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Minister of Land, Transport and Maritime Affairs (MLTM)

IndoorGML – Candidate Standard for Indoor Navigation

82nd OGC Technical Committee

Seoul Korea

Ki-Joune Li

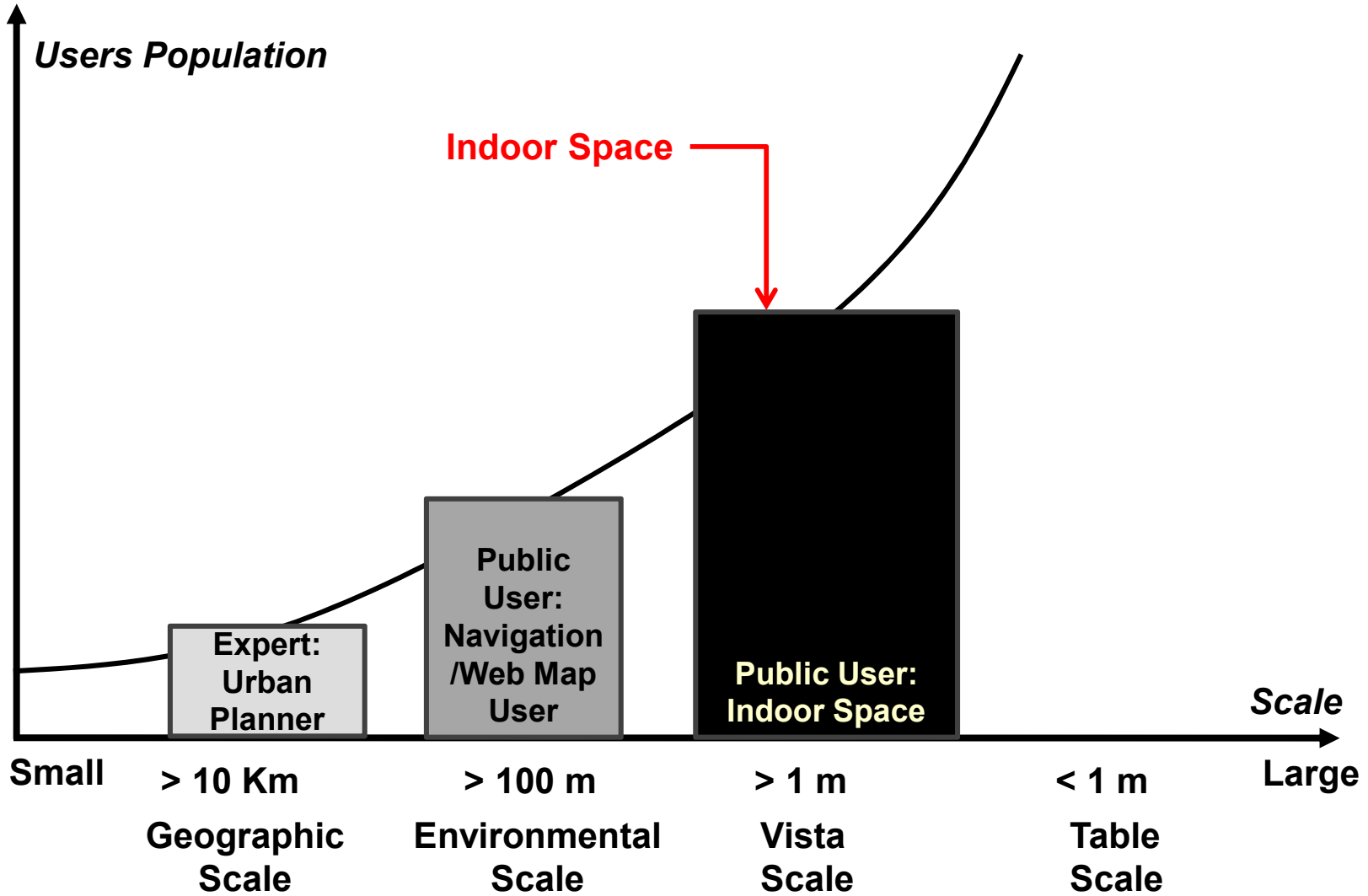
October 8, 2012

Background



87%

Background



Demands from other standards



- ISO/TC204 WG 17 (Nomadic Devices of ITS Systems)
 - Extension of road navigation standards for covering outdoor space AND **Indoor Space in a seamless way**
 - NWIP: Adopted on May 7, 2012 (ISO 17438-1) – Part I

Indoor navigation for personal and vehicle ITS station

– Part 1: General information and use cases definition

– Part 3: Requirements and specification for indoor positioning reference data format

– Part 4: Personal/Vehicle and central ITS stations interface requirements and specification for indoor map and indoor positioning reference data

- IEEE RAS(Robotics and Automation Society)
 - Indoor maps for localization and navigation of robots
 - IEEE MDR (Map Data Representation for Robots)
 - WG established in Nov. 2011

Prior work for indoor space



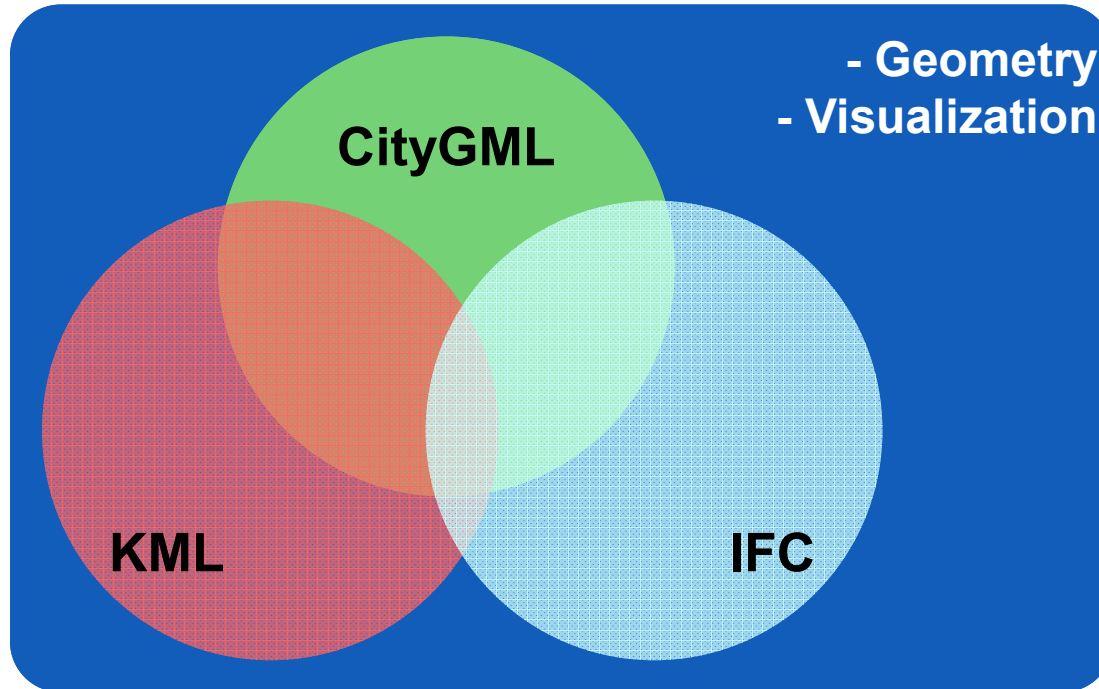
- IFC: Mainly focused on BIM
- CityGML: LoD 4: Interior space
- KML



