



Finnish Transport Infrastructure Agency and BIM by Tarmo Savolainen

30.5.2019

Who am I?

- Tarmo Savolainen M.Sc (Tech)
- Chief Specialist, InfraBIM, Finnish Transport Infrastructure Agency, 2017-> www.ftia.fi
 - Viasys VDC Oy, VP Customer Relations, 2013-2016
 - Rapal Oy, Key Account Manager, Senior Consultant 2001-2012
- Other positions:
 - BuildingSMART, www.buildingsmart.org
 - Chair, BuildingSMART Nordic Chapter
 - Chair, BuildingSMART Finland Infraroom
 - Member of Project Steering Committee, buildingSMART International Infra and Rail Room
 - The Council of European Construction Economists www.ceecorg.eu
 - President 2015->
 - Vice president 2012-2015



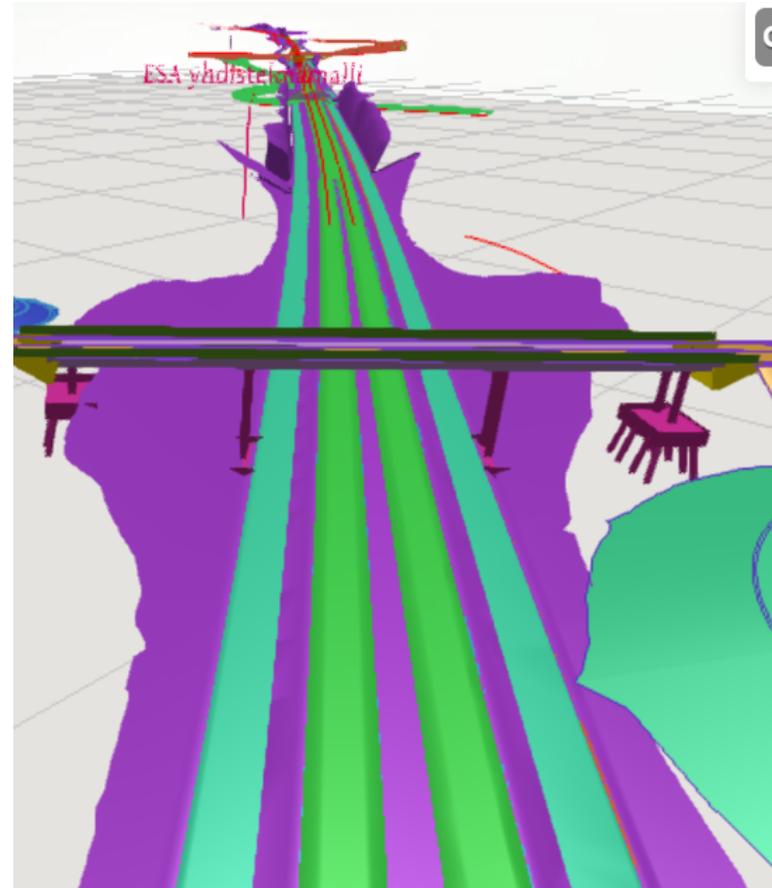
Agenda

- **Introductions**

- Finland
- Finnish Transport Infrastructure Agency
- BIM initiatives
 - Finland / EU / International

- **FTIA BIM**

- BIM politics and Guidelines
 - National / FTIA
- BIM Use - projects, software etc
- Future

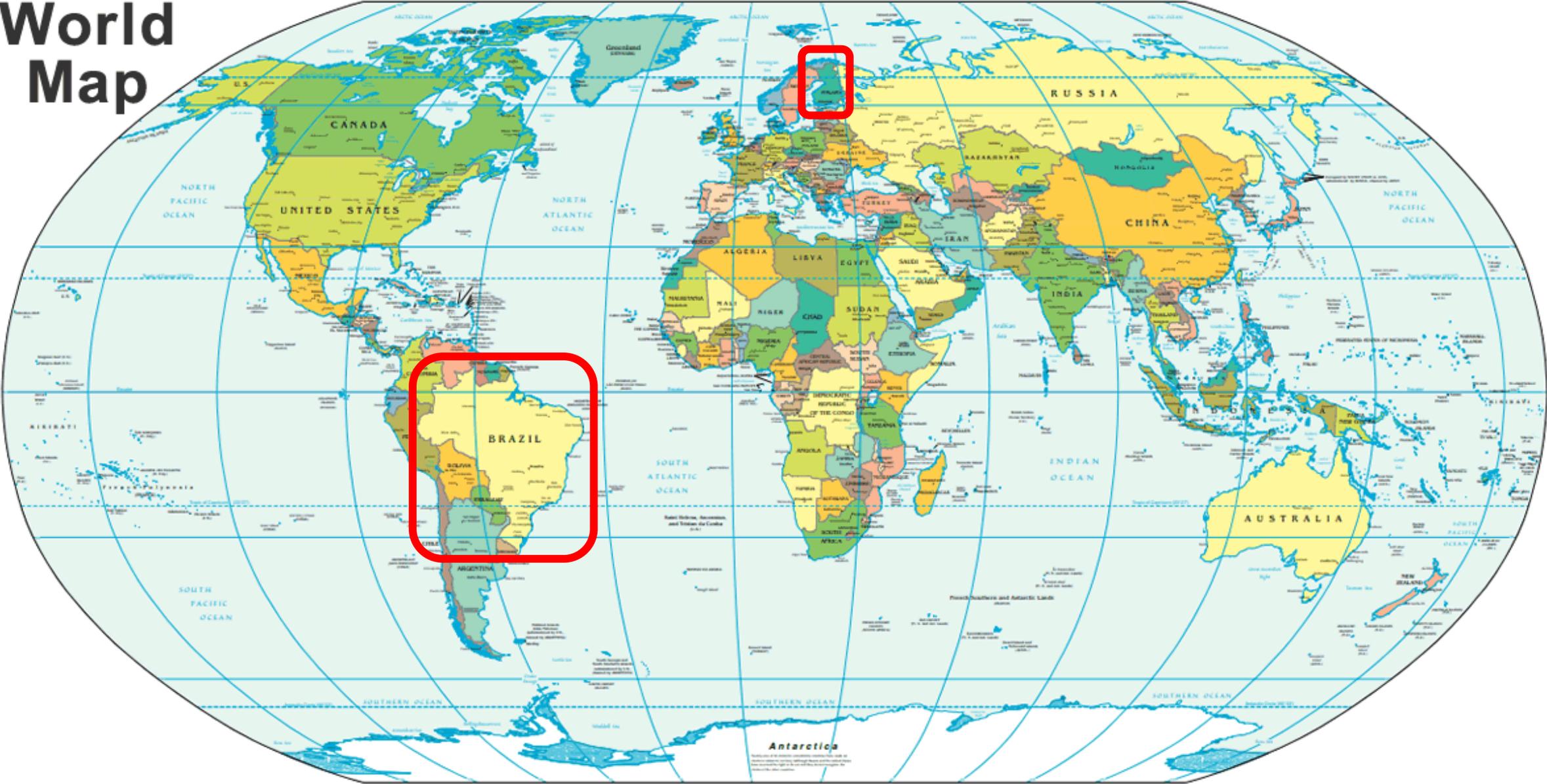


Introduction



Source: www.geology.com/

World Map



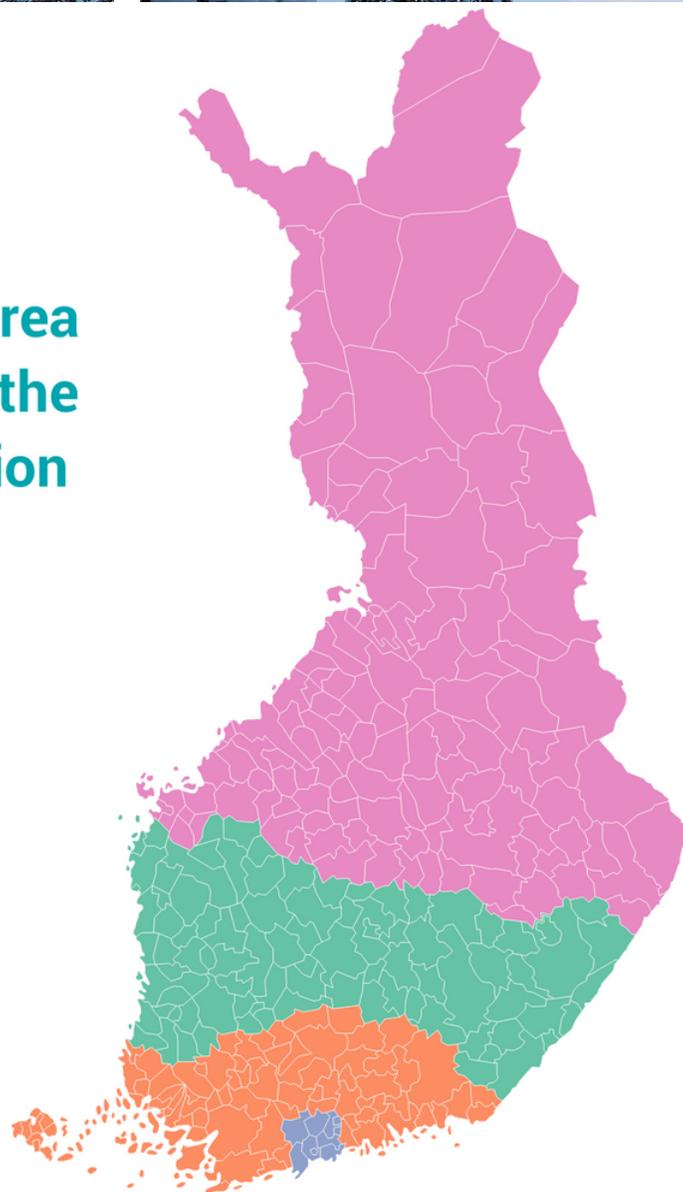
Brasil-Finland-European Union

- Finland
 - 5,5 M people
 - 338 000 km²
- Brasil
 - 209,3 M people
 - 8 156 000 km²
- EU
 - 508 M people
 - 4 476 000 km²



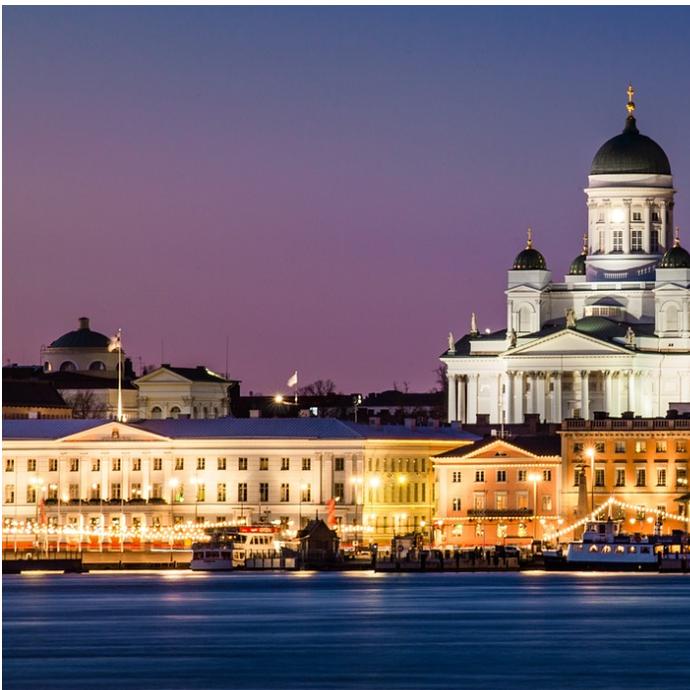


Each coloured area contains 1/4 of the Finnish population (2017)



Source: Statistics Finland

@NaytaData



The industry in Finland

The total value of the construction industry output in 2017:

33.7
EUR billion

Building Construction – EUR 27.0 billion

New building

Residential 6.4 b

Other 7.5 b

Renovation

Residential 7.6 b

Other 5.4 b

Civil Engineering Works – EUR 6.7 billion

Investments

4.9 b

Maintenance

1.8
b



What does the Finnish Transport Infrastructure Agency (FTIA) do?

- **We focus** on designing, developing, and maintaining road, rail, and maritime transport routes, arranging winter navigation, as well as on coordinating transport and land use.
- **We strive** to ensure that transport networks meet the needs of our citizens and businesses alike – promoting Finland's competitive edge.
- **FTIA**, in cooperation with the ELY Centres, operates as the primary partner of regional councils, municipalities, urban regions, and other operators in the planning of transport systems.
- **FTIA** is also responsible for organising traffic management according to a service agreement with Traffic Management Finland (TMF).
- **FTIA** operates responsibly by limiting environmental damage.
- **FTIA** is an expert procurement organisation.

Infrastructure provides a platform for growth

€ Infrastructure assets
20 billion €

€ Current spending on ongoing projects
2.6 billion €

€ Maintenance backlog of traffic network
2.6 billion €

€ Annual budget approximately
1.6 billion €

FTIA personnel, permanent

400
experts

Number of people the FTIA employs indirectly through projects

14,000

Road Statistics

Finland has approx.

78 000

km of highway

Motorways,
approx.

890 km

Pedestrian and
bicycle lanes

5 300 km

Passenger transport
amounts to

90%

and freight
transport to

63 %

of all road transports

270
million tonnes of
goods carried by
lorries annually

By bus

352

million journeys
of which

80 %

In cities

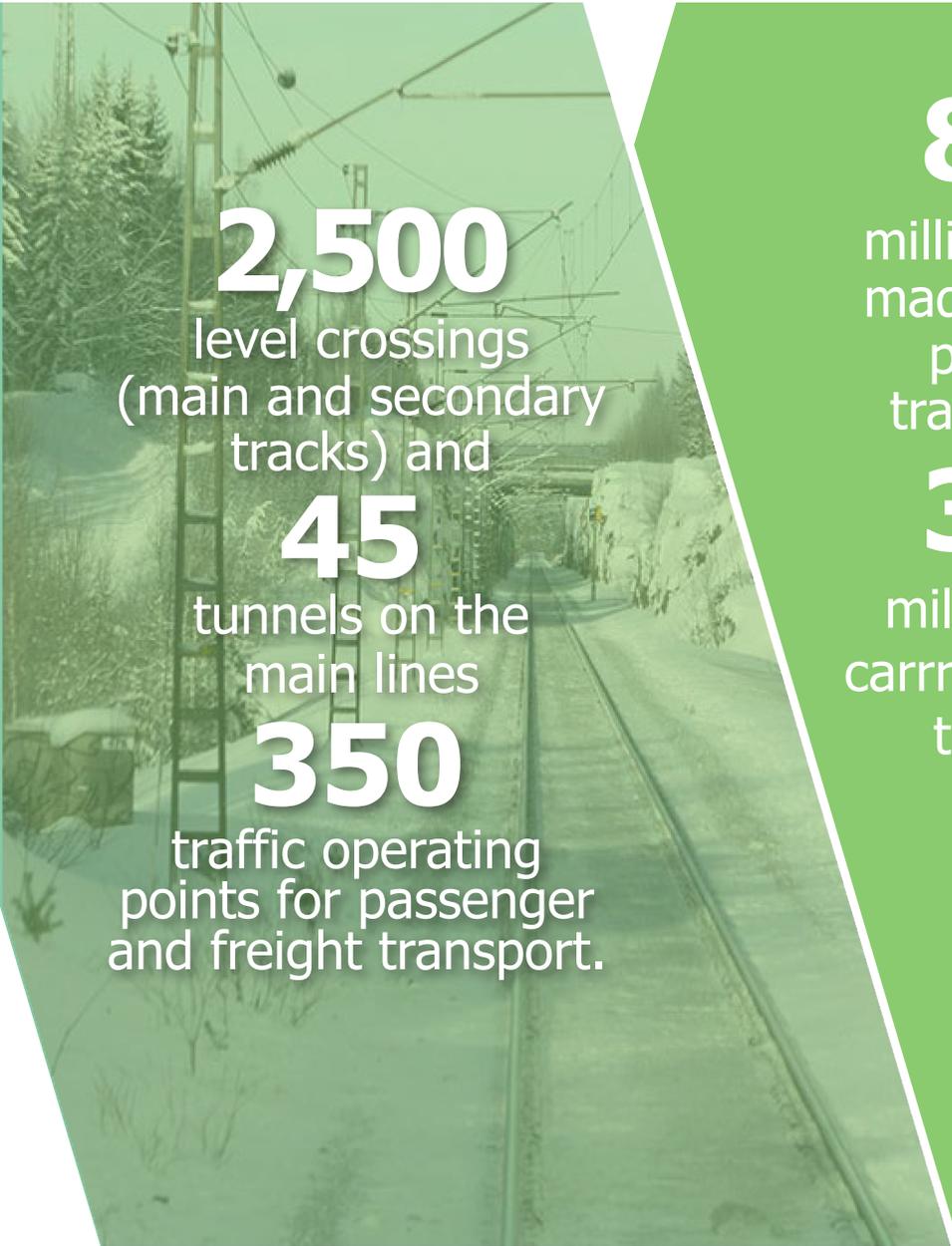
Street network

26 000 km

Private roads

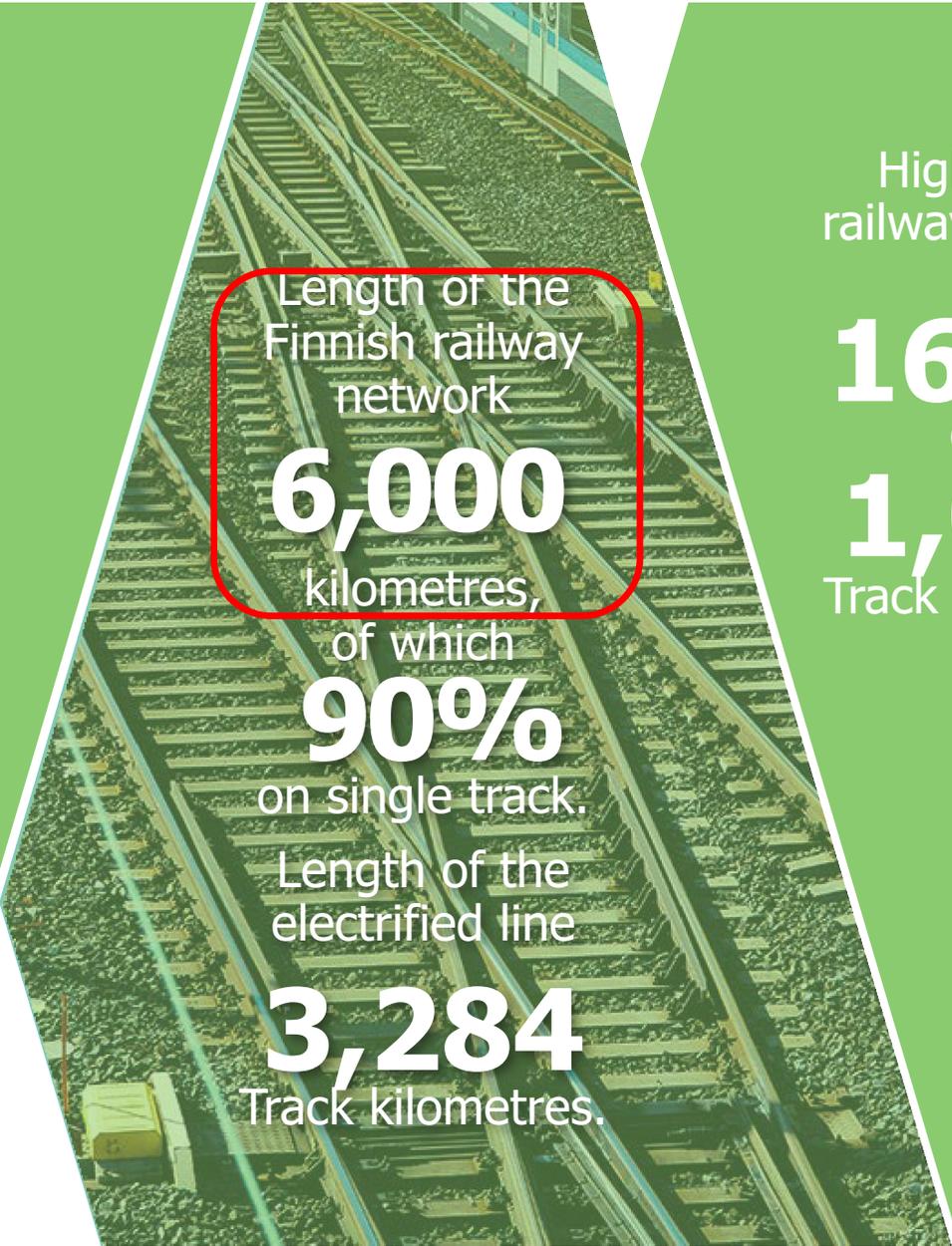
350 000 km

Railway Statistics



2,500
level crossings
(main and secondary
tracks) and
45
tunnels on the
main lines
350
traffic operating
points for passenger
and freight transport.

