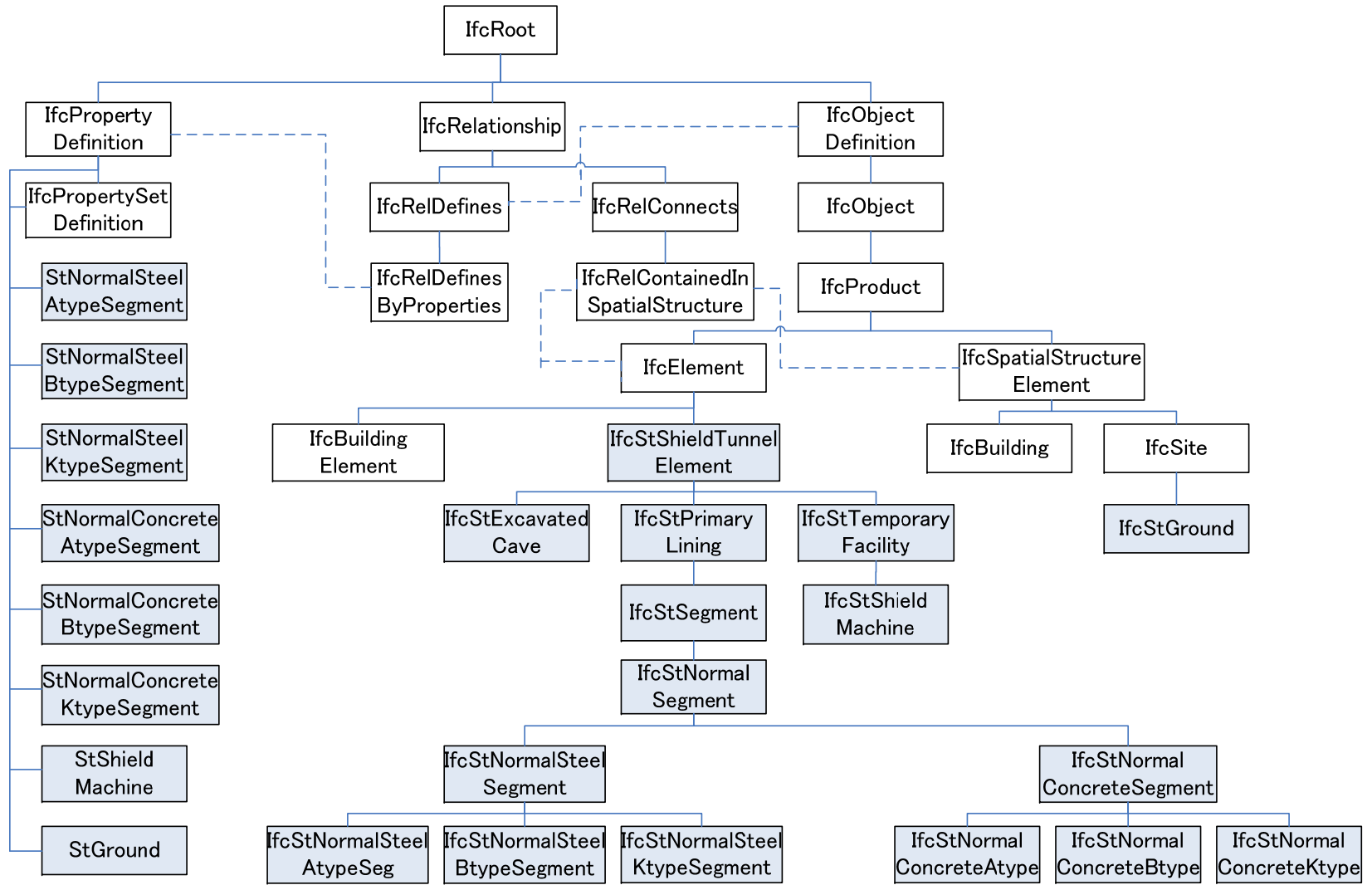
4. Samples of Information Collected and Presented

- Representation of 3D world by using SKETCHUP and RUBY.
- Virtual Prototyping from CSTB (Sophia Antipolis) of France.
- Developing IFC-BRIDGE with the Civil Engineering Group of IAI Japan and CSTB (Sophia Antipolis) of France.
- Semantic comparison between 3D product model data in different phases.
- Road Alignment Data Model of the MLIT.
- ISO AP 241.
- 3D models and advanced sensor technologies in movies and dramas.