... and

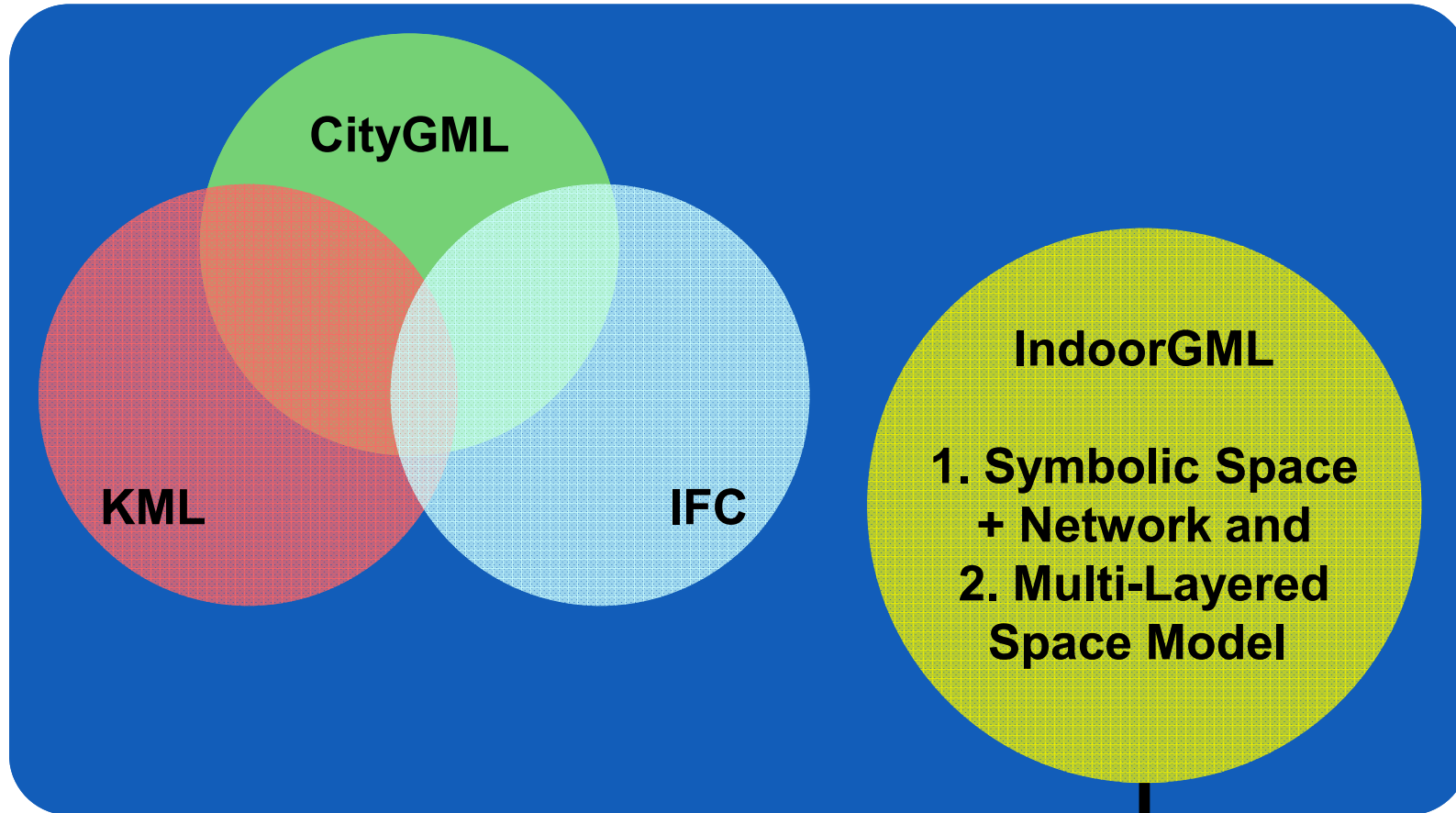
- Commercialized Services

Why IndoorGML?



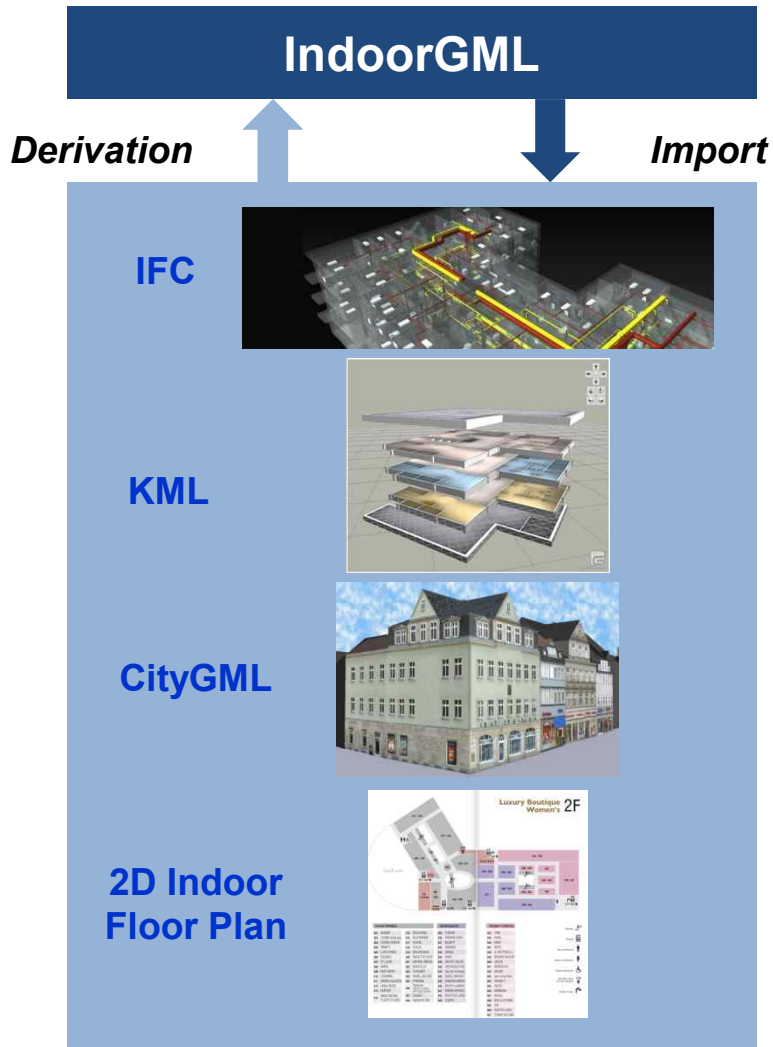
Navigation ??
Symbolic Representation ?