85,7
million journeys
made in railway
passenger
transport and
38,4
million tonnes
carried in freight
transport.



Length of the
Finnish railway
network

6,000
kilometres,

of which
90%
on single track.

Length of the
electrified line

3,284
Track kilometres.

High-speed
railway network,
over
160 km/h
on
1,059
Track kilometres.

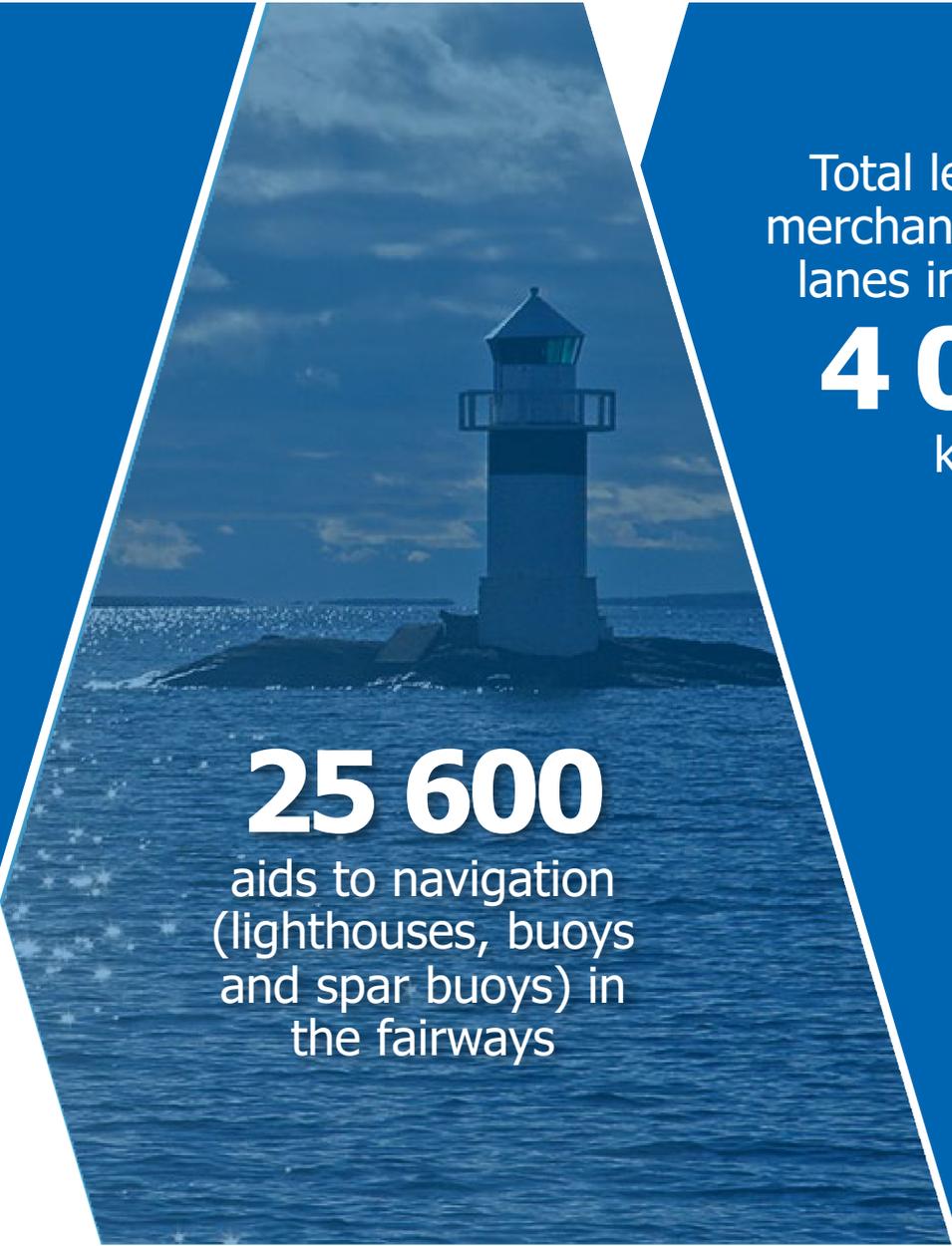
Maritime Statistics



About
8 300
km of coastal
fairways and
8 000
km of Finland
fairways



Finland has
29
ports kept open all
year. About
80 %
of the freight traffic
is handled by 10
ports.

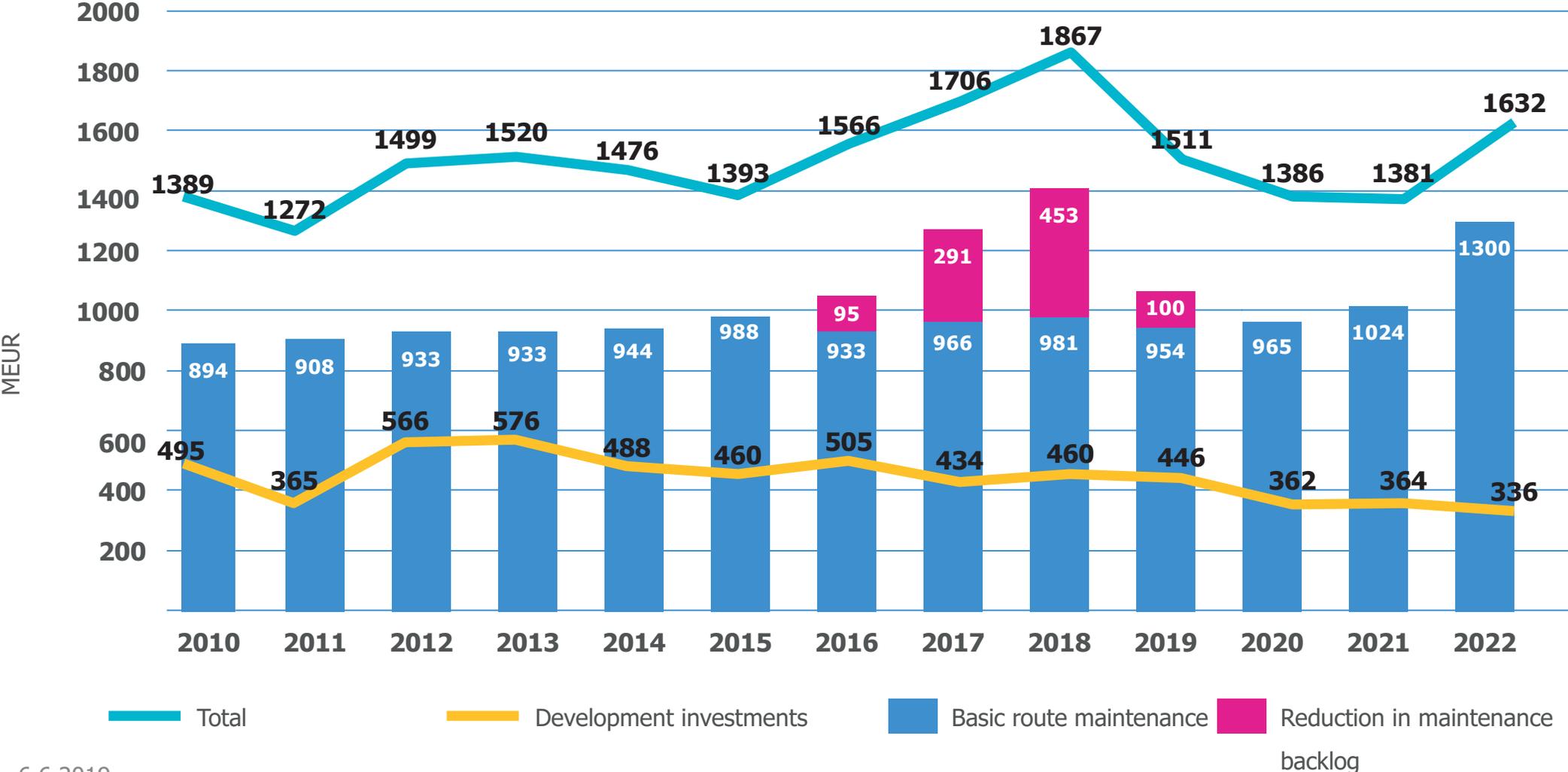


25 600
aids to navigation
(lighthouses, buoys
and spar buoys) in
the fairways



Total length of
merchant shipping
lanes in Finland
4 000
km

State funding for transport routes (road, rail, and waterways)

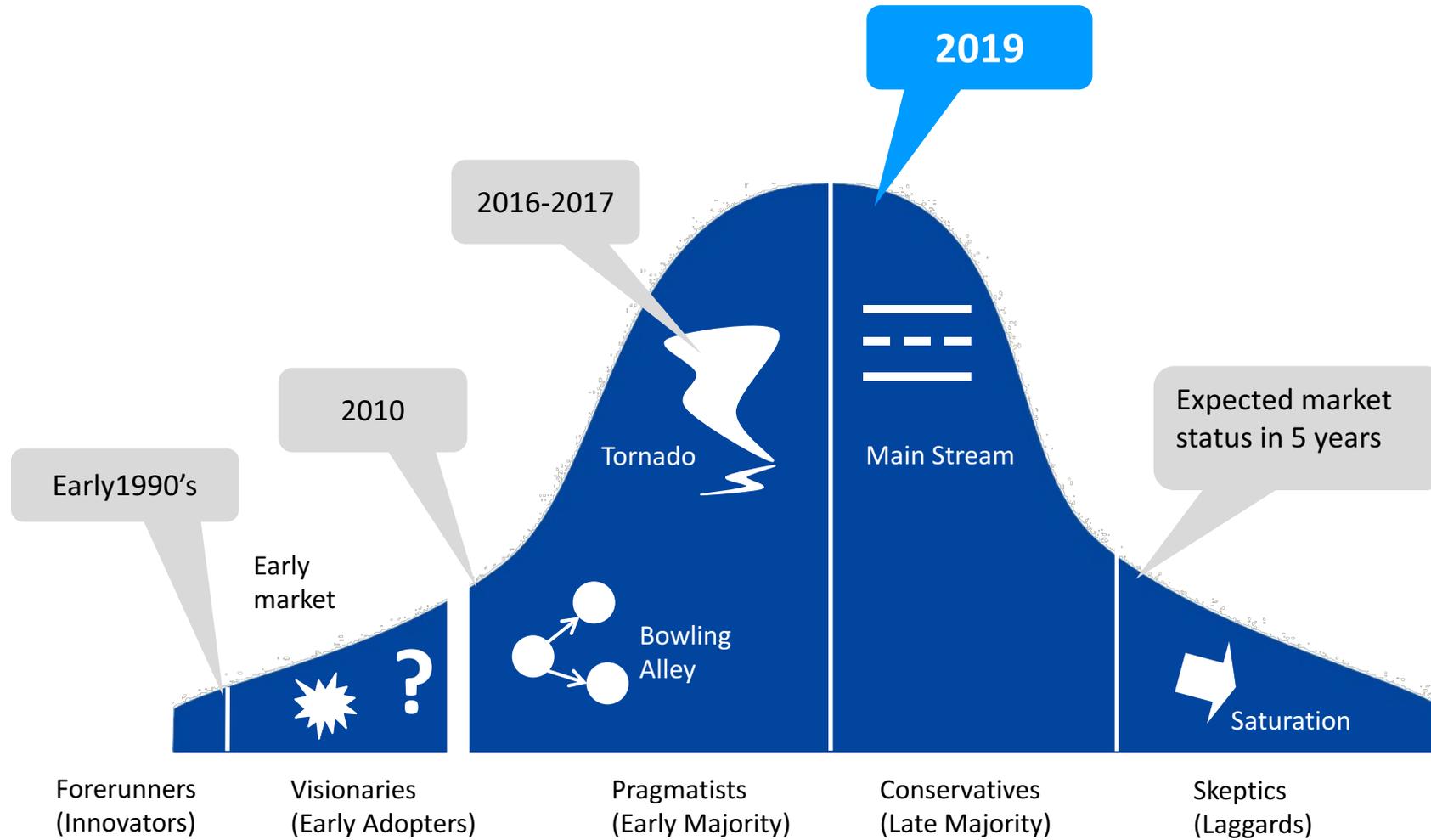


BIM initiatives

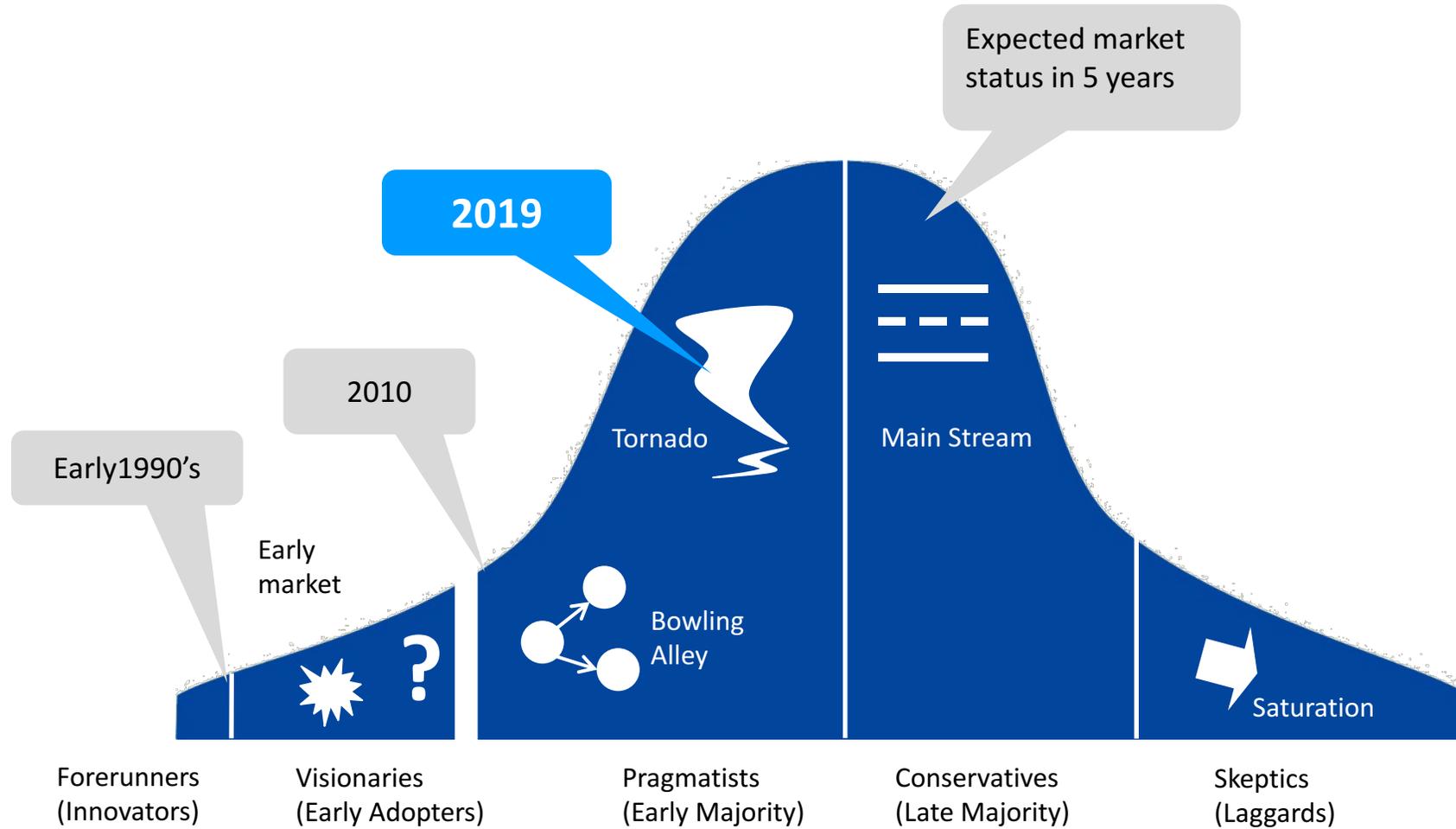
- Finland
- EU
- International

BIM in Finland
=
open standards

Status of **open BIM** in Finland (building sector)



Status of **open BIM** in Finland (infra sector)

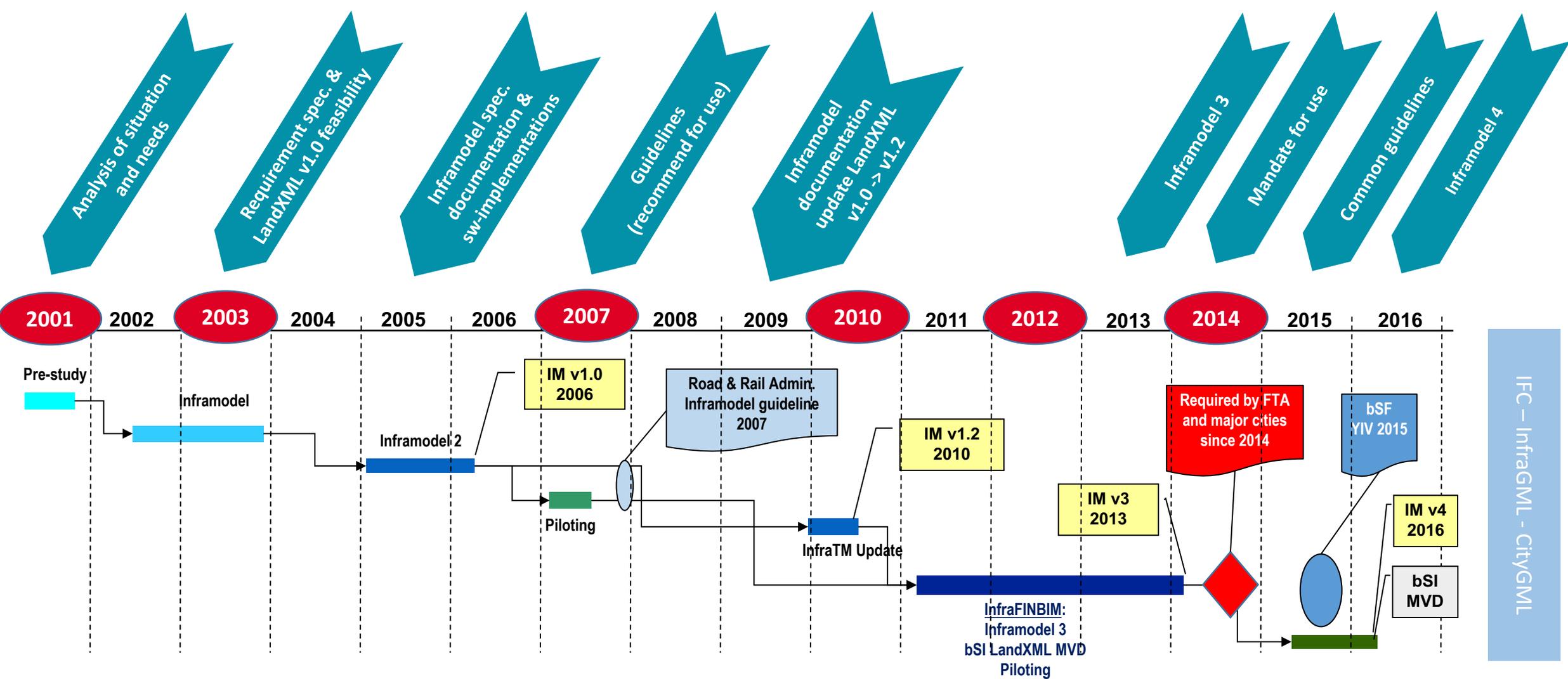


BIM initiatives in national level

- Building sector started
 - Vera –project 1998-2001
 - ProIT –project 2002-2006
 - Senate Properties started piloting 2001-2008
 - General BIM requirements 2012

- Infrastructure sectore started after that...