- Developing a shield tunnel product model with JACIC and IAI Japan.
- Developing 3D models by using digital images obtained from satellites.
- George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES) of the US and E-Defense Grid (EDgrid) of Japan.
- Application of RFID in civil engineering.
- Business Continuity Plan (BCP) after severe disasters.
- Computational Geometry
- Application of cellular phones, GPS, digital cameras to probing person technology.
- 3D data by using LiDAR and Laser Profile Scanner.
- Utilization of 3D models in actual civil engineering practices

5. Efforts in Development of IFC-ShieldTunnel

- Shield IT Study Group in JACIC from 2006 summer to March 2007
- Developed a conceptual product model for representing shield tunnels
- Modified and translated it into a form in compliance with IFC product model.
- Partially implemented the temporary IFC-ShieldTunnel by EXPRESS and IfcXML
- Developed a simple converter program from IFC-ShieldTunnel to AutoCAD.
- Collaboration with IAI Japan.



図ー4.1 本研究で構築したシールドトンネルのプロダクトモデル

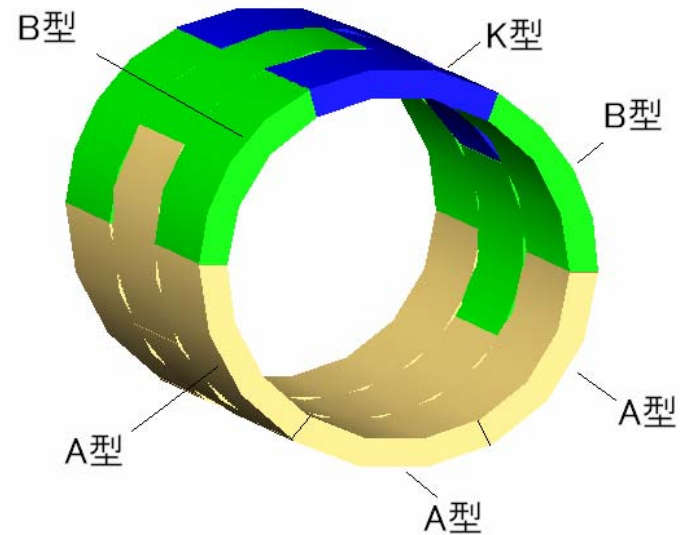
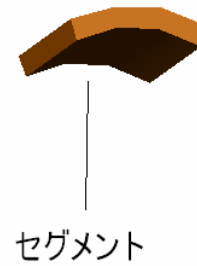
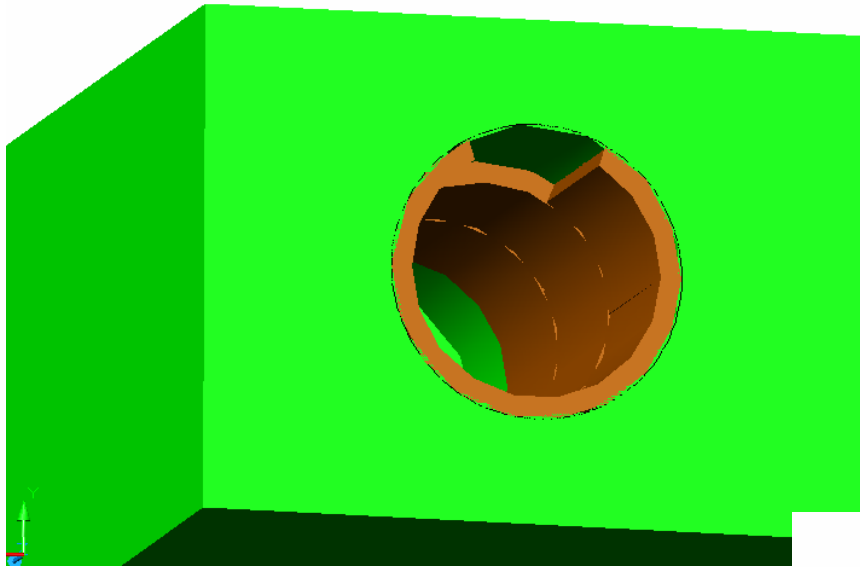
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3D CAD Representation of Shield Tunnels



Nobuyosh

6. Expected Publications

- Seminars
- Publishing reports
- Publishing domestic conference papers
- Publishing domestic journal papers
- Publishing international conference papers
- Publishing books if possible

Acknowledgments

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Thank you for your attention!