IndoorGML as complements



Indoor positioning and geometry are out of scope

IndoorGML and Other Standards



Services for handicapped persons

Emergency Control

Indoor LBS

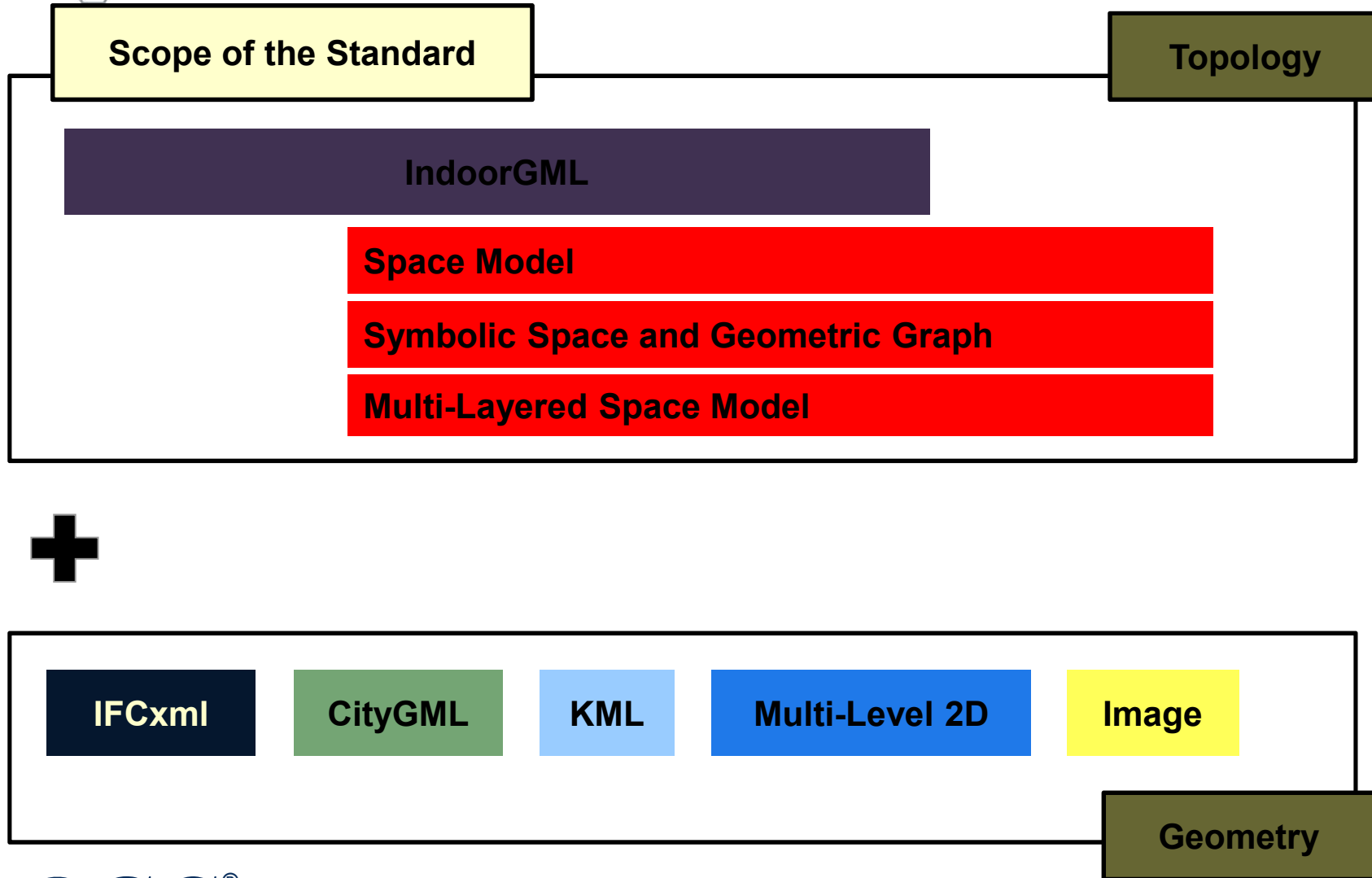
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Application