InfraBIM history



IFC – InfragML - CityGML

PRE

Built Environment Process
Re-Engineering

Results Report

The first research program of RYM Oy created totally new procedures and business models for the real estate, construction and infra sectors.

The new modes are user-centred and supported by product model-based data management over the entire life cycle of the real estate, infrastructures and communities in question.

The adoption of new business processes allows a significant increase in productivity and quality.



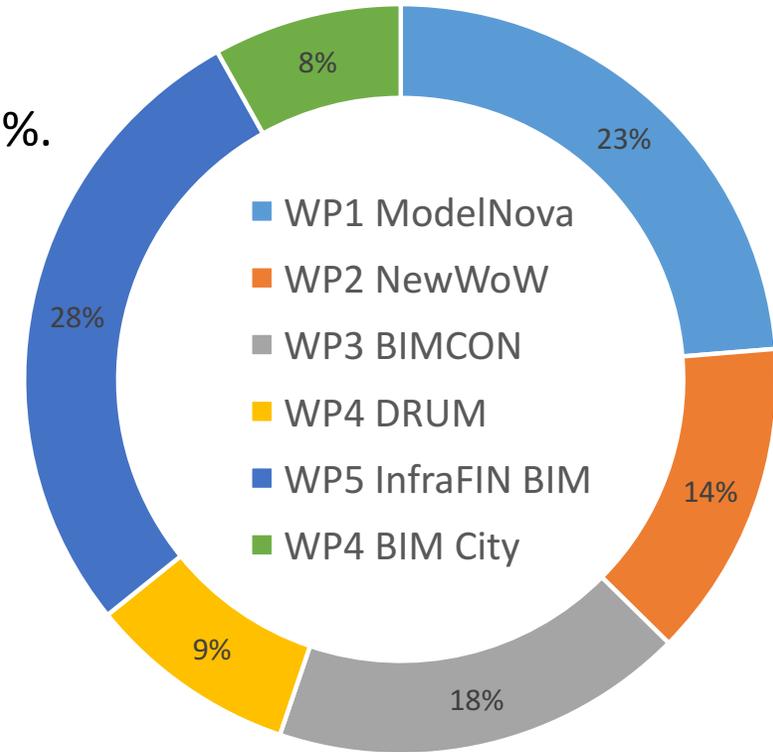
Go to
rymreport.com/pre
for the online
version

<http://rymreport.com/pre/home/>

PRE 2010 - 2014

PRE Actuel Cost 22,24 million €

- Involved 37 companies and 6 research institutes.
- Public Fund with Tekes < 51 %.
- **Infra FINBIM 6,1 m€**
Future innovation-based delivery chain of the infra sector
 - 13 companies,
 - 6 research institutes
 - 6 infra clients
 - 30 pilot projects

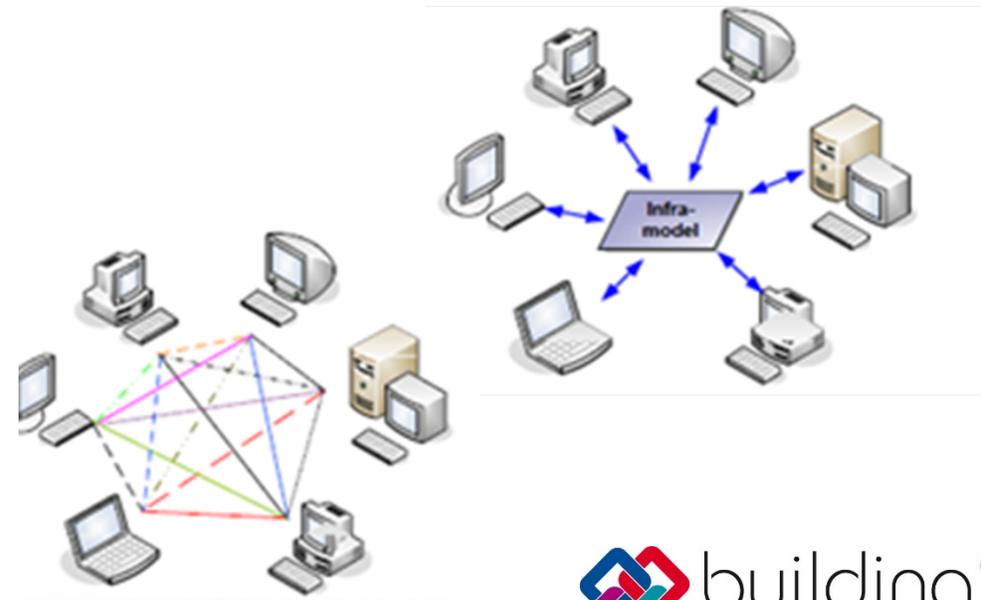
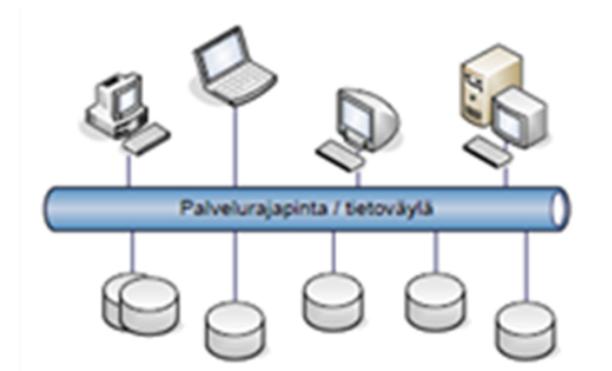


“An outstanding example of the radical change in the markets”



InfraFINBIM 2010-2014

BIM = Information Management



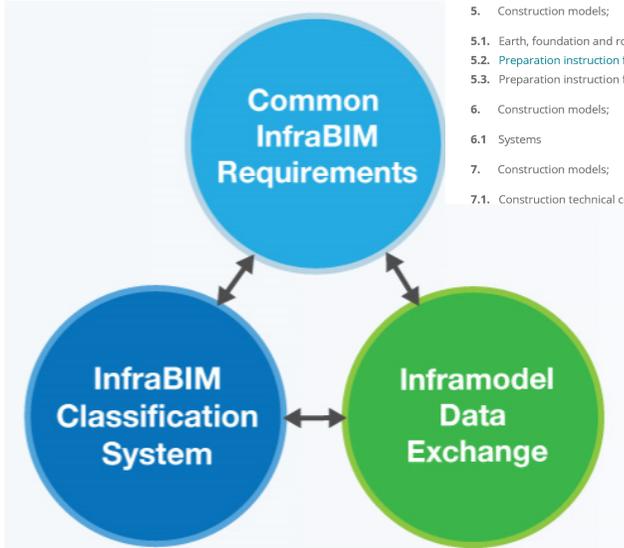
Common InfraBIM Guidelines

- Classification System
 - 'The language'
 - InfraBIM Terminology
- Requirements
 - What and how to model in different phases
- Data exchange
 - Open format
 - Inframodel4 (LandXML)
 - IFC (bridges)
 - GML

Common InfraBIM Requirements YIV 2015

The InfraBIM requirements (vol 1-7) were published on May 5, 2015 by buildingSMART Finland. The first volumes are now available 'freely translated' in English. There has been some challenges in finding the correct translation for certain terms. This is especially true for the construction product classification, which the volumes 4 through 6 are based on.

1. Data model-based project
2. General modelling requirements
3. Initial data
4. Model and modelling in different design phases in project
5. Construction models;
 - 5.1. Earth, foundation and rock constructions, pavement and surface constructions
 - 5.2. Preparation instruction for as-planned model for earth works (machine control model)
 - 5.3. Preparation instruction for as-built model for earth works
6. Construction models;
 - 6.1 Systems
7. Construction models;
 - 7.1. Construction technical components



Liite 1 Tien rakennepiinat ja taiteviivat (1/7)

Yksiajortaisen tien rakennepiinat ja taiteviivat (1/3)

Rakennepiinat

- 162200 Puiki- ja johtolainento
- 200000 Vihaydistelmäpinta
- 201100 Väylärakenteen alapinta
- 202200 Aien yhdistelmäpinta
- 211100 Suodattelukerros, yläpinta
- 212200 Jakava kerros, yläpinta
- 213200 Skotatun kantava kerros, yläpinta
- 214113 Kulkusuikerroksen asfalttobetoni AB, yläpinta
- 214113 Karttaivan kerroksen asfalttobetoni AB, yläpinta
- 216200 Pienentäytö, yläpinta

Taiteviivat

Esim.: 21210 Jakava kerros, yläpinta

Pinnat ja koodit (luonnos)

Taiteviivat ja koodit (luonnos)

INFRAMODEL 3

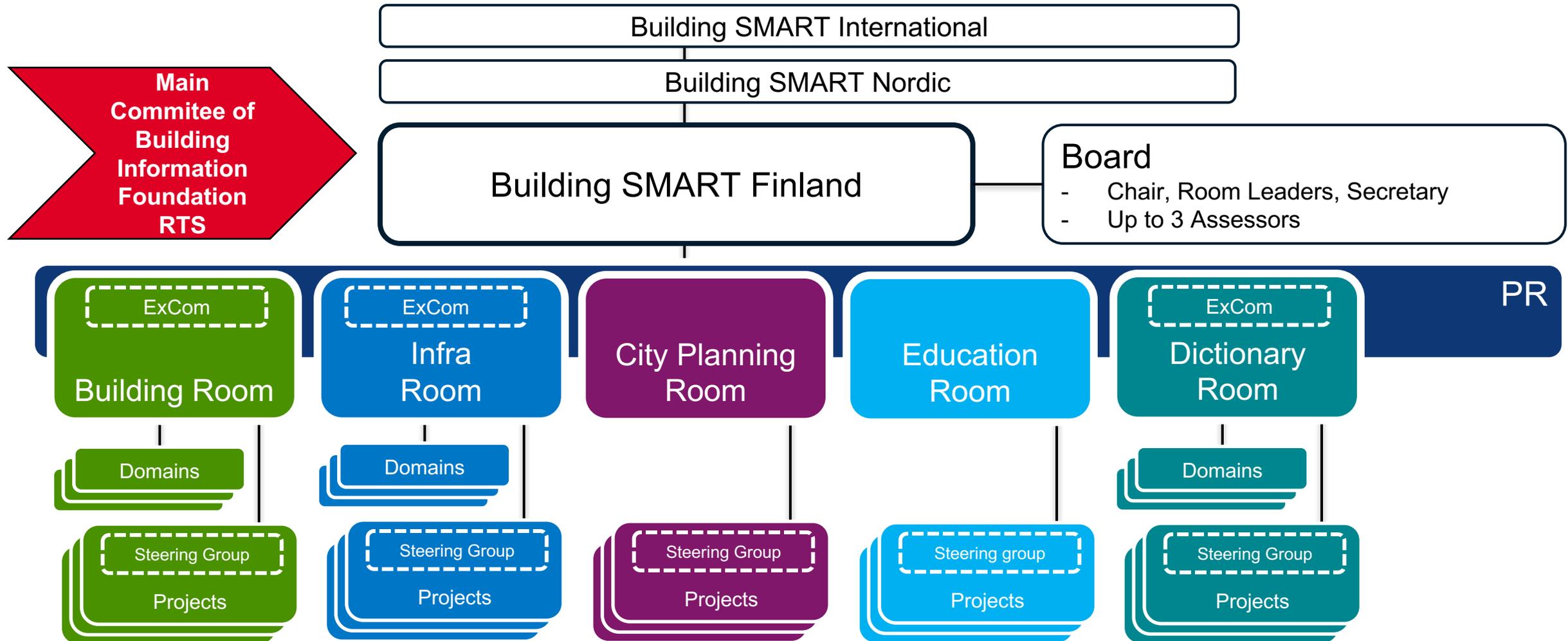
INFRAMODEL

Finnish Inframodel application documentation for LandXML v1.2

Version 3 - 2013

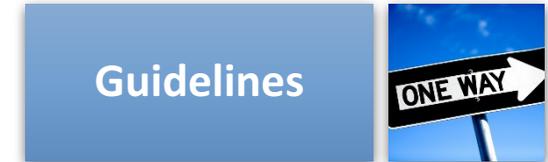


BuildingSMART Finland Organization



bSF InfraRoom - Activities

- > 60 organizations
 - Infra owners: FTIA, Big cities
 - Assosiations
 - Research institutes, universities, colleges
 - Consulting companies
 - Contractors
 - Software/technology companies
- 130 persons
- 20-25 workshops
- 2200 h funded bSF projects
- 5000 h related projects
- X000 h in-kind



A Forum for BIM Collaboration



INFRA
Building Smart Finland infrastructure business group is responsible for developing and advancing the use of infrastructure information modelling in Finland.

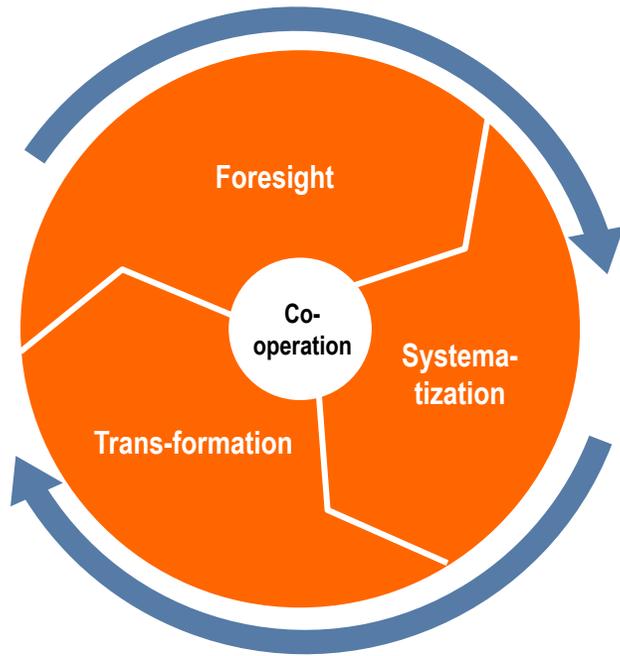
- WHAT'S NEW
- PUBLICATIONS
- BLOG
- VIDEOS
- About

f
t
G+
in

<https://buildingsmart.fi/en/infrabim-en/>

VISION

The Purpose of the Group:
We are the flywheel of the
built infrastructure



New business



Improved
productivity and
competitiveness

Standards and
guidelines for
the whole life-
cycle

Comprehensive
information
management
know-how

Collaborative
model-based
processes

Services
created
through
open data

Enabling
technology

Strategy of the Infrastructure Industry Group

December 10, 2014

The Building of Finland

Harri Hautajärvi, Editor

RAKENNUSTIETO >

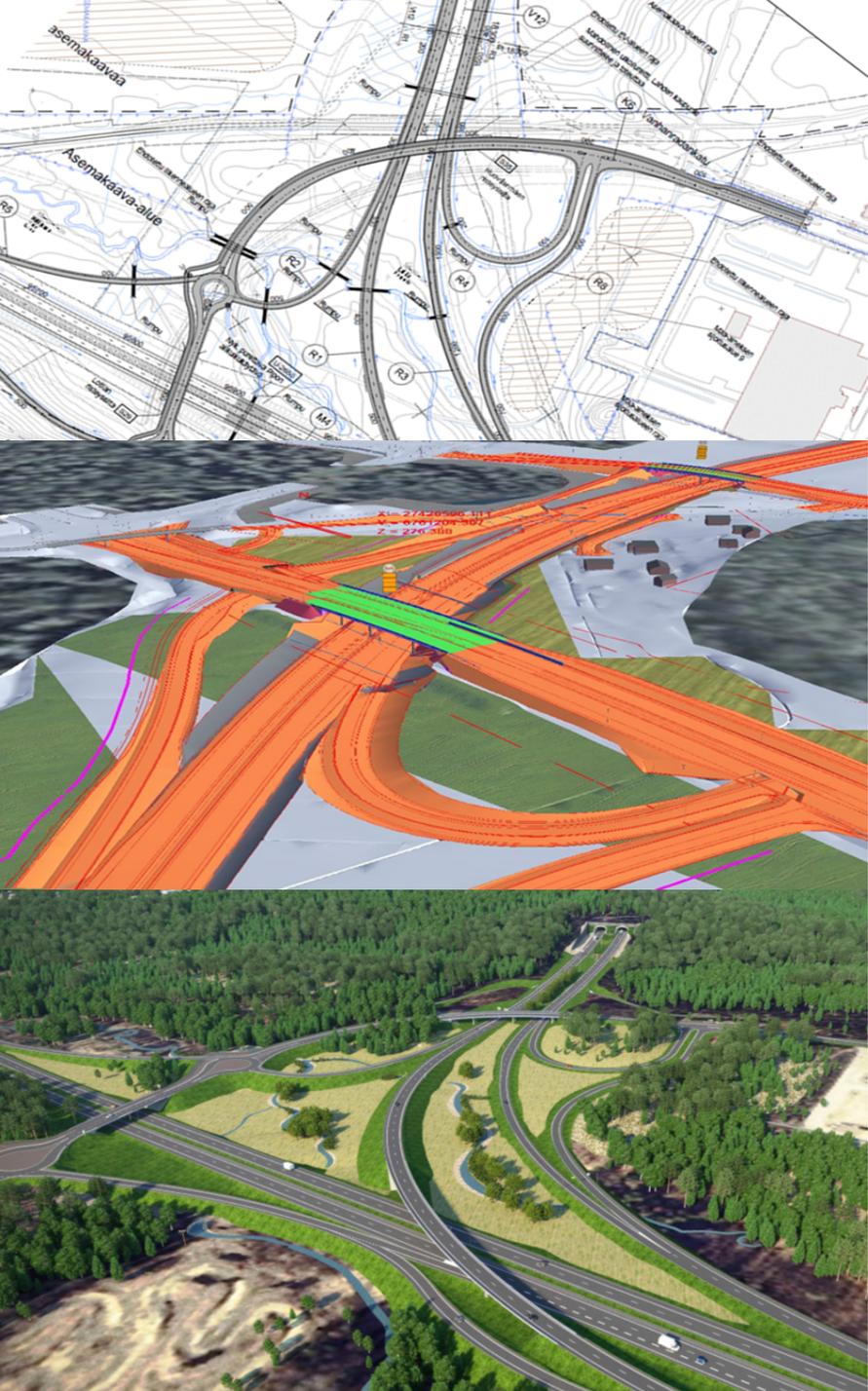
The Building Information Foundation RTS sr