Indoor mCommerce

Indoor Robot

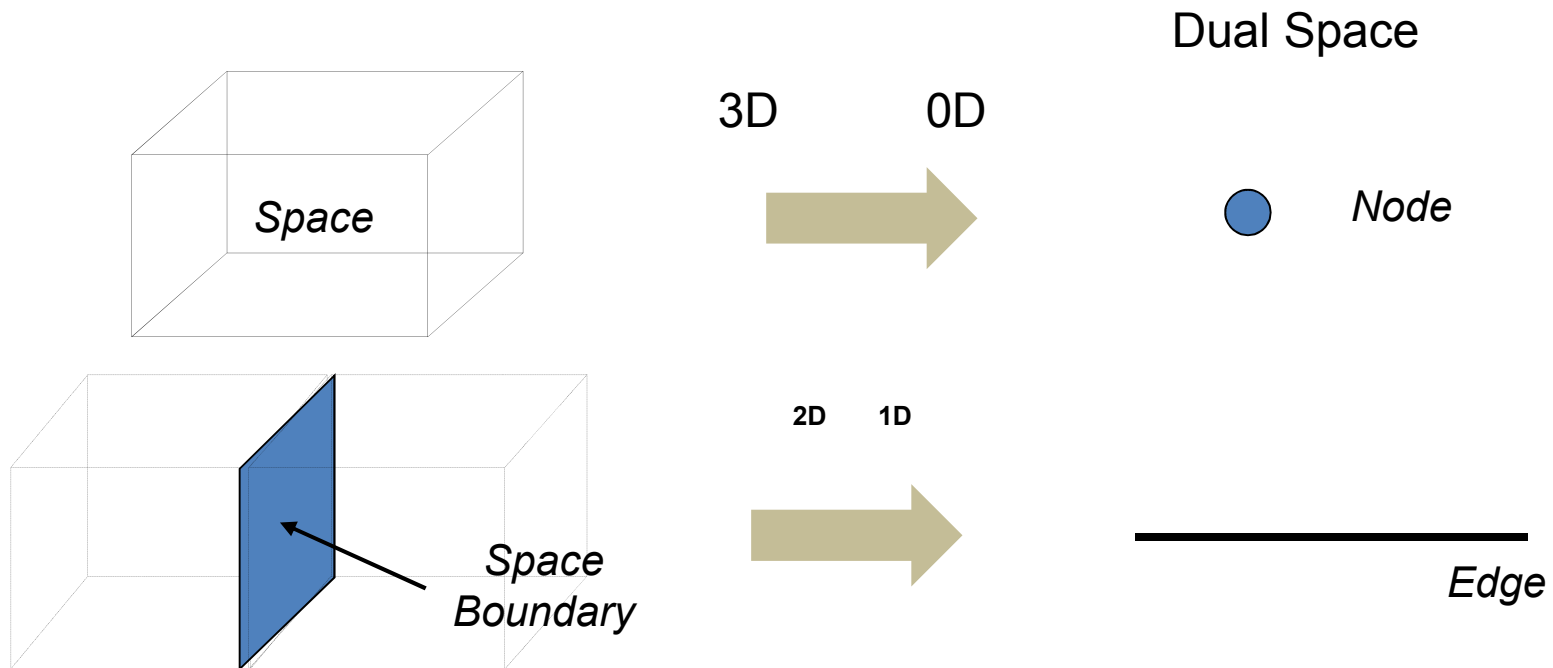
Basic Components of IndoorGML



Space Model of IndoorGML



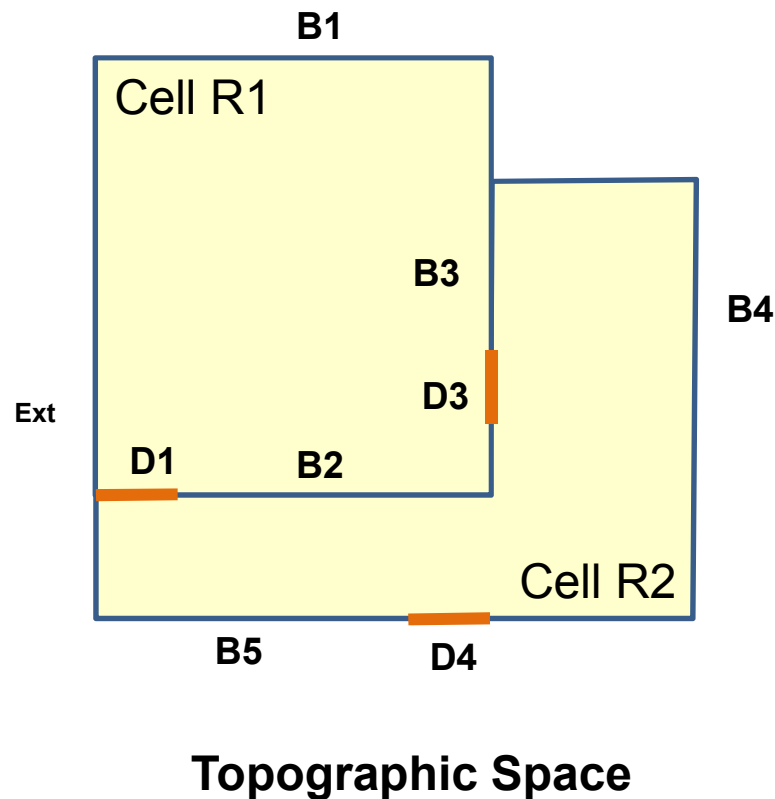
- Poincare Duality
 - Conversion from k D object $\rightarrow 3 - k$ D objects



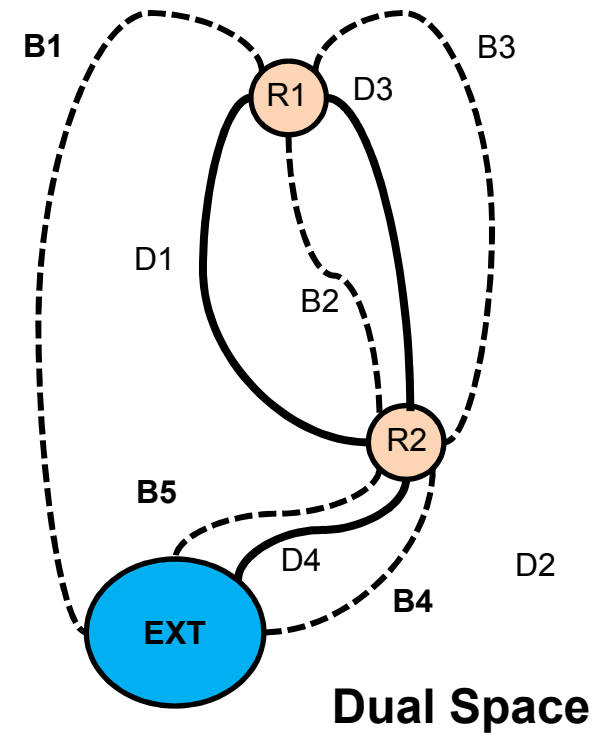
Space Model of IndoorGML - Example



Example: Wall and Door as Space Boundary



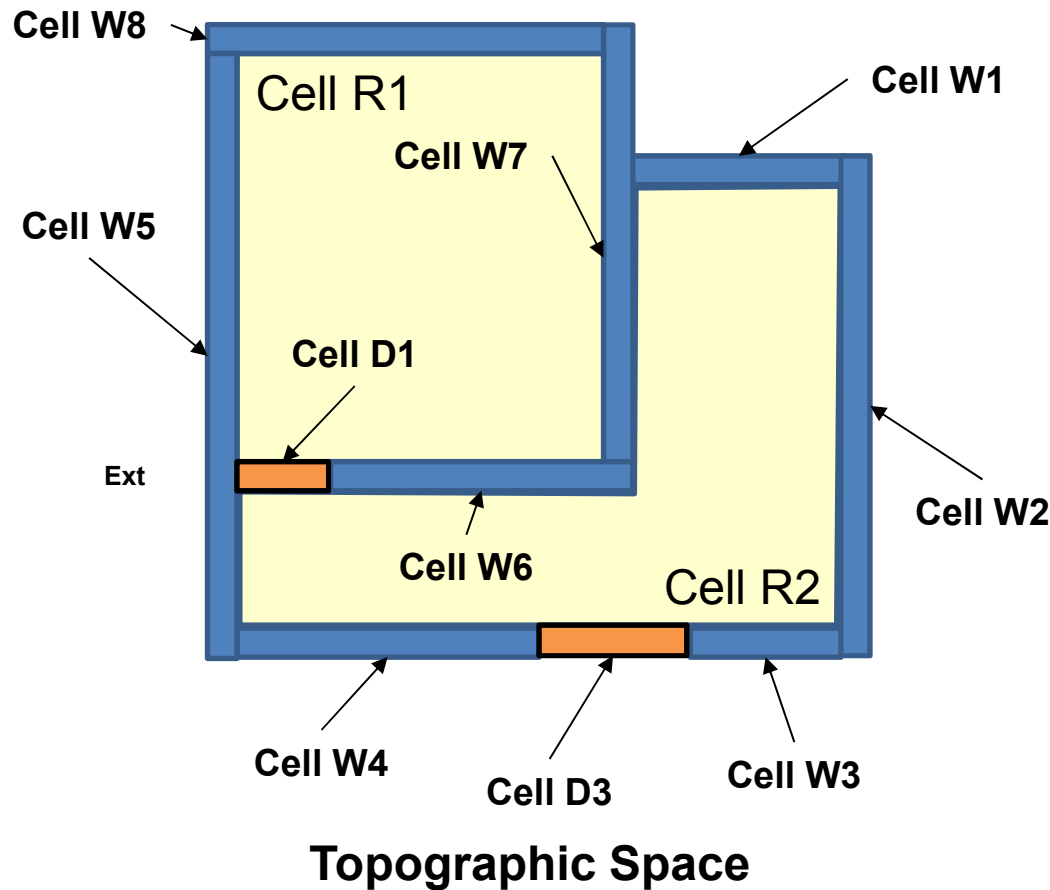
— Navigable Link (Connectivity)
- - - Non-navigable Link (Adjacency)



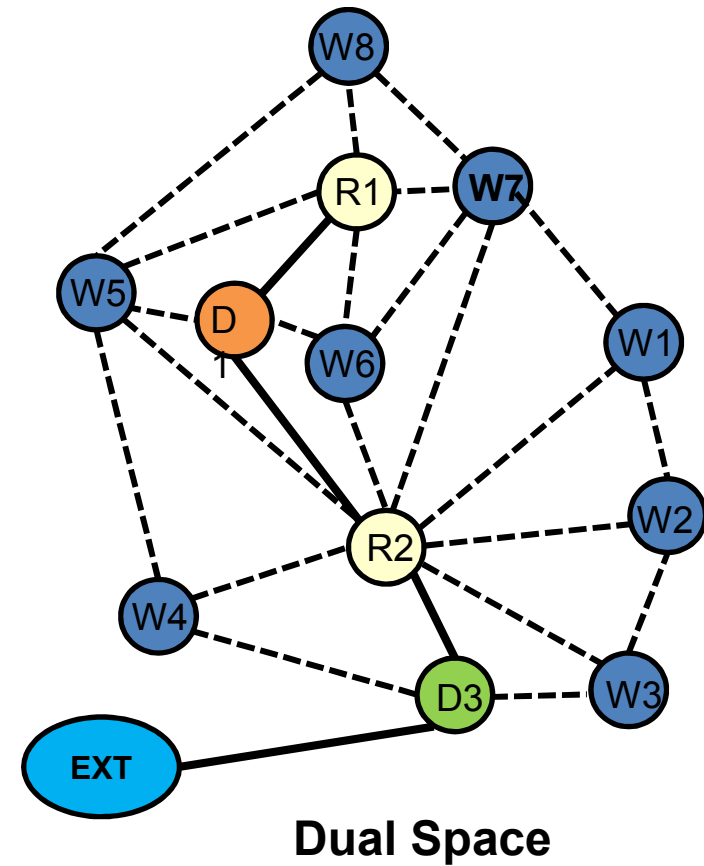
Space Model of IndoorGML - Example



Example: Wall and Door as Space



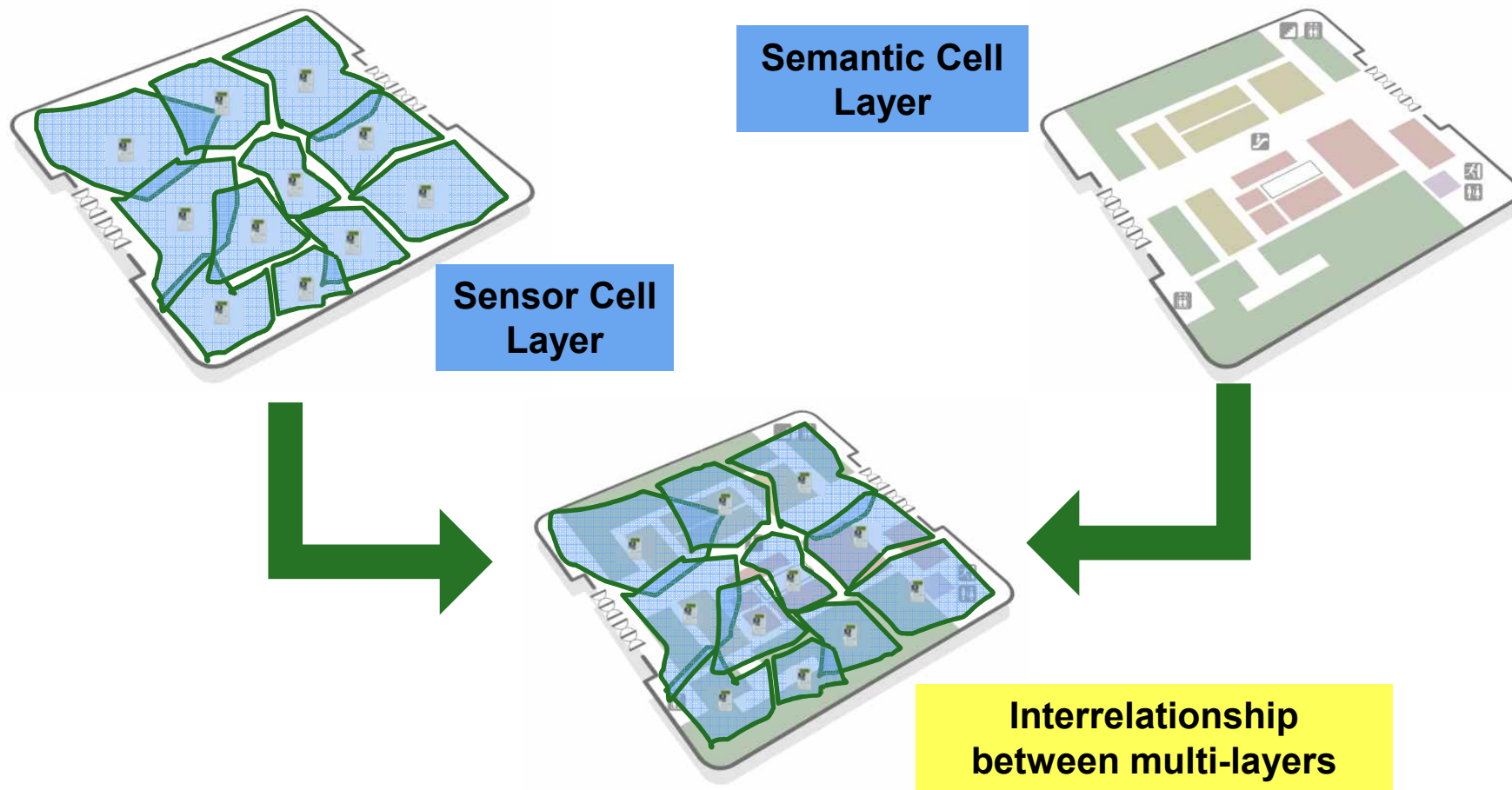
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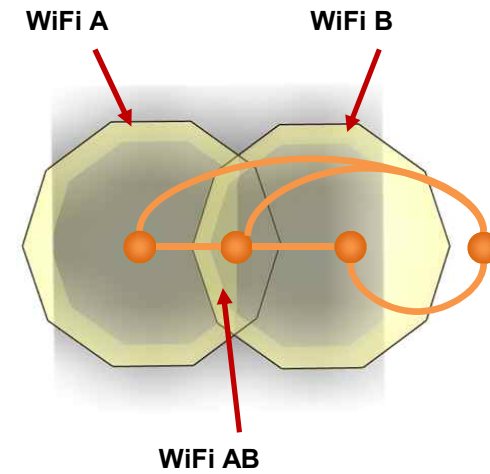
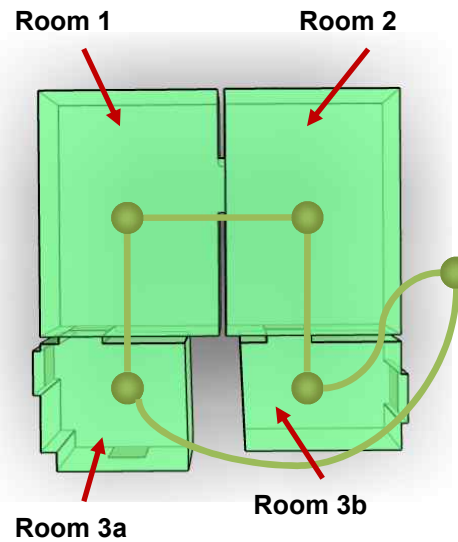