A private non-profit organization promoting best practices in zoning, construction and property management

The owner of the publishing company Building Information Ltd (Rakennustieto), the leading provider of construction information in Finland

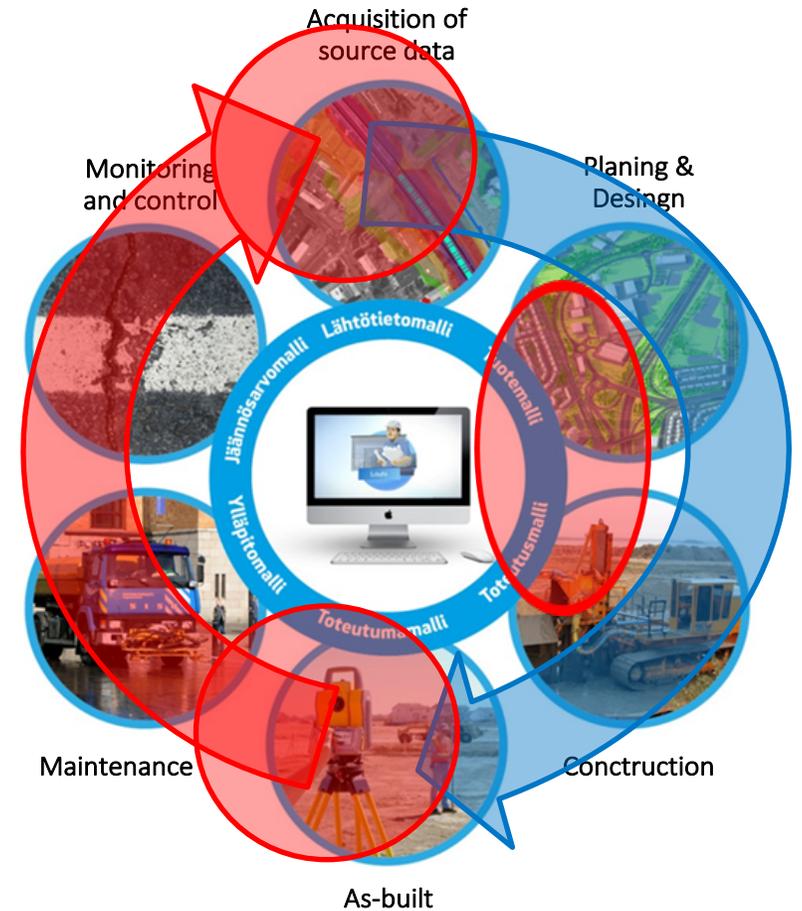
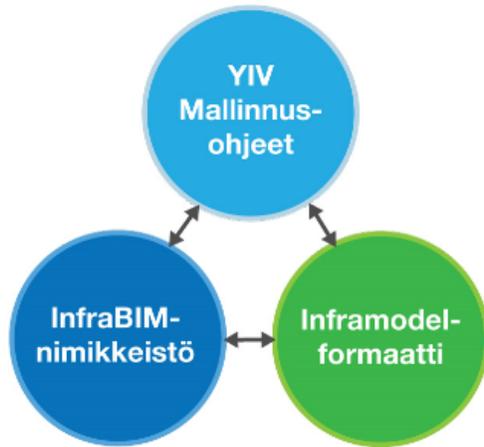
The majority of information services is produced in committees together with public authority, other organisations and best experts in the field.





Where have we succeeded ?

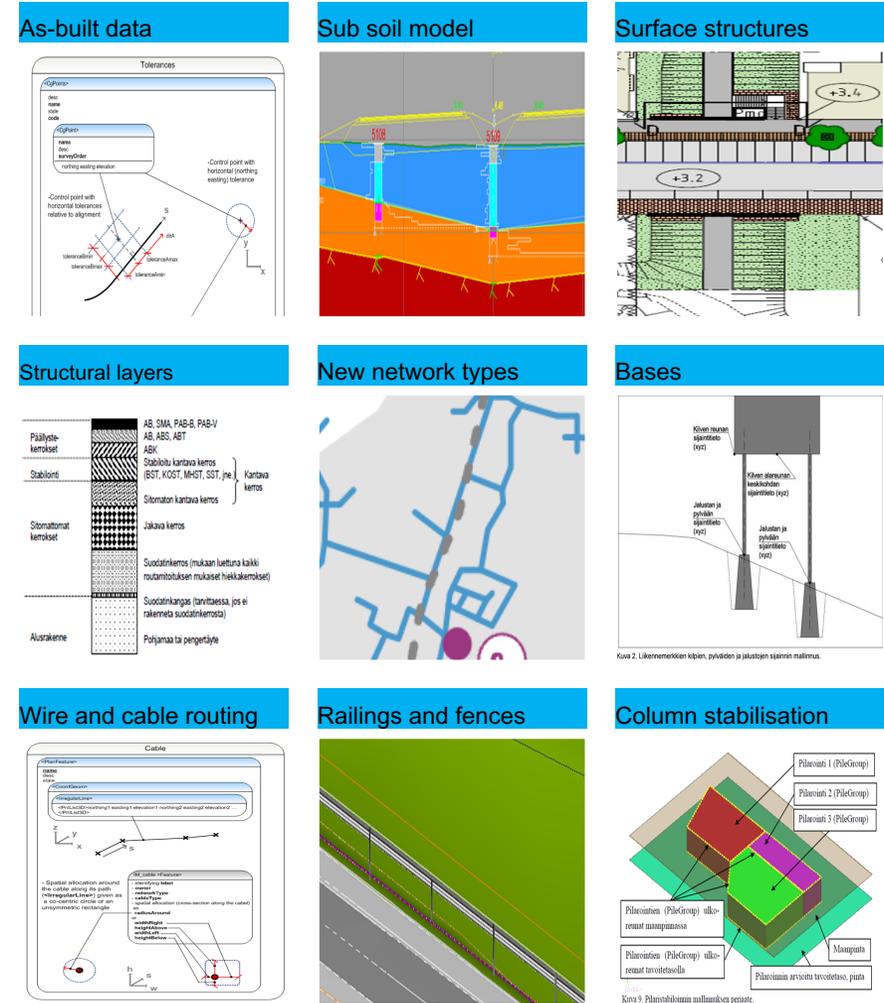
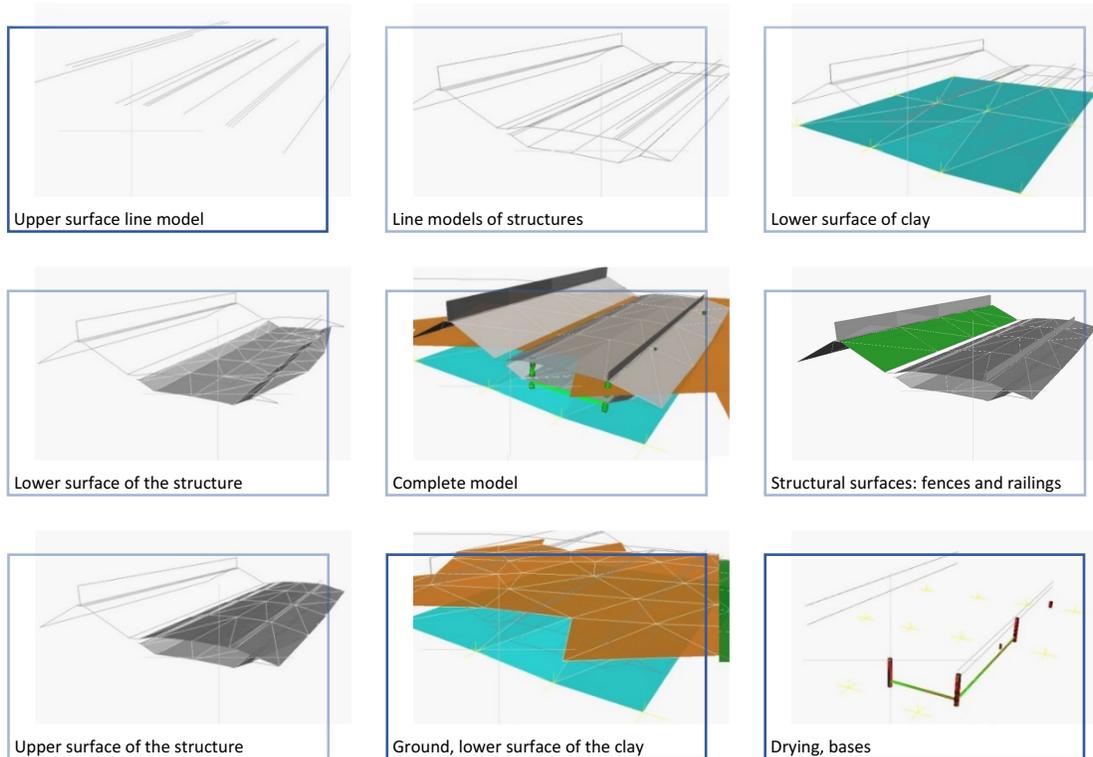
What must we improve ?



Inframodel3 + Inframodel4

Inframodel4 to be adopted on 1 February 2018

From 1 February 2018, the Finnish Transport Agency and all major Finnish cities will require the Inframodel4 standard to be used in new design and implementation projects. As a rule, the requirement will only apply to materials delivered to the customer. This will ensure that the information will be available in a software-independent, open format to all parties involved in the further planning and construction phases of the project. For bridges and other engineering structures, the IFC standard will continue to be applied.



Digital Built Environment Viewpoints– Next steps



InfraBIM Guidelines
ver 2 & web
publication

Extended classification

Inframodel4
implementation
Inframodel5 strategy

Digital Built Environment - Further steps



Digital Twin

Asset Information
Management

Digital Built
Environment
Guidelines

IFC – InfraGML-
CityGML

BSF Professional

EU co-operation



- **EU BIM Task Group**
www.eubim.eu
 - All EU members
 - EU BIM Hand Book
 - Published also in Portuguese
- **CEDR BIM Call** www.cedr.eu
 - 2019-2021 research project starting soon
 - 8 Road Administrations from Europe
 - 2015-18 previous: BIM in Asset Management



BuildingSMART Vision



Enable full benefits
from
digital ways of working
in the
built asset industry

Chapter Community



Full



Full



Full



Full



Full



Full



Full



Full



Full



Full



Full



Full



Full



Full



Full



Full

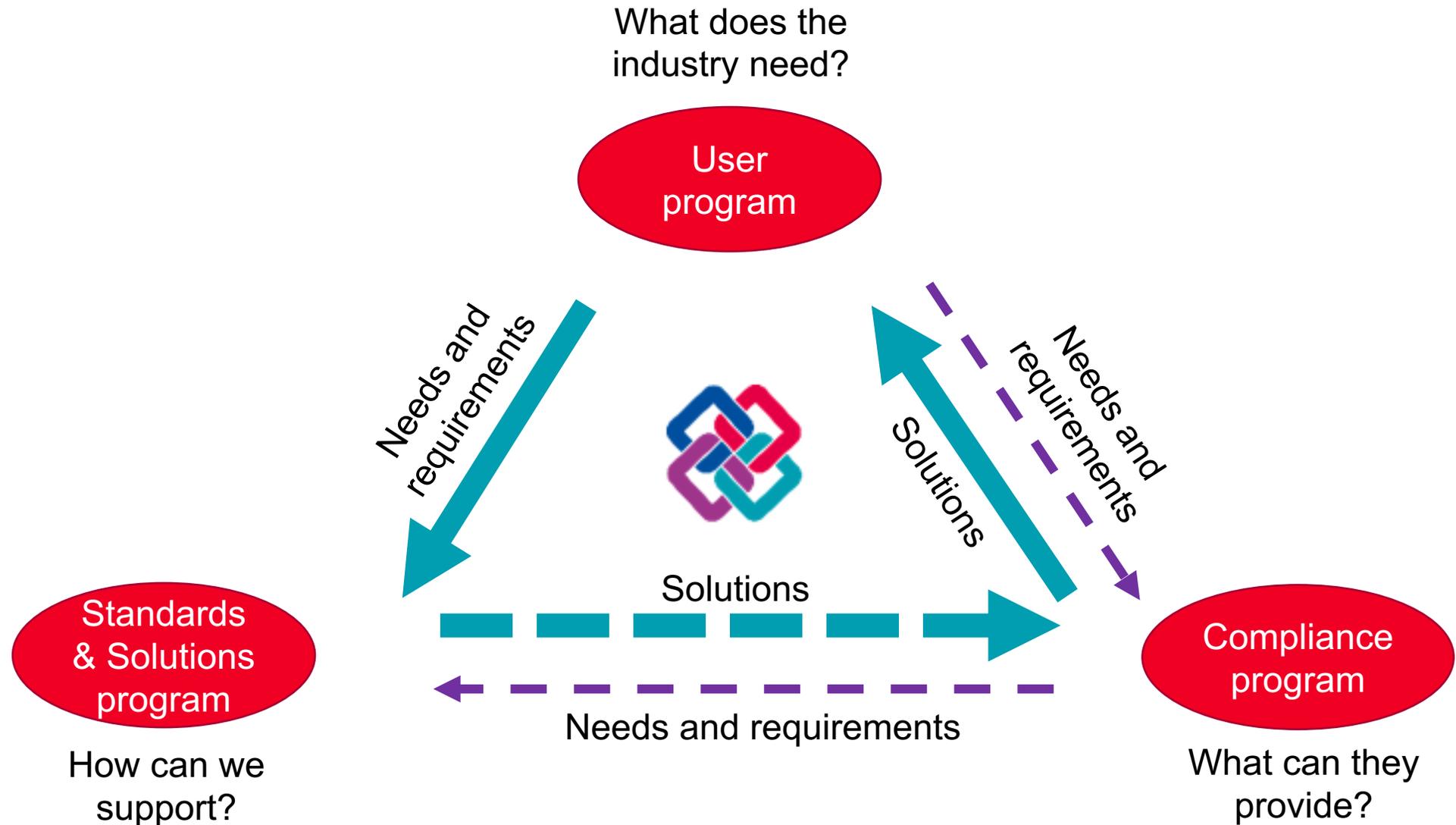


Full



Full

Demand driven



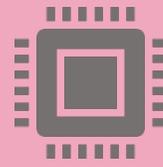
buildingSMART Rooms



Building



Infrastructure



Product



Technical

buildingSMART Rooms



Airport



Railway



Regulatory

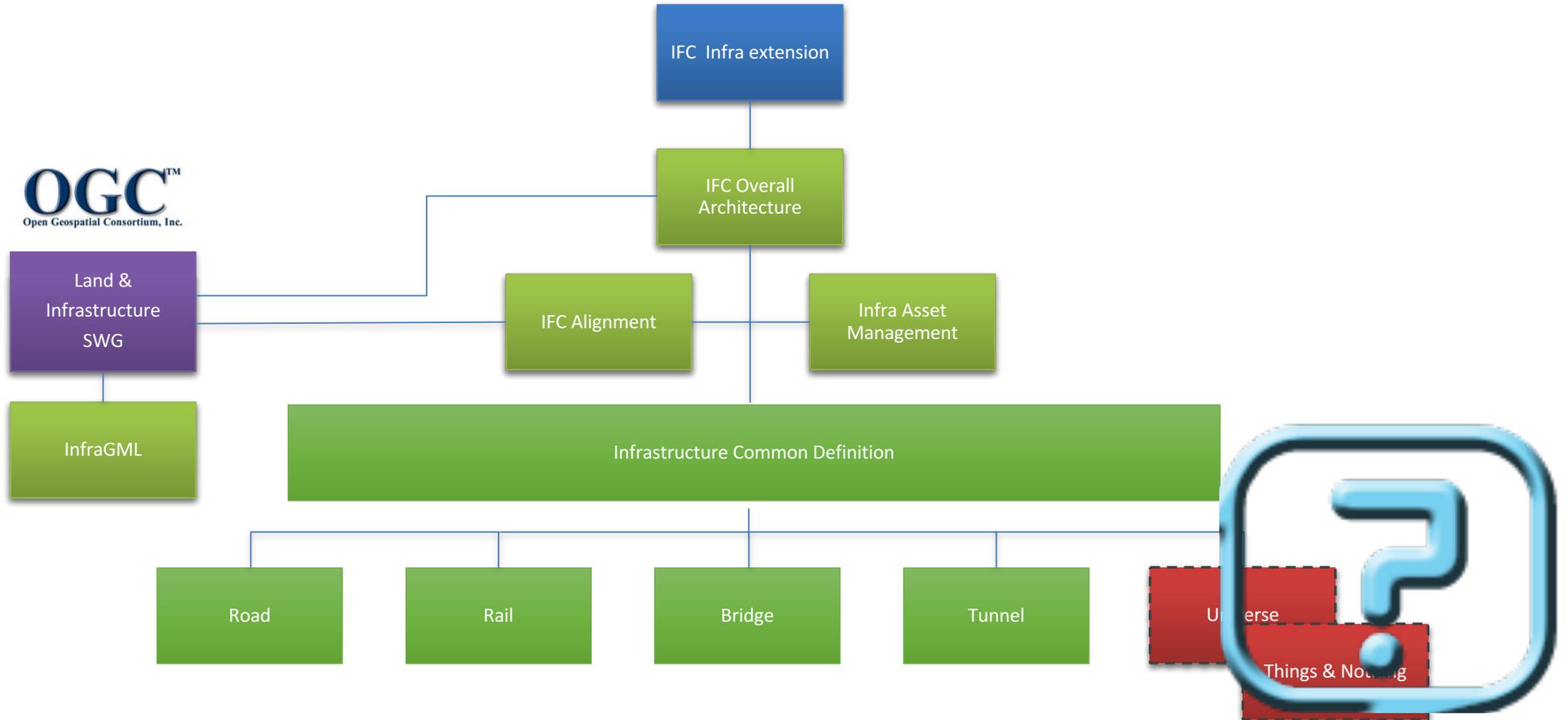


Construction

IFC expands to infrastructure

On April 5th 2017, a number of authorities and organizations signed a Memorandum of Understanding for the development of IFC for infrastructure (Road, Rail and Infrastructure Principles)





OGC[™]
Open Geospatial Consortium, Inc.

Land &
Infrastructure
SWG

InfraGML

IFC Infra extension

IFC Overall
Architecture

IFC Alignment

Infra Asset
Management

Infrastructure Common Definition

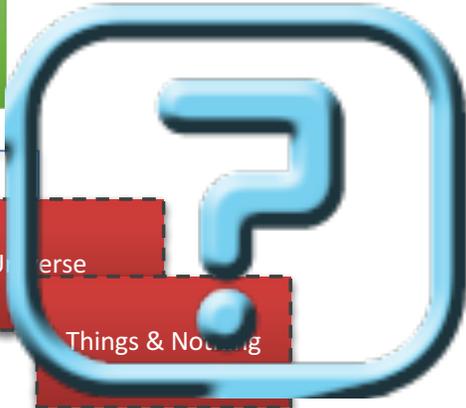
Road

Rail

Bridge

Tunnel

Universe
Things & Noting



IFC expands to infrastructure

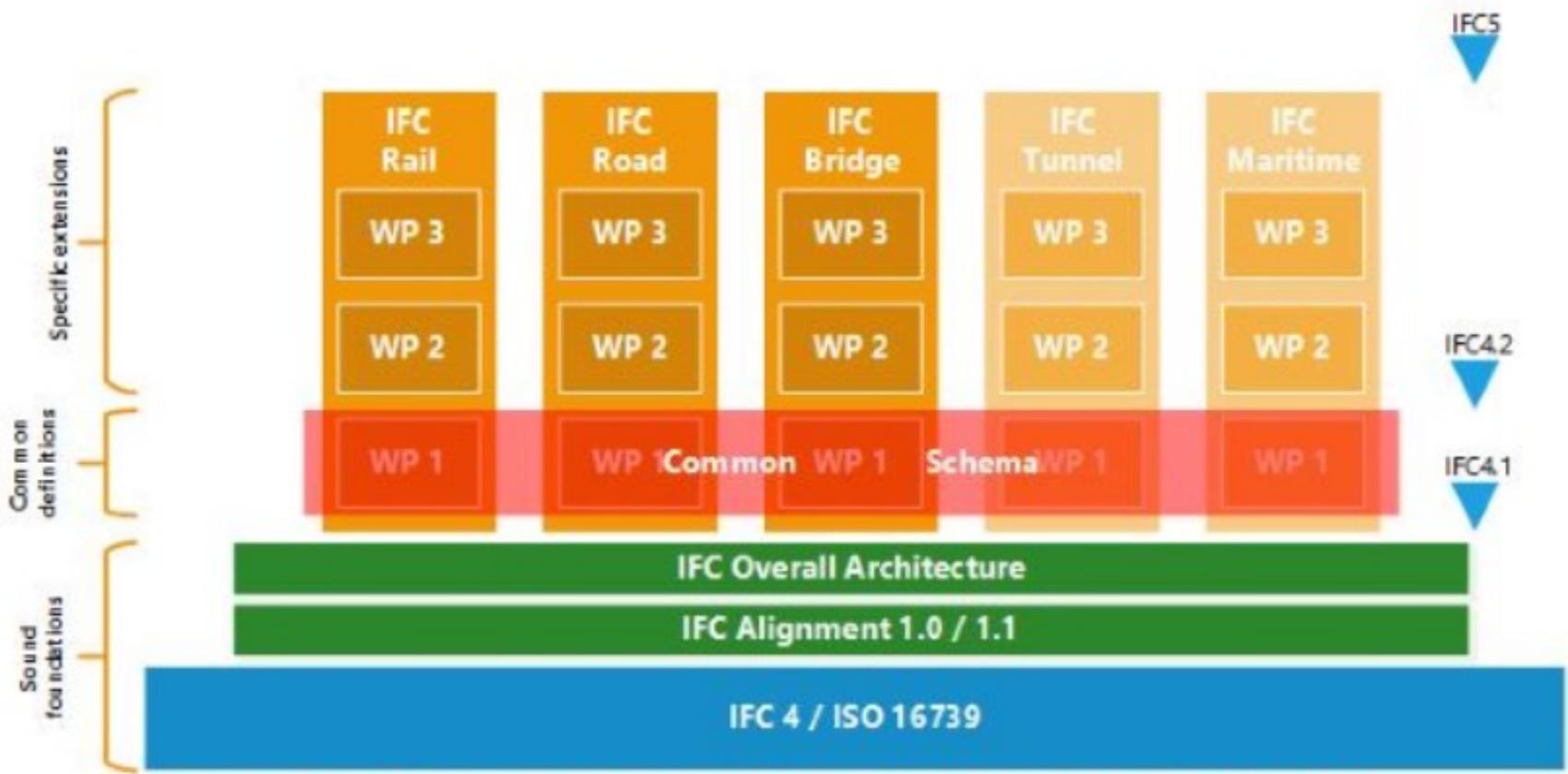


Figure 1: Overall structure of the current buildingSMART extension project (proposals)

Infrastructure Room



Steering committee:

Tiina Perttula, Jim Plume, Nobuyoshi Yabuki, Tristan McDonnell, Christophe Castaing, Phil Jackson, Ronald Bergs, Benno Koehorst

Road

Bridge

Ports & Waterways

Tunnels

Integrated Digital Built Environment & Landscape

Railway Room



IFC Rail

Track

Signals

Power

Communications

Steering committee:

Winfried Stix, Liming Sheng, Peter Axelsson,
Lukas Spengeler, Guy Pagnier, Peer Franz
Josef, Tarmo Savolainen, Xenia Fiorentini,
Billal Mahoubi, Christophe Castaing

€5million investment

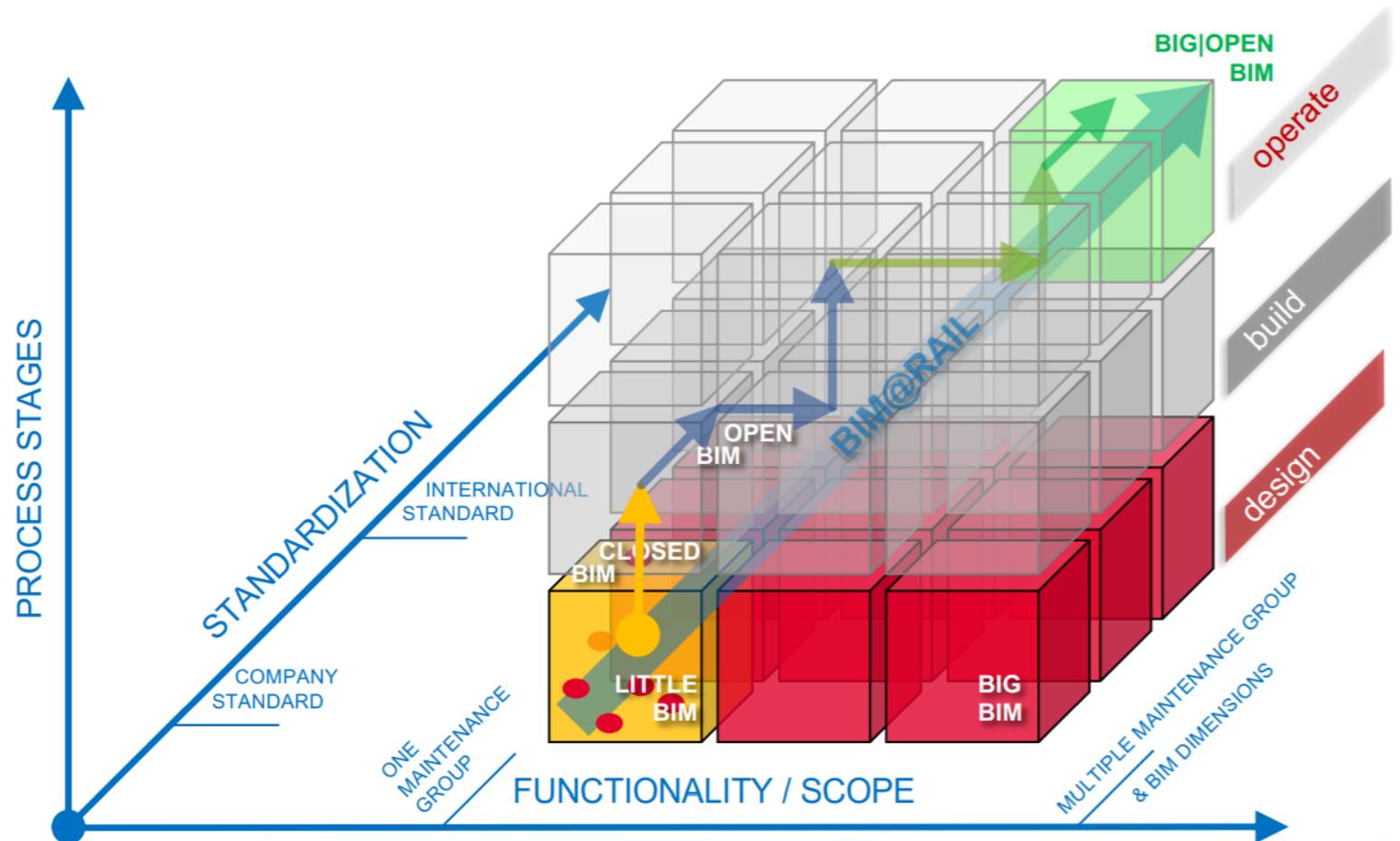
Phase 1 completes 2019

FTIA and BIM



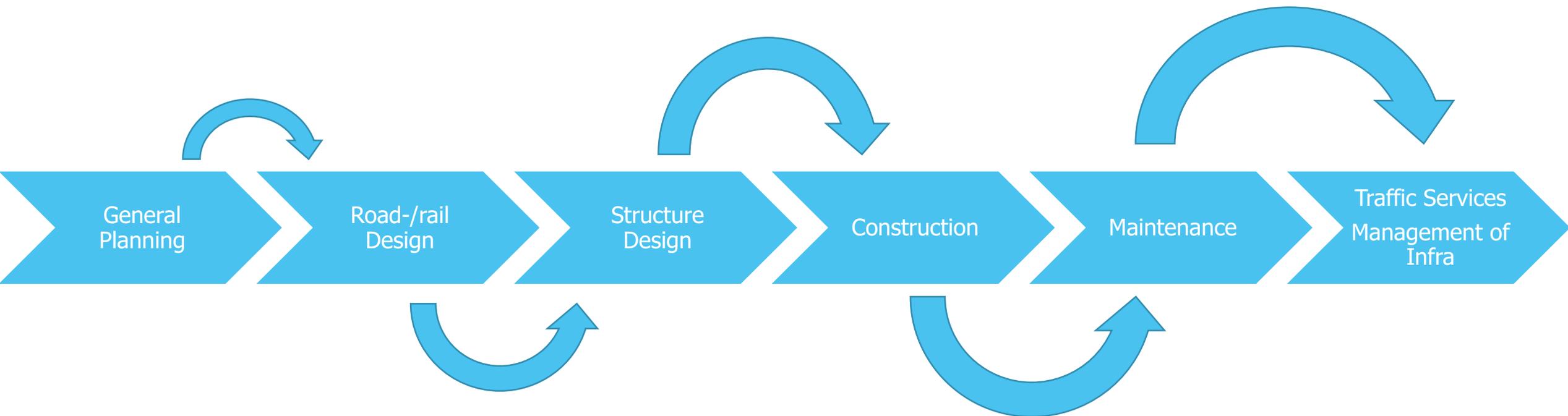
Target: BIG OPEN BIM

- International standards
- All life cycle phases
- All parties and stakeholder

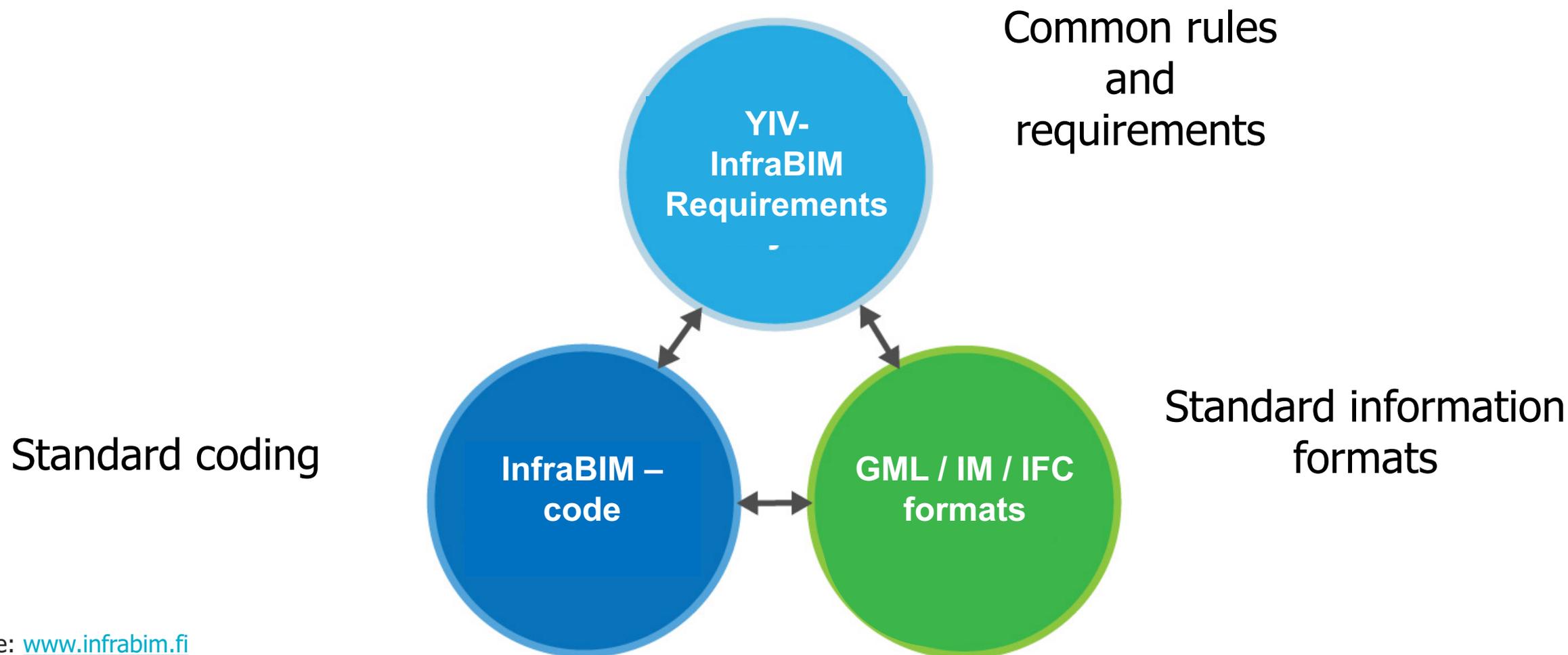


FTIA BIM Strategy

- Open common standard formats
- Enrichment of information through the life cycle



Finnish BIM Standards (BSFI)



Lähde: www.infrabim.fi

InfraBIM Requirements (YIV)

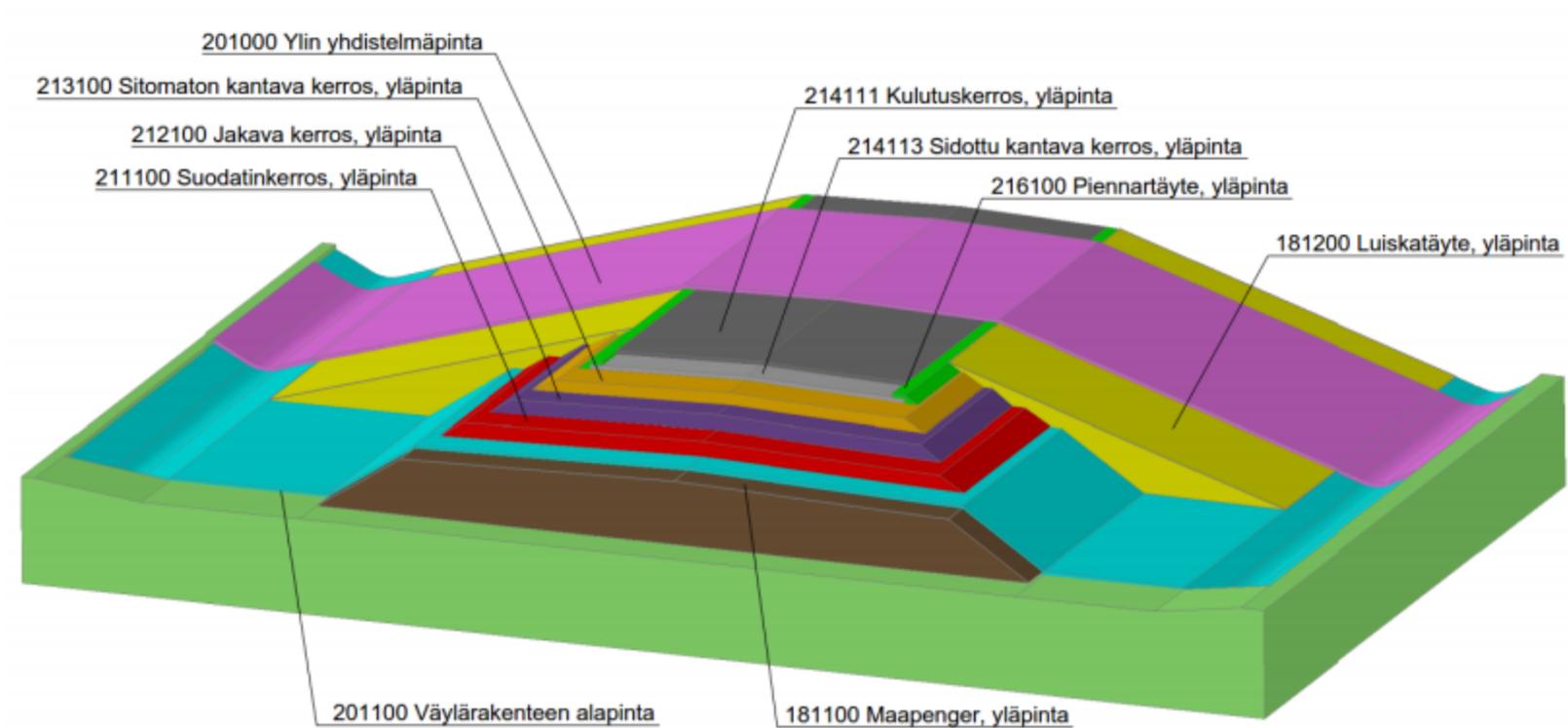
1. General
2. Initial information
3. Design
4. Construction
5. Maintenance

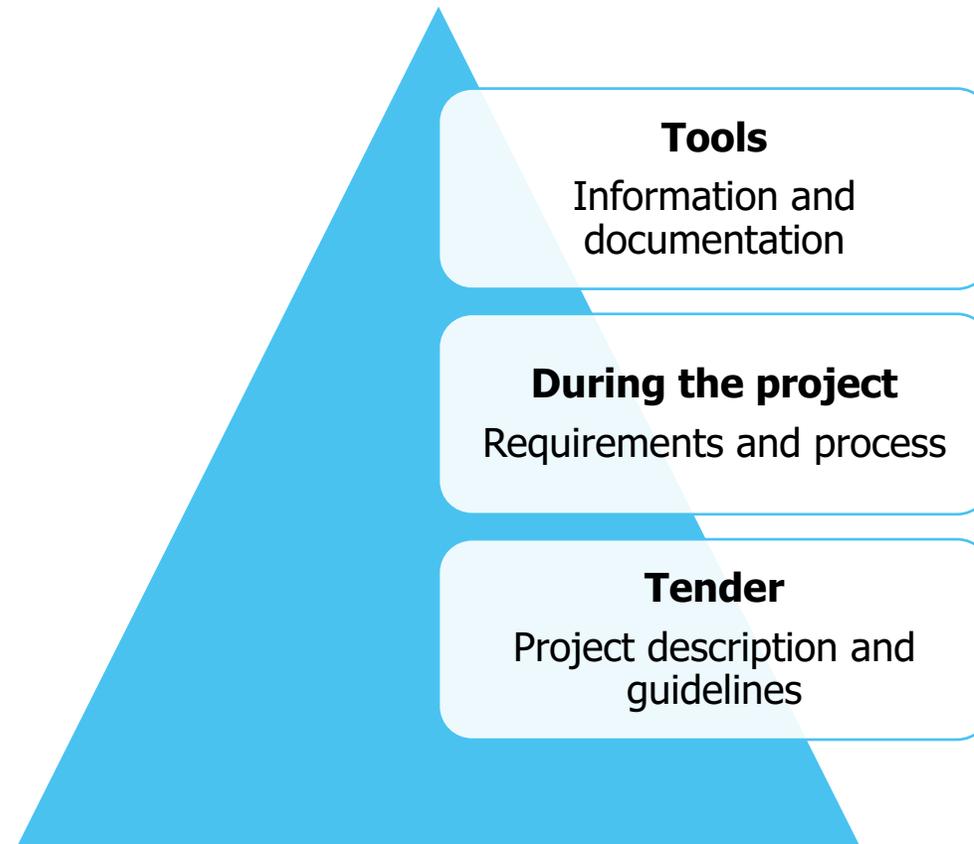
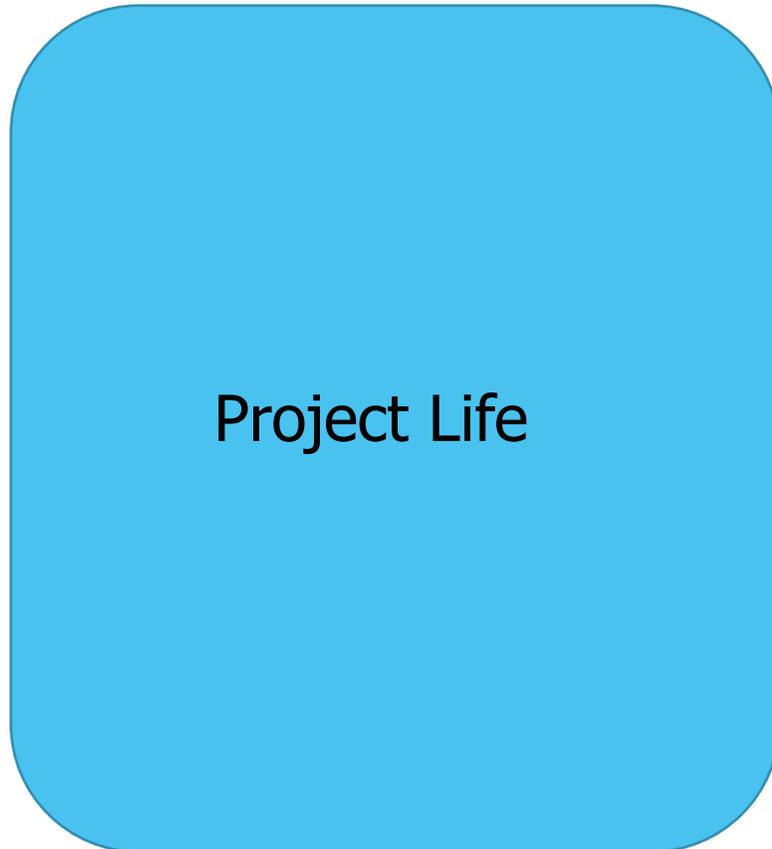
Updated 2019 – published May 2019!



InfraBIM-coding

Translation in English:
https://buildingsmart.fi/wp-content/uploads/2019/04/InfraBIM-nimikkeisto_ENG.pdf





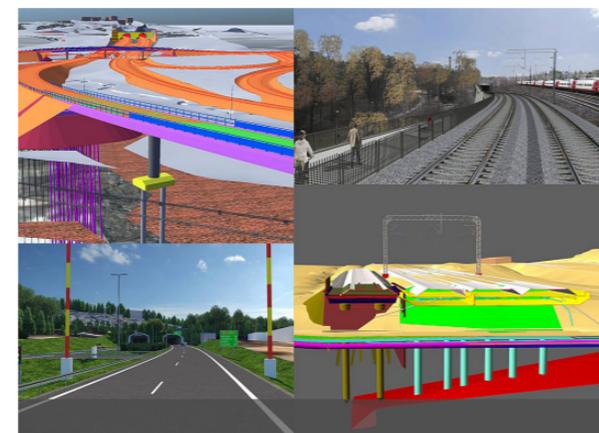
FTA has own BIM-guidelines

- [Tie- ja ratahankkeiden inframalliohje 12/2017](#) – ROAD AND RAIL
- [Siltojen tietomalliohje 6/2014](#) – BRIDGES
- Meriväylien tietomalliohje – SEAWAYS (IN UPDATE PROCESS)
- **New: Project data delivery requirements will be updated to Velho requirements 3-10/2019**



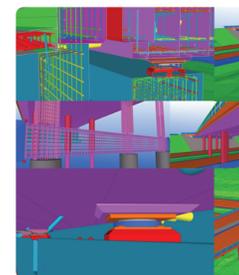
Liikenneviraston ohjeita
12/2017

Tie- ja ratahankkeiden inframalliohje



Liikennevirasto

Siltojen tietomalliohje



Documents

- **For tendering**
 - Project description
 - Project information plan

- **For designer / contractor as requirements**
 - Information Modelling documentation
 - Information Delivery documentation

FTIA - Level of details

RO	Suunnitelman osa	Yleis	Tie Rata	Rak
1760	Maanalaiset kalliotilat	P	P	P
1771	Kallioon poratut reiät	P	P	P
1779	Muut kallioon porattavat rakenteet	E	H	H
-	Tasauslouhinta	E	E	H
	Penkereet, maapadot ja täytöt			
1811	Penkereet	P	P	P
1811.5	Vastapenkereet	P	P	P
1811.6	Esikuormituspenkereet	H	H	P
1812	Luiskatäyte	H	P	P
1831	Asennusalustat	E	H	P
1832	Alkutäytöt	H	P	P
1833	Lopputäytöt	H	P	P
1834	Perustusten alustäytöt	E	H	P
1835	Rakenteiden ympärystäytöt	E	H	P

FTIA – formats

	RS	Ei lisättäviä kohteita edellisiin suunnitteluvaiheisiin.	Inframodel
2. Rata	YS	<ul style="list-style-type: none"> Vaaka- ja pystygeometriat, kilometripaalutus. Ylin yhdistelmäpinta. Ojat, luiskat, huoltotiet ja meluvallit. Maa- ja kallioleikkaukset sekä penkereet. Vaihtoehtotarkasteluiden sekä viimeistellyn ratkaisun mallit. 	Inframodel
	RaS	<ul style="list-style-type: none"> Vaaka- ja pystygeometriat, kilometripaalutus ja kallistukset. Huoltoteiden geometriat ja rakennepinnat. Ylin yhdistelmäpinta. Alin yhdistelmäpinta. Rakennekerrosten pinnat. Kuivatusrakenteet ja laskuojat. Tarvittaessa aukean tilan ulottuma (ATU) tai ratatyön suojaulottuma (RSU). Rautatiealue. 	Inframodel
	RS	Ei lisättäviä kohteita edellisiin suunnitteluvaiheisiin.	Inframodel
3. Pohjara- kennus	YS	<ul style="list-style-type: none"> Merkittävät massanvaihdot. Paalukentät ja paalulaatat. Stabilointikentät. 	3D-DWG (ja Inframodel)
	TS	Ei lisättäviä kohteita edellisiin suunnitteluvaiheisiin.	3D-DWG (ja Inframodel)
	RS	<ul style="list-style-type: none"> Pohjavahvistustoimenpiteiden sijaintitiedot (massanvaihdot, stabilointikentät, pilarien sijainnit ja pituudet, esikuormitus ja vastapenkereet, paalukentät ja paalujen sijainnit sekä pituudet). Työnaikaiset tuennat. 	3D-DWG (ja Inframodel)

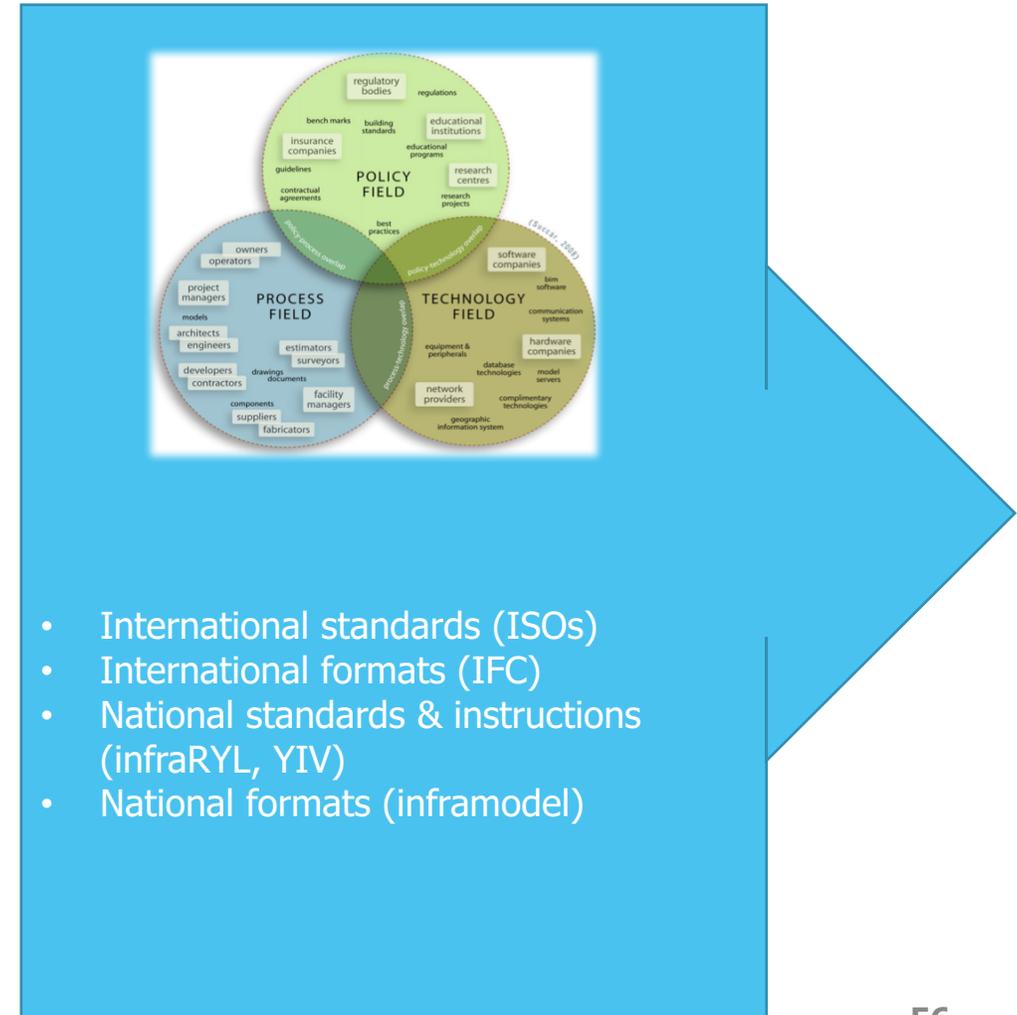
NOW: BIM services in FTIA

- **Infrakit –inframodel checker**
 - Client asks the designer rights to system. Designers send the model files to system, which accepts / rejects them.
 - Earlier BIMONE (2014-2017)
- **Information and model management support service (TiMaHa)**
 - Service by Destia to help client for information and model issues during the projects.
 - Documents, checking the models, information delivery etc...

In project use

- Trimble Connect, Quadri
- Infrakit
- Tekla BIM Sight, Civil
- Magnet
- Autodesk tools
- Bentley
- ...

On-going digitalization projects related to infraBIM

- International standards (ISOs)
- International formats (IFC)
- National standards & instructions (infraRYL, YIV)
- National formats (inframodel)

Velho?

Includes:

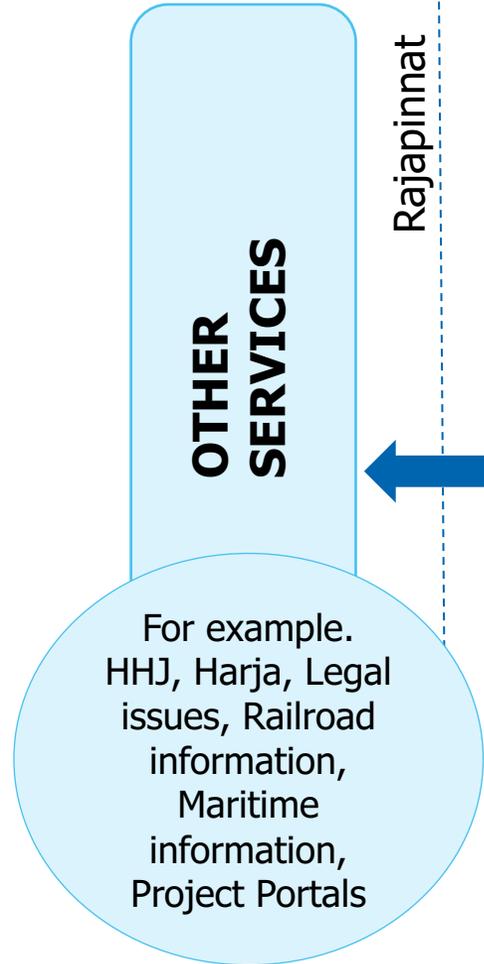
- **Road Asset Information register** (~new and modern road register)
- **Projects and materials: Project and design information portal** (road, rail, seaways)

Plus:

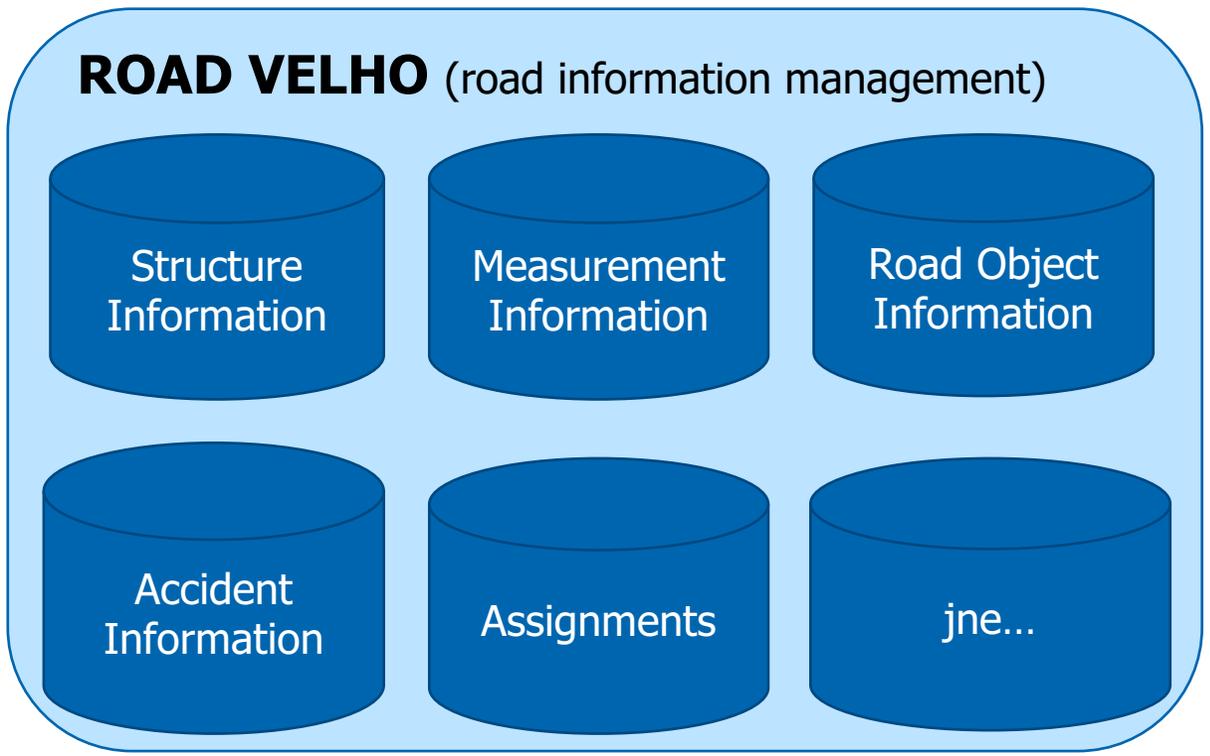
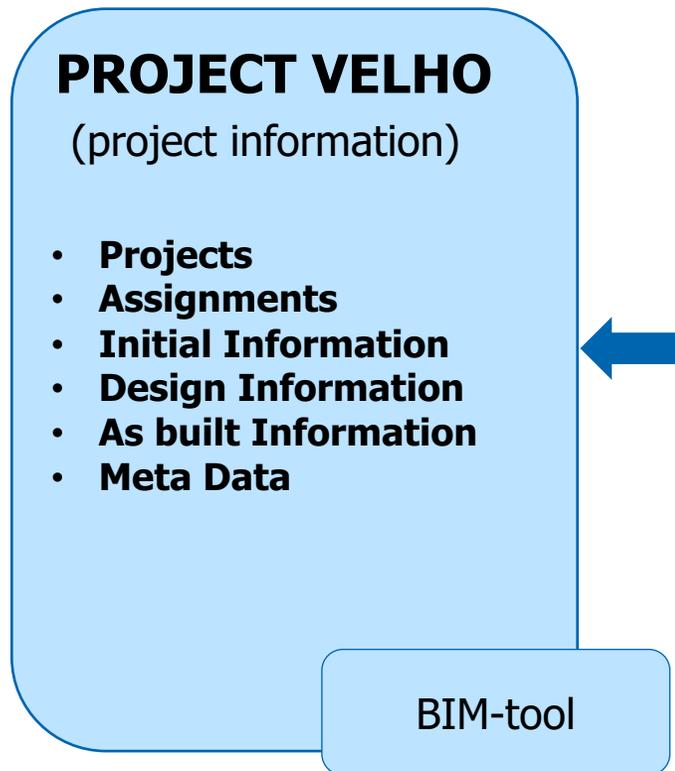
- Services related and digitalizing processes
- BIM in use through the process



Velho system



Rajapinnat



Velho Road Asset Information

Velho (what is it for road asset information):

- **Provides** users clear view to road asset information search, view and reporting
- **Contains** first mainly the old road register data in better storage, in future the content will expand and is updated directly as an result of the asset management process
- **Integrates** to important road asset systems (Harja, YHA, Bridge asset management system, location based systems and project data in Velho).

Velho projects and materials

Velho (project view):

- **Project information:** all basic information of road, rail and seaway projects. See by all government personnel.
- **Design and project materials** central data storage for all stakeholders
- **Integrates** to important road asset systems (Harja, YHA, Bridge asset management system, location based systems and project data in Velho).
- **BIM-tool** enables inframodel view for all stakeholders.