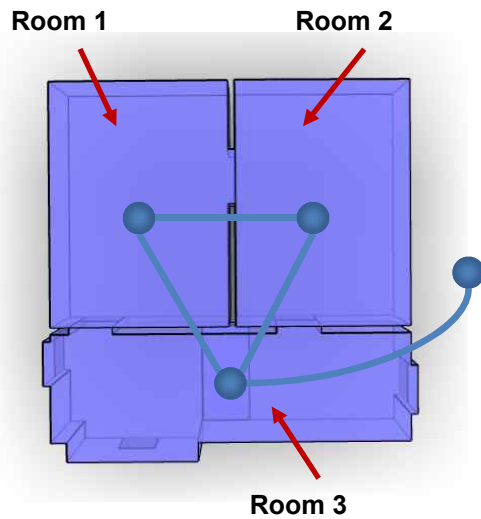
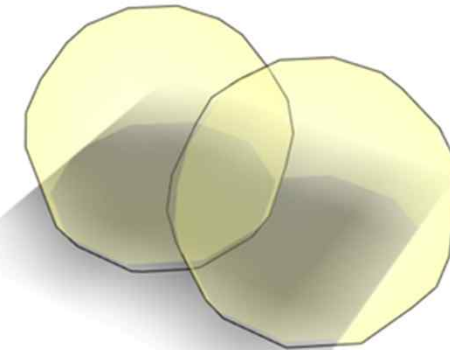
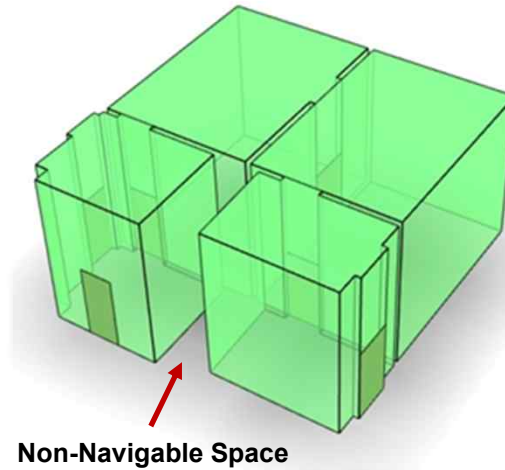
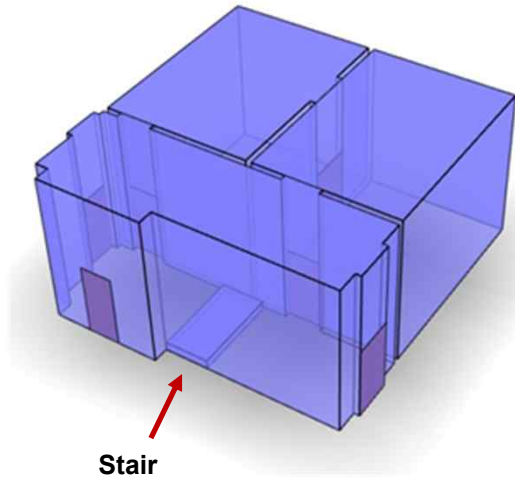
Multiple-Layered Space Model



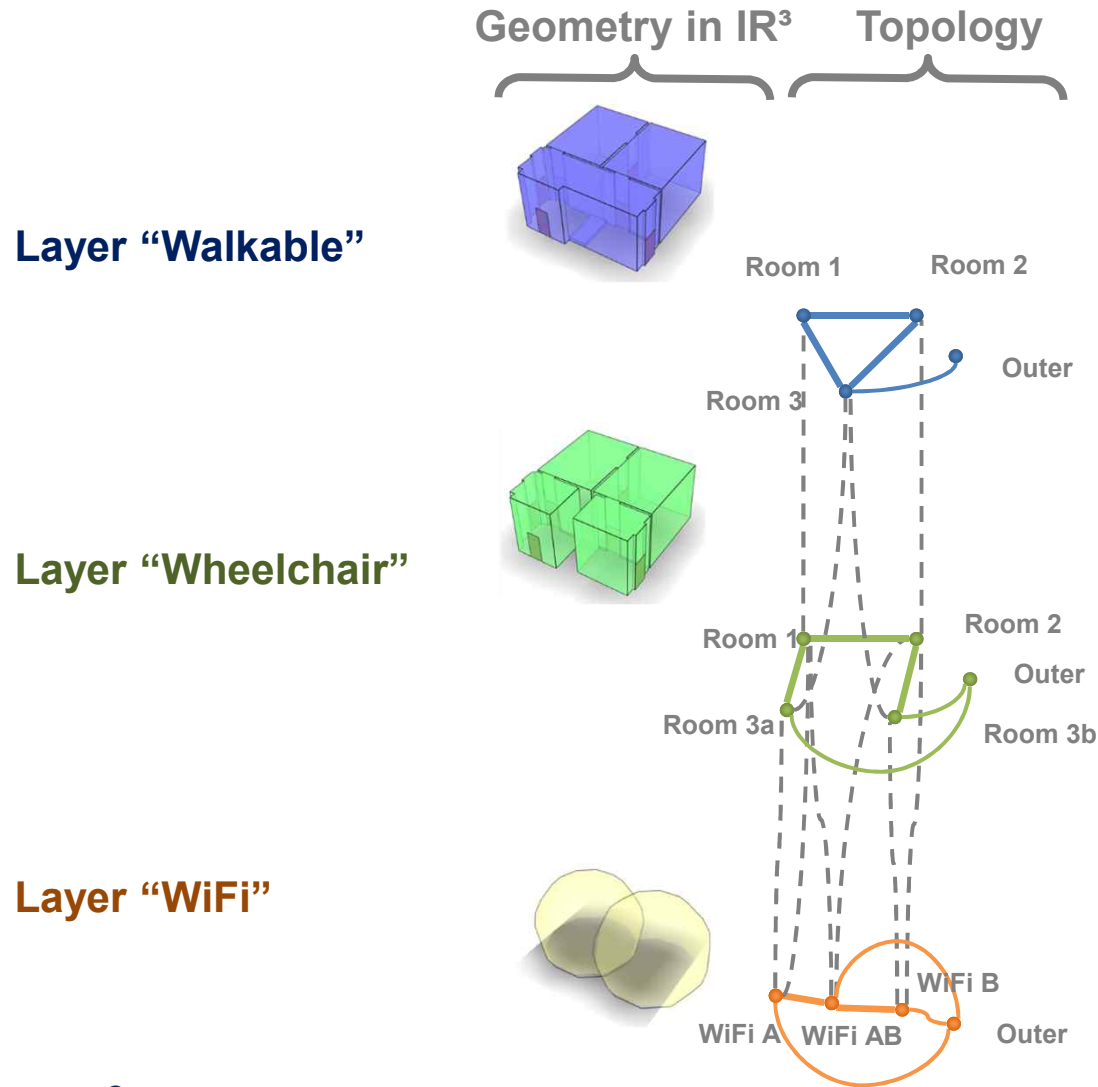
- An given indoor space is interpreted for several purposes