Design phase

Tender phase

Start of the project

Project delivery

Delivery to client

Procurement

Design project

Model based design material
(native material)

Designer's
own delivery

Designer's
own delivery

Designer's
own delivery

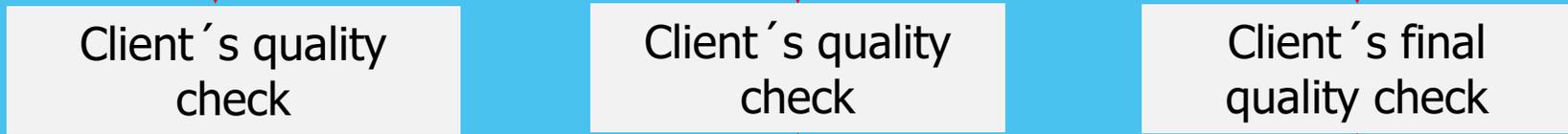
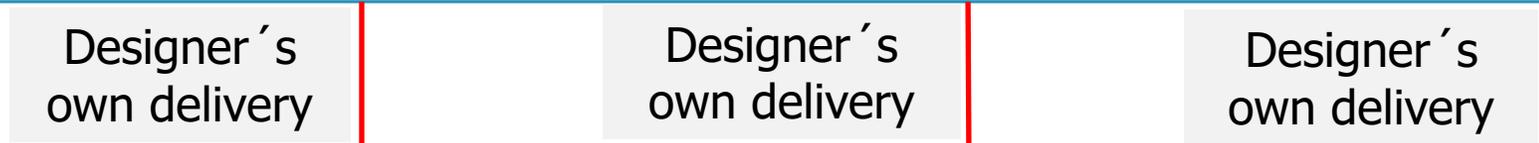
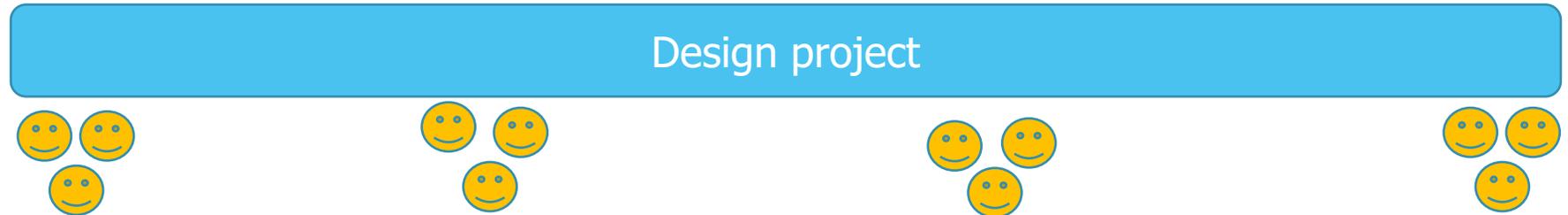
Client's quality
check

Client's quality
check

Client's final
quality check

- FTIA and ELY Quality Check
- Project manager / consultant
 - What can be automatised in future?

CLIENT INFORMATION STORAGE
Velho, RaidE, Ihku, BIM –tool...



Construction phase

Tender phase

Start of the project

Project delivery

Delivery to client

Procurement

Construction project

Model based construction material
(native material)

Contractor's
own delivery

Contractor's
own delivery

Contractor's
own delivery

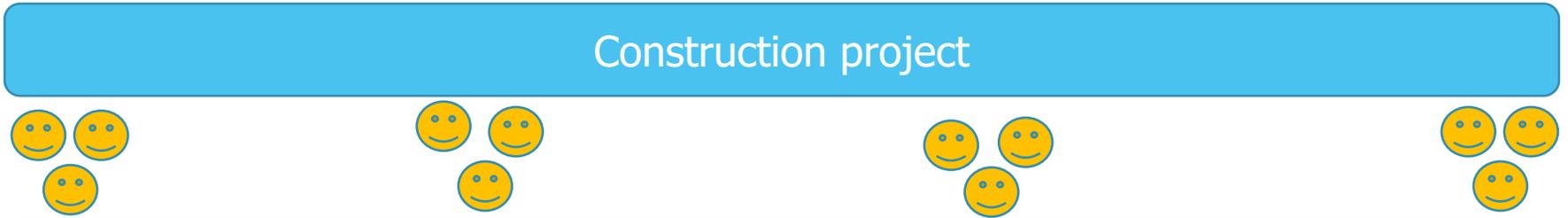
Client's quality
check

Client's quality
check

Client's final
quality check

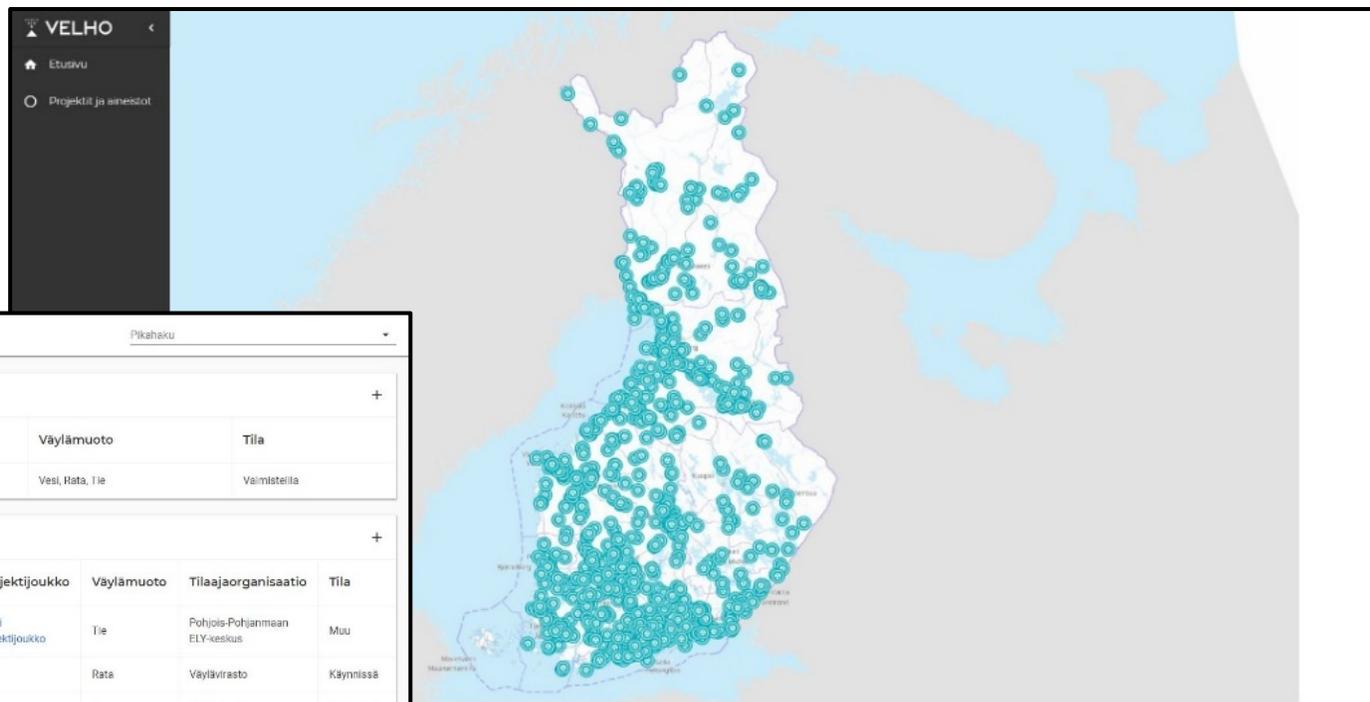
FTIA and ELY Quality Check
- Project manager / consultant
- What can be automatised in
future?

CLIENT INFORMATION STORAGE
Velho, RaidE, Ihku, BIM –tool...



Velho

- <https://velho.vayla.fi>



VELHO

Etusivu

Projektit ja aineistot

Pikahaku

Projektijoukot

Nimi	Lyhenne	Tilajaorganisaatio	Väylämuoto	Tila
Testi projektijoukko	TESIT	Väylävirasto	Vesi, Rata, Tie	Valmistella

Projektit

Nimi	Projektijoukko	Väylämuoto	Tilajaorganisaatio	Tila
Ailasto-kirkonkylän kevyen liikenteen väylä	Testi projektijoukko	Tie	Pohjois-Pohjanmaan ELY-keskus	Muu
Akaan raakaputeminaalin Ratasuunnitelma	-	Rata	Väylävirasto	Käynnissä
Akin testiprojekti	-	Tie	Väylävirasto	Käynnissä
AL-testi	-	Rata	Väylävirasto	Ehdolla
Atakyläntie Auran majan kohdalla	-	Tie	Pohjois-Pohjanmaan ELY-keskus	Muu
Atakyläntien ja Raitiotien liittymän parantaminen	-	Tie	Pohjois-Pohjanmaan ELY-keskus	Muu
Alavesikan taajamajärjestelyt	-	Tie	Pohjois-Pohjanmaan ELY-keskus	Muu
Alpuminkangas-Kiviojantie kevyen liikenteen väylä	-	Tie	Pohjois-Pohjanmaan ELY-keskus	Muu

Käyttöohje

Velho-manual



<http://ohje.velho.vayla.fi>

VELHO
- käyttöohjeistukset

ETUSIVU KÄSITTEISTÖ [?] KÄYTTÖOHJEET UKK VELHO TIETOSUOJASELOSTE

[Käyttöohjeet](#)

[Usein kysytyt kysymykset](#)

[Käsitteistö](#)

Ajankohtaista

- [Käyttäjätuki ja palaute](#)
maaliskuu 5, 2019
- [Velhon ensimmäinen julkaisu](#)
maaliskuu 5, 2019
- [Velhon käyttöoikeudet](#)
helmikuu 26, 2019
- [Velho-järjestelmän tukemat internet-selaimet](#)
helmikuu 12, 2019
- [Velhon ensimmäisen julkaisun sisältämä projektidata](#)
helmikuu 6, 2019

Haku ... **HAE**

AVAINSANAT

dokumentti hakeminen **käsitteet**

käyttöoikeus **lataaminen**

lisääminen palaute pikahaku

päivittäminen selain

sijainti tuki virhe

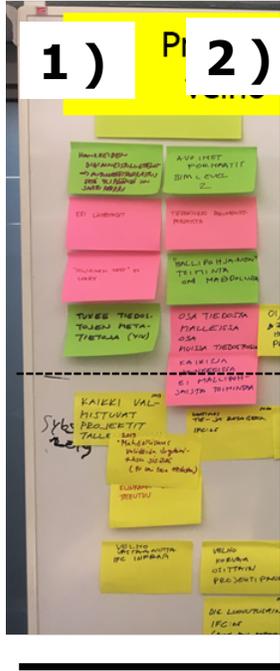
KATEGORIAT

Aineisto Ajankohtaista

Velho implementation

- **First version implemented march 2019**
 - FTIA and ELY-keskus personnel
 - Design project basic information
- **Next steps in the development**
 - Road Velho first version June 2019
 - Materials to Velho (first design project materials coming to FTIA to acceptance project)
 - BIM tool autumn 2019

BIM tool select



1)

2) **BIM-työkalu**

- Velho –allianssin tavoitteissa on määrittää osana Väylän hankeaineistoja.
- **Helppokäyttöinen tarkastelutyökalu**
 - Työkalua voivat käyttää tilaaja, palveluntuottaja (myöhemmin Käyttäjä)
 - Käyttäjä pääsee työkalulla helposti katsomaan malleja
 - Käyttäjä voi tarkastella useita malleja
 - Käyttäjä voi helposti muodostaa omia näkemyksiä niistä sidosryhmille
 - Järjestelmä toimii isoilla malliaineistoilla
 - Käyttäjä voi ottaa leikkauksia (pystysuunnassa)
 - Järjestelmä tukee inframalleihin sovellettavien työkalujen käyttöä
 - Malleja voi kommentoida järjestelmässä

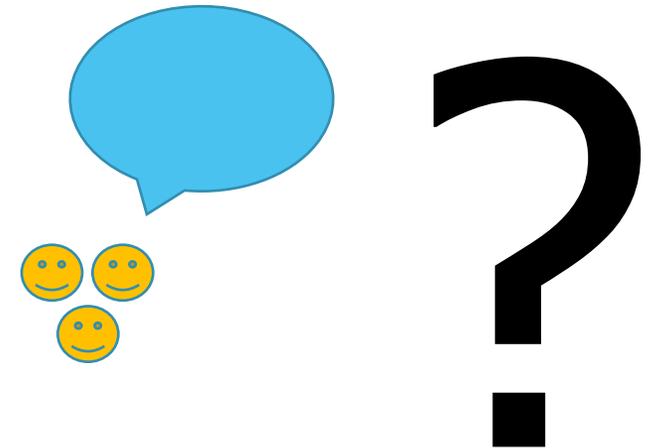
3)

VELHON BIM -TYÖKALUN
MARKKINAINFO



4)

SI
LITA



**1) Velho BIM workshop
21.11.2018**



**2) Market info
27.2.2019**



**3) Market discussions
phase 1 – 28.2.-
31.3.2019**



**4) Market discussions
phase 2 – 3.4.-
31.5.2019**

BIM tool MVP – autumn 2019

- **Usability**

- The BIM tool's usability experience must be good for the normal user. User Case: The user of the wizard system goes to the desired project and retrieves the plan material (sample files) and selects one or more of them. When the user presses the BIM tool icon, the user can easily view the sample material. In the model, navigation is easy and intuitive.

- **Materials**

- Supports the following formats: IM / XML, IFC, DWG, DXF, etc. Commonly Used Formats
- Large files, as well as large / long infra projects
- Coordinate System: Detects different coordinate systems and is able to position sub-models in local coordinates to their correct location.

- **Tools**

- Characteristics: Support for IM and IFC feature data, show what. information when the object is assigned.
- Managing Levels / Objects / Templates (Possibility of Hiding / Hiding Things)
- Cutting Tool
 - Vertical cutting
 - Free cut
 - Binding the cut to the bus line

- Measuring Tool

- Distance (distance between two points, height difference and slope, and line length)
- Binding the measurement to the geometric line (measuring line, edge line); Pile Measurements (Pile + Distance)
- Binding a Measurement to a Line / Point / Surface / Object (Infection)

- User example: The project manager of the ELY center selects the bus X for examination. Next, the project manager selects the drum in the model, so he can see the drum properties (including drum diameter and material).

- **Technical features**

- browser based SaaS service
- Integration with the Velho system
- User Management via Velho
- Hardware requirements (must work with existing FTIAy notebooks) and program functionality (not crashing, running smoothly)

Project: Espoo-Salo railroad

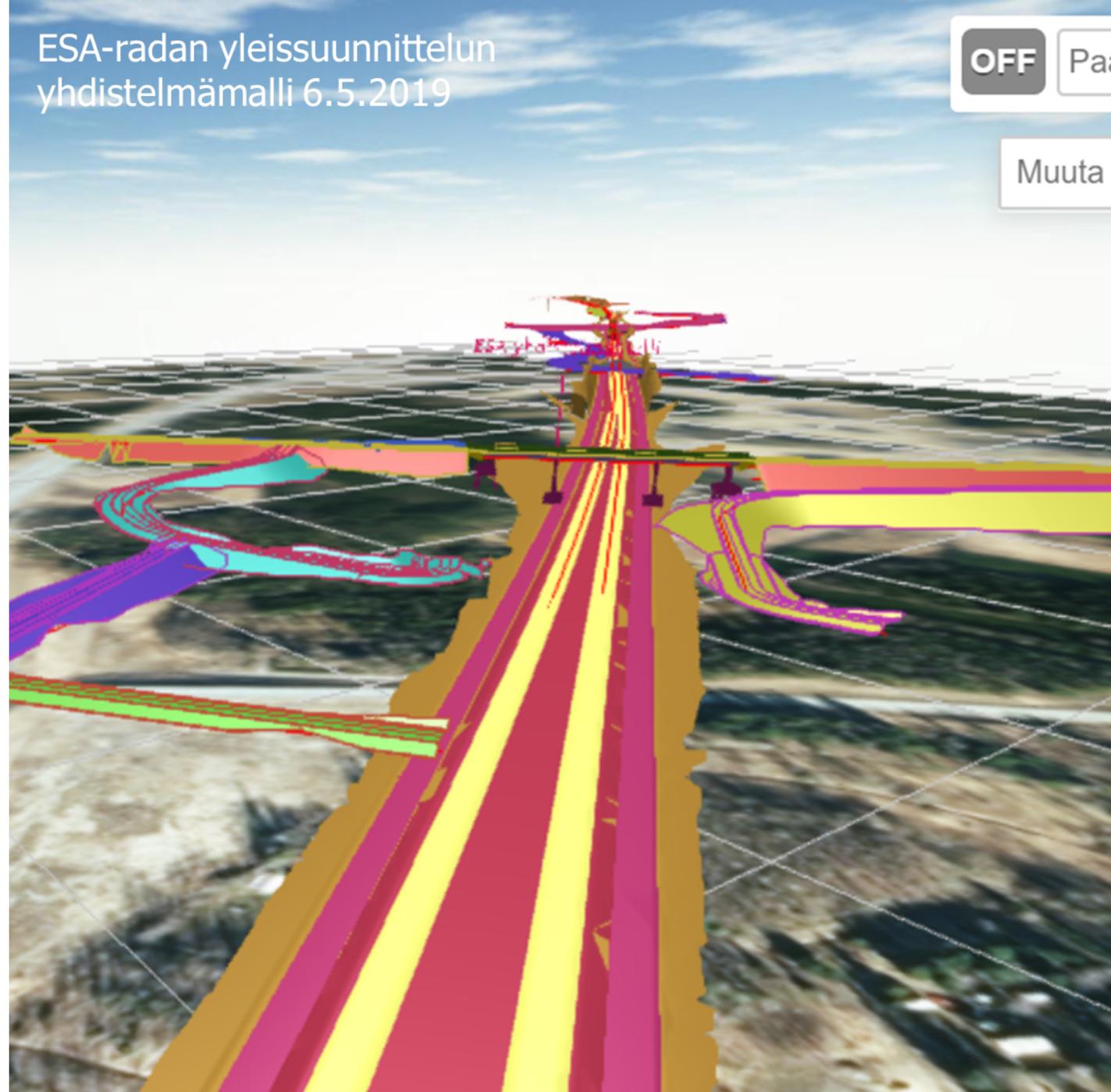
- General planning phase
 - Digital coordinator
 - 3 design groups with BIM teams
 - 94 km railroad
 - 23 Tunnels
 - 120 Bridges

ESA-radan yleissuunnittelun
yhdistelmämalli 6.5.2019

OFF

Pa

Muuta



Project: Espoo-Salo railroad



- **Digital coordinator**

- Master plan
- Digital plan
- Data quality check

- **Digital enterprise**

- Model view tool /
Combination model
- Process database



Project: Highway 4, E1 Äänekoski Intersection

- Quantity measurement during the procurement
- Model based as built information updated during the construction



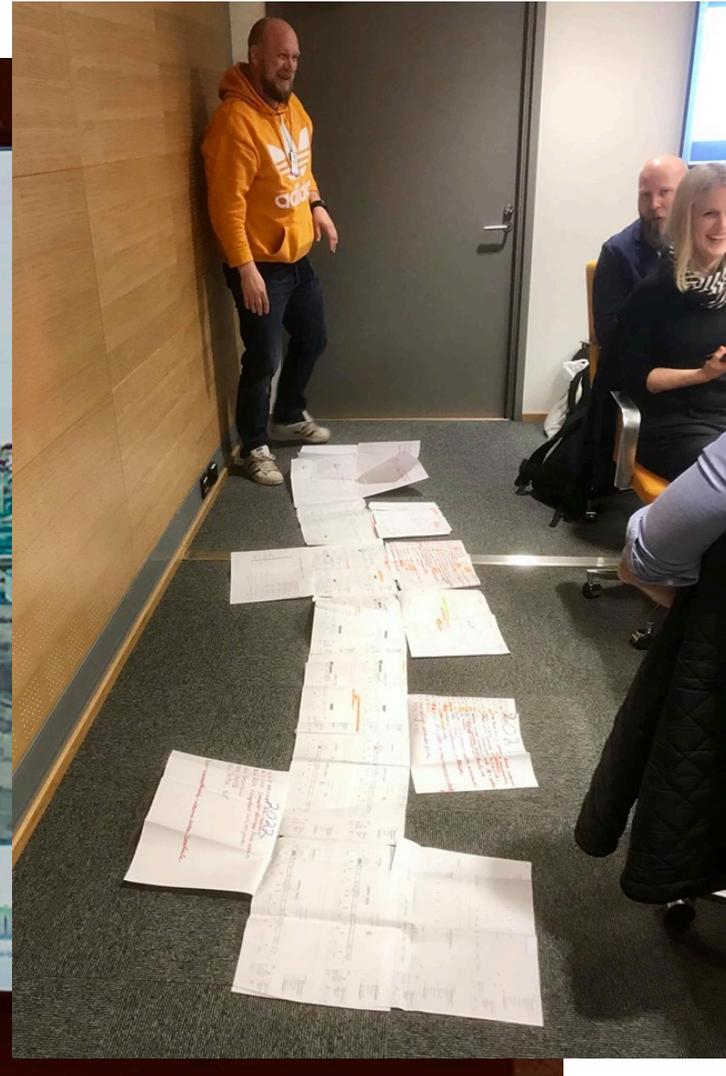
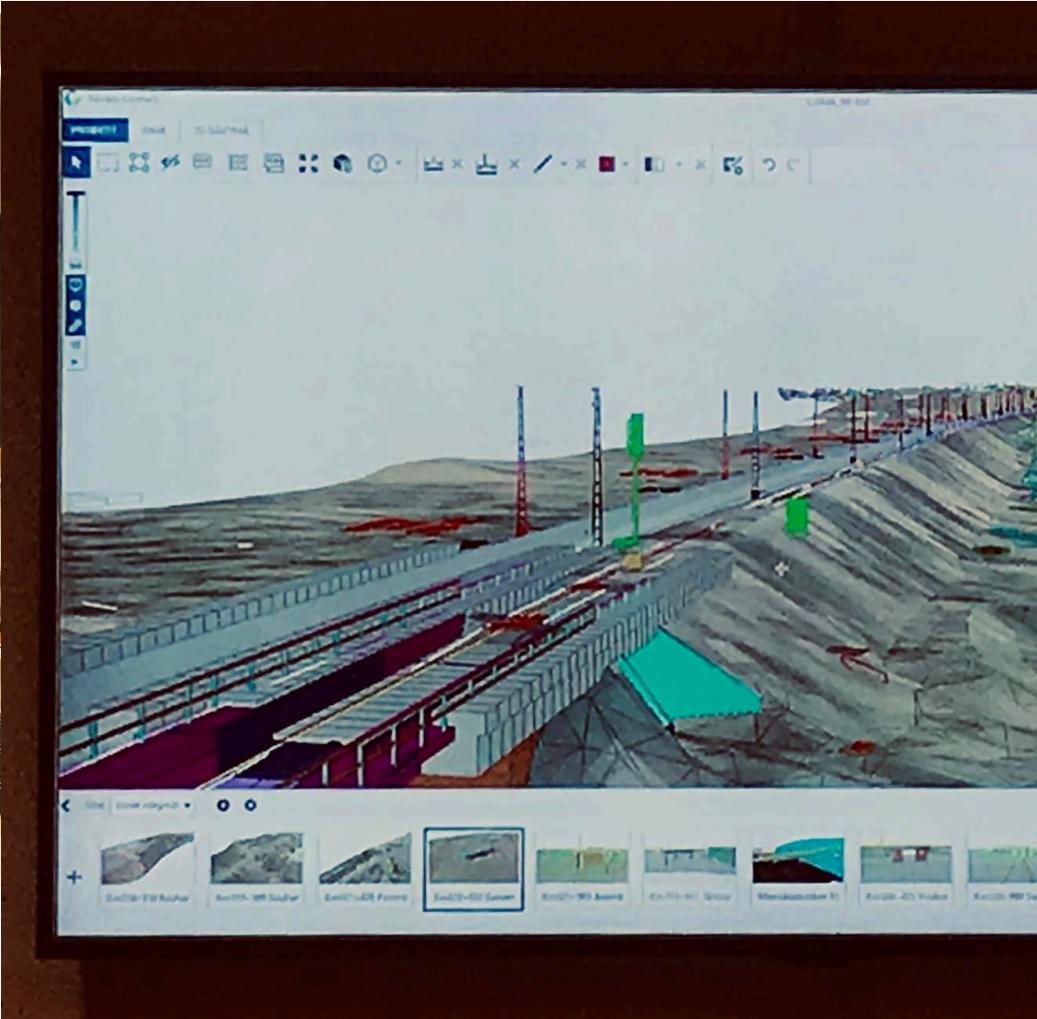
VALTATIE 4, E1 ÄÄNEKOSKEN
ERITASOLIITTYMÄ

E1 Äänekosken
eritasoliittymä

7.1T-14

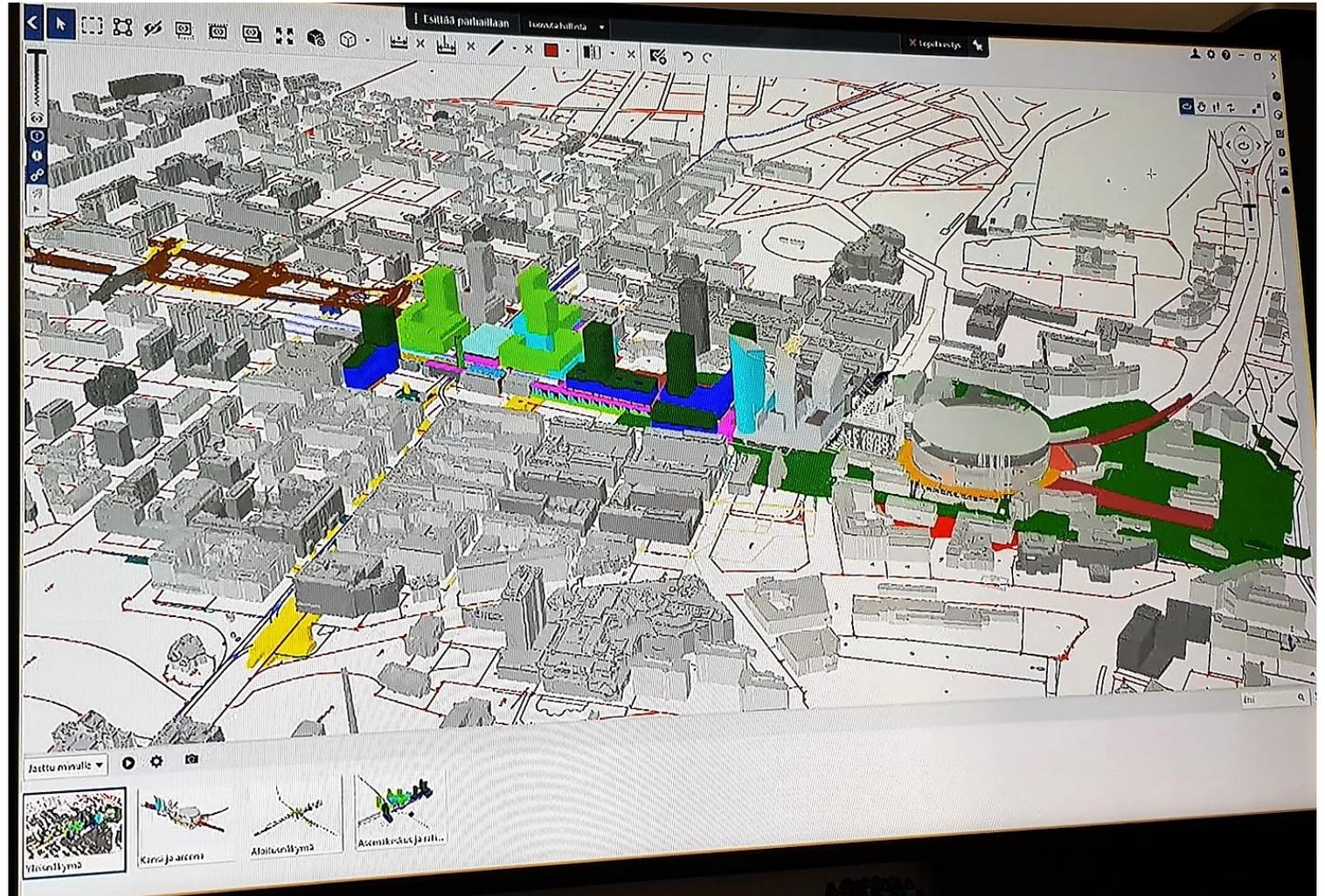


Project: Luumäki-Imatra railway - project



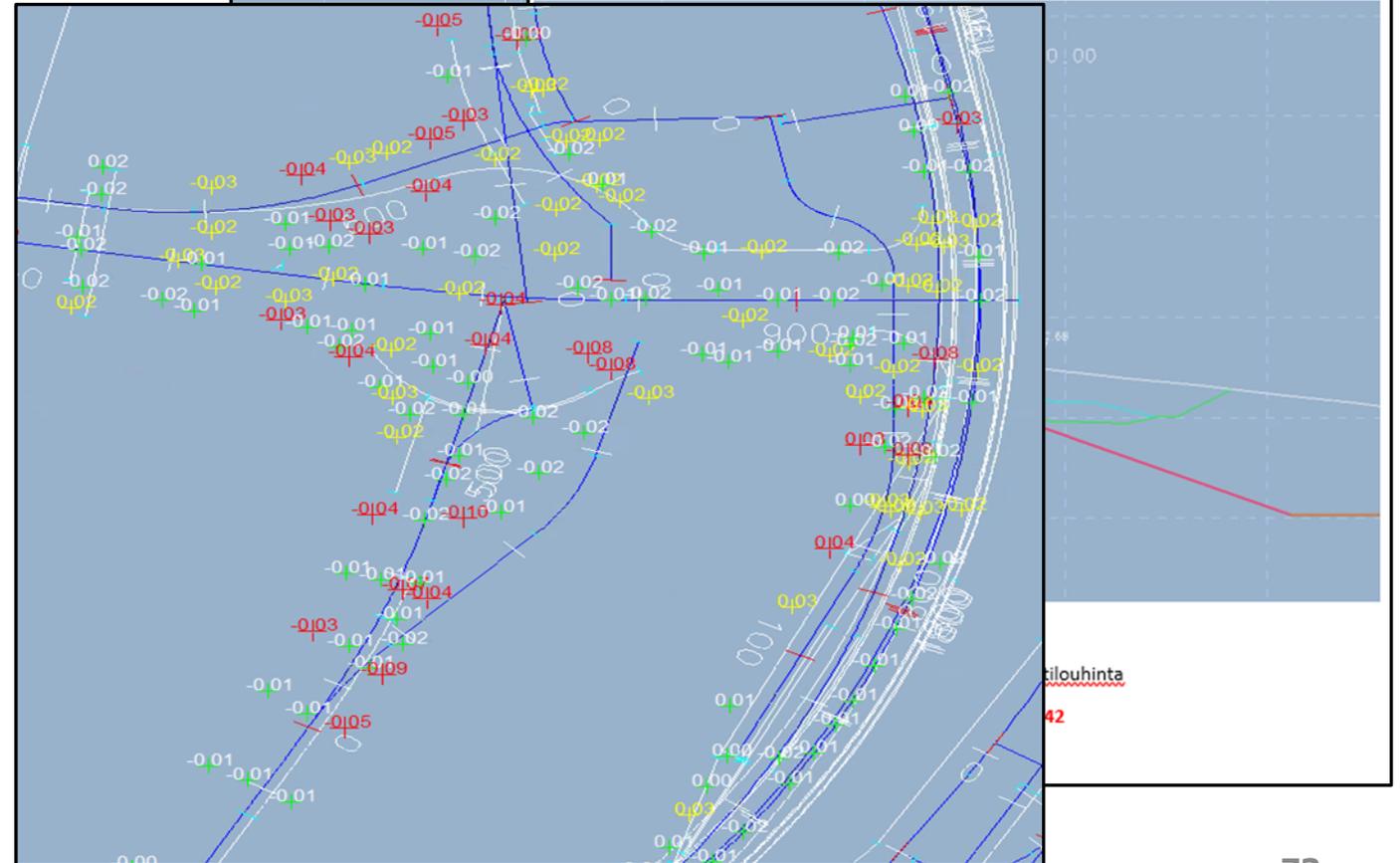
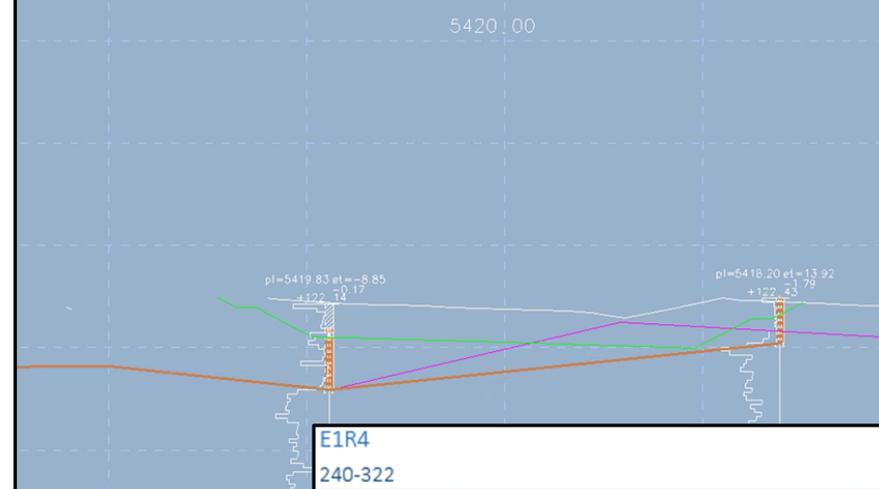
Project: Tampere City Development

- Project partners:
 - City of Tampere
 - Tampereen asemakeskus
 - Tampereen raitiotie
 - Tampereen Kansi ja Areena
 - TAHERA
 - Hämpin parkki
 - Väylä



General use cases

- Initial information / Geotechnics
- Quantity take off
- As built comparison



FTIA BIM Maturity Model

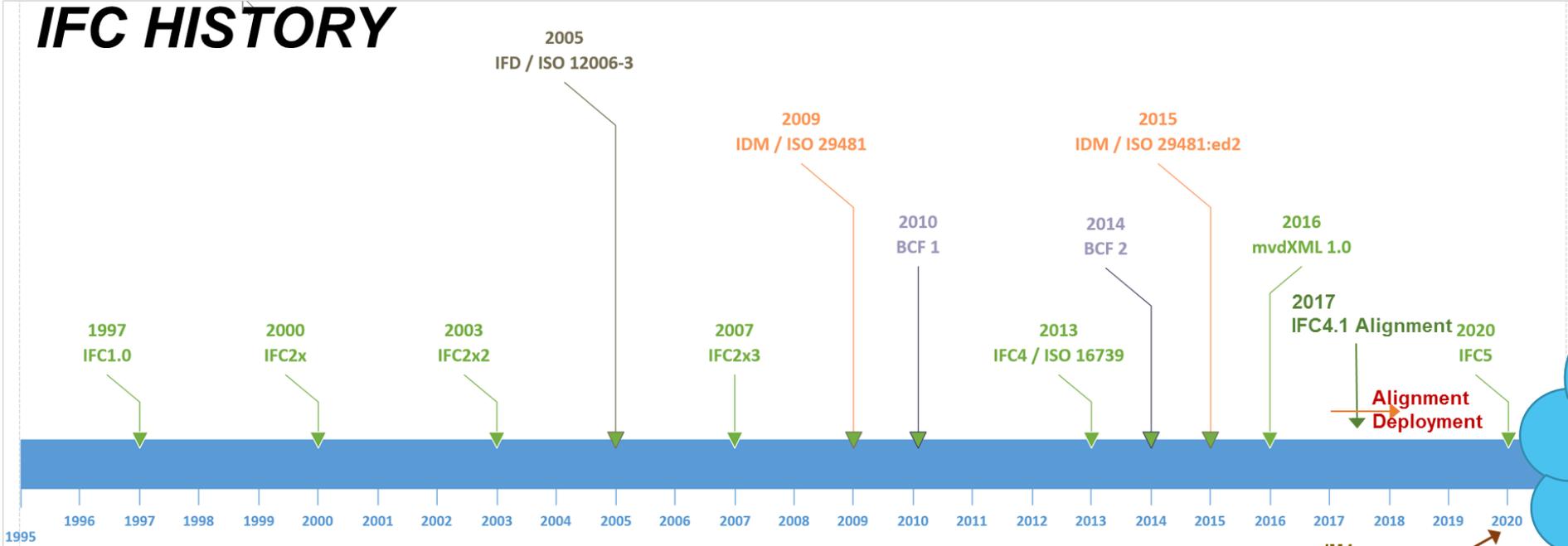
	Level 0		Level 1	Level 2	Level 3		Level 4
Content	Pencil and ink lines, text.	Digital lines, text, blocks and symbols in 2D.	Simple 3D objects.	3D building objects with unspecified information	3D building objects with requirements to objects, properties and ID	Manufacturer's 3D objects & properties for operation /FM	All project, operational documentation and history are linked to objects in the model
Digitization	Drawings on transparent paper on a drawing table.	Drawings made with 2D CAD in a computer.	Drawings made with 3D CAD/BIM.	Drawings / views from BIM. <i>Velho</i>	Drawings / views from BIM streamed to mobile devices. Limited paper use.	Open BIM with dimensioning streamed to mobile devices.	Open BIM with all operational information and history streamed to mobile devices.
Interoperability	Drawing on plastic film copy of other disciplines drawings.	Work on 2D DWG or DXF background from other disciplines.	Work on 3D DWG background from other disciplines.	File based sharing of open BIM (IFC/inframodel), aggregated models hosted in the common data environment.	Server based sharing of open BIM (IFC), continuous validation of model.	Server based communication & issue handling, all issues related to objects in BIM.	Sensors enrichen model. Direct communication between the model and functional systems.
Collaboration	Coordination in design meetings and onsite meetings.	Systematic interdisciplinary controls with digital workflows.	3D visualization, visual controls in modeling tools.	Systematic model coordination, clash detection, quantity take off.	Interface handling in BIM. Advanced simulations. Integrated Project Delivery (IDP).	Models carry all information for construction and operation. Model driven production and assembly.	Model used by operations and for employees, users and the public.
Delivery method	Paper copies.	PDF/TIFF or paper copies.	PDF/TIFF or paper copies.	File based sharing of open BIM (IFC/inframodel). PDF or paper copies.	File based sharing of open BIM (IFC/inframodel). Sharing of combination models.	Automatic data transfer between phases, e.g. from construction to maintenance.	Continuous electronic data transfer in all project and business tasks.
Cost estimation	Assessed with traditional methods.	Cost estimation is not linked to the model.	Simple data reports from model, like mass quantities.	Cost estimation database. <i>lhku</i>	Calculating life cycle costs from the model.	Models include all necessary cost information linked to other functions.	Cost estimation is a clear fifth dimension. (3D + 4D time + 5D).

Future



Future?

IFC HISTORY