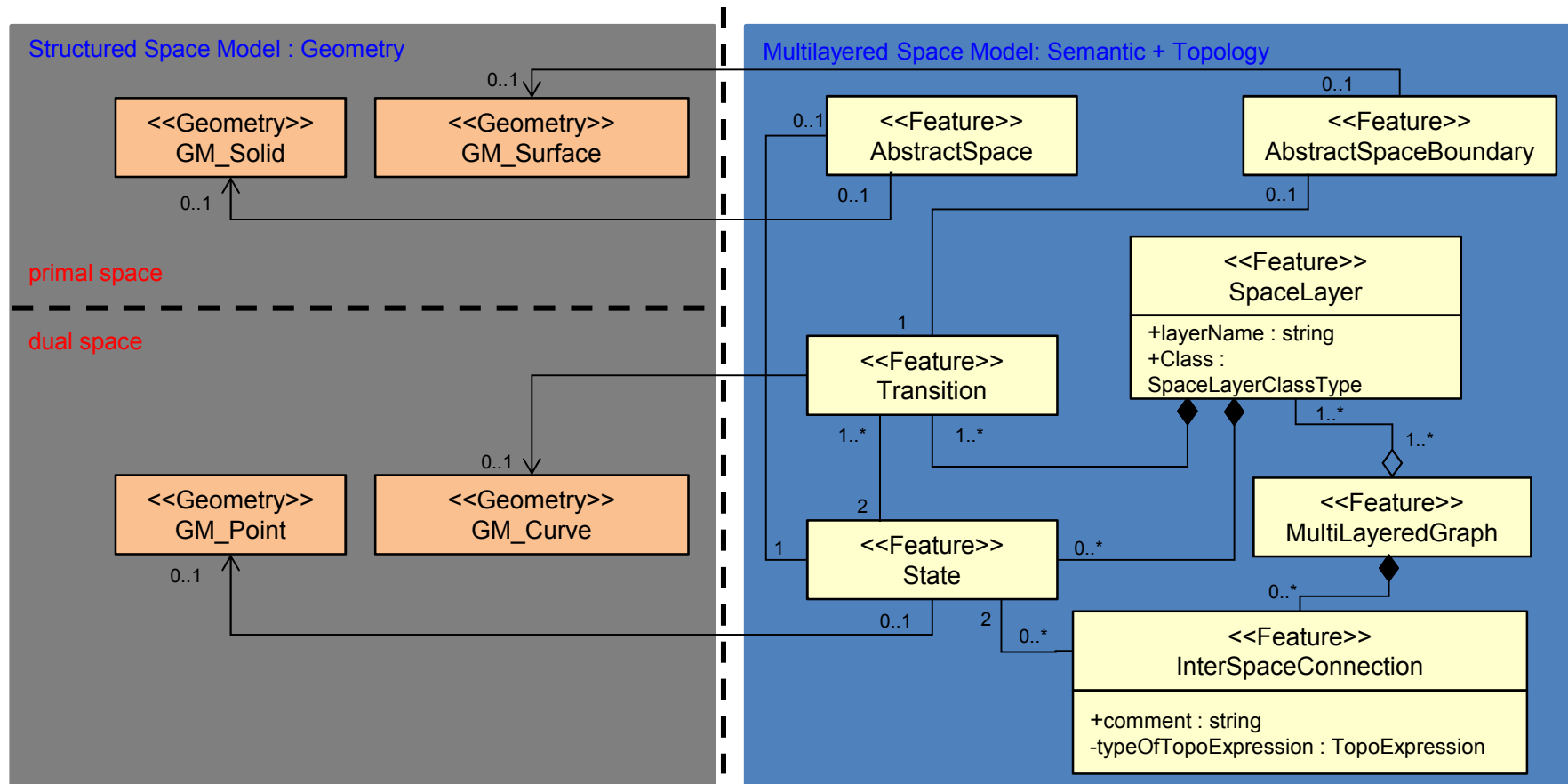
Example – Multi-Layered Space



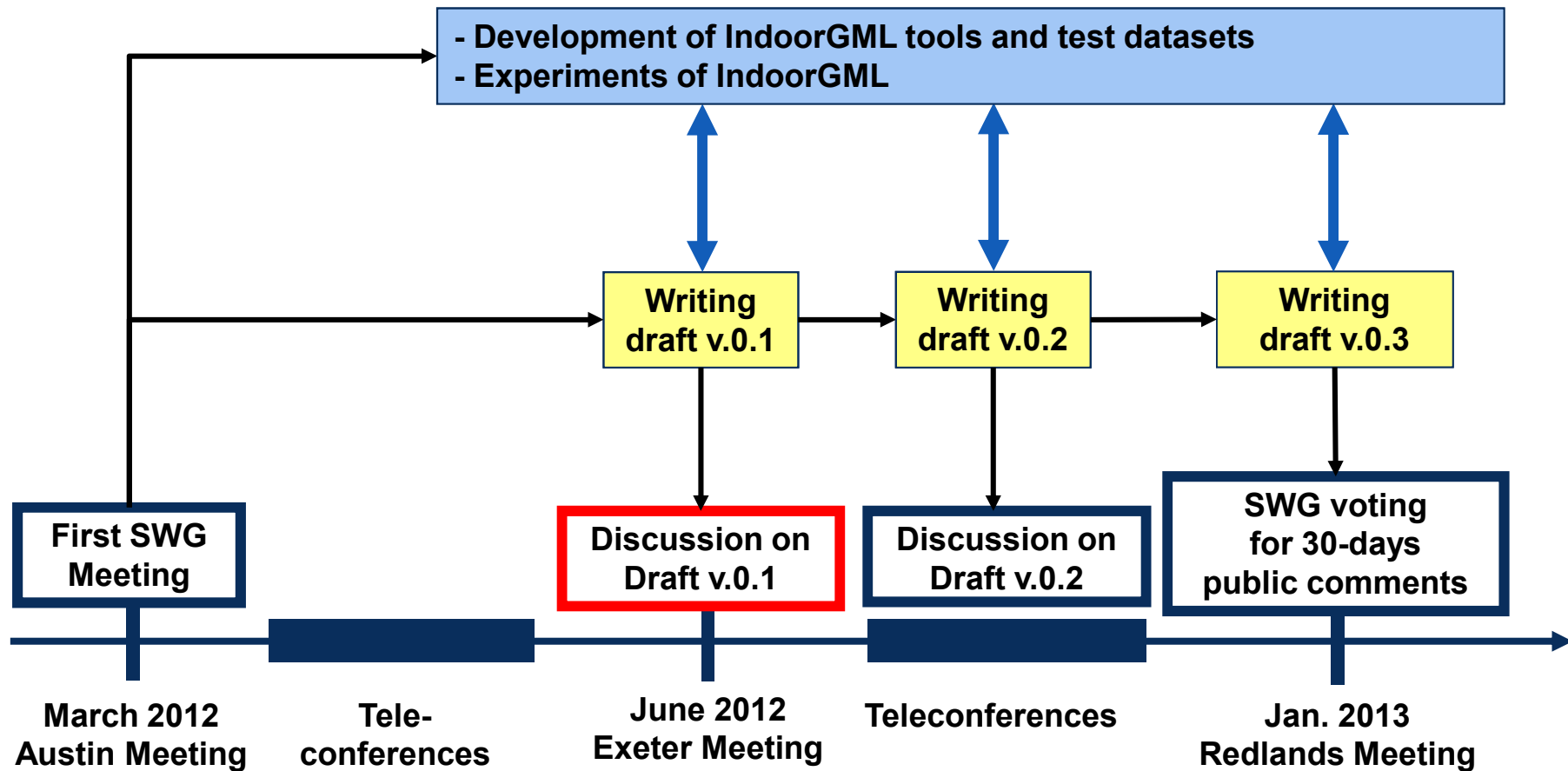
Example – Multi-Layered Space



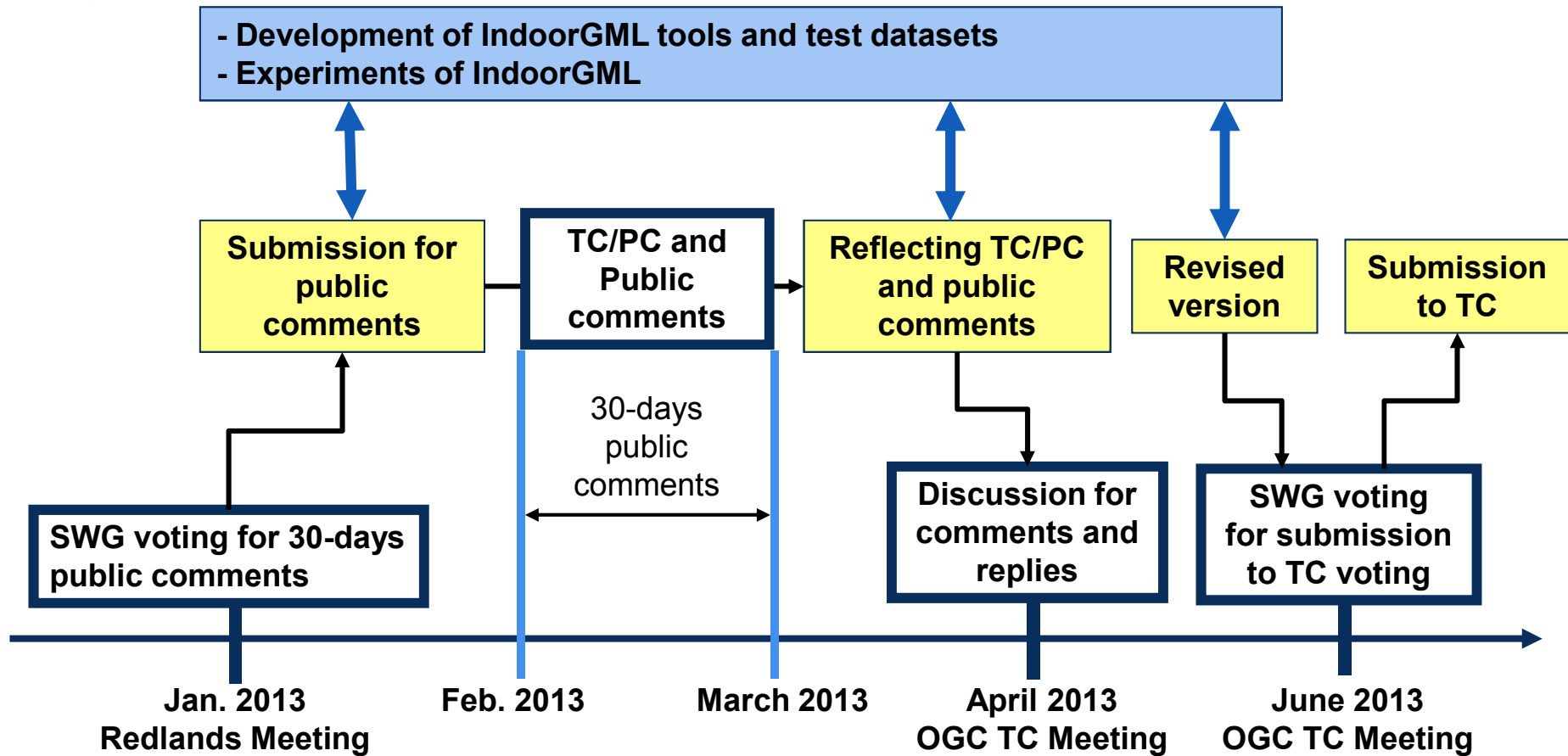
Data Model of IndoorGML – Geometric Graph



Milestones - 2012



Milestones - 2013



Summary



- IndoorGML
 - A Candidate Standard for Indoor Navigation
 - Basic Concepts
 - Symbolic Space and Geometric Graph (Topology)
 - Multi-Layered Space
 - Planning to publish it in mid-2013

- Two Strategies
 - As simple as possible: Core Module and Application Modules
 - As flexible as possible
 - To be used as a base standard of other fields and standards



**Indoor spaces of the world,
unite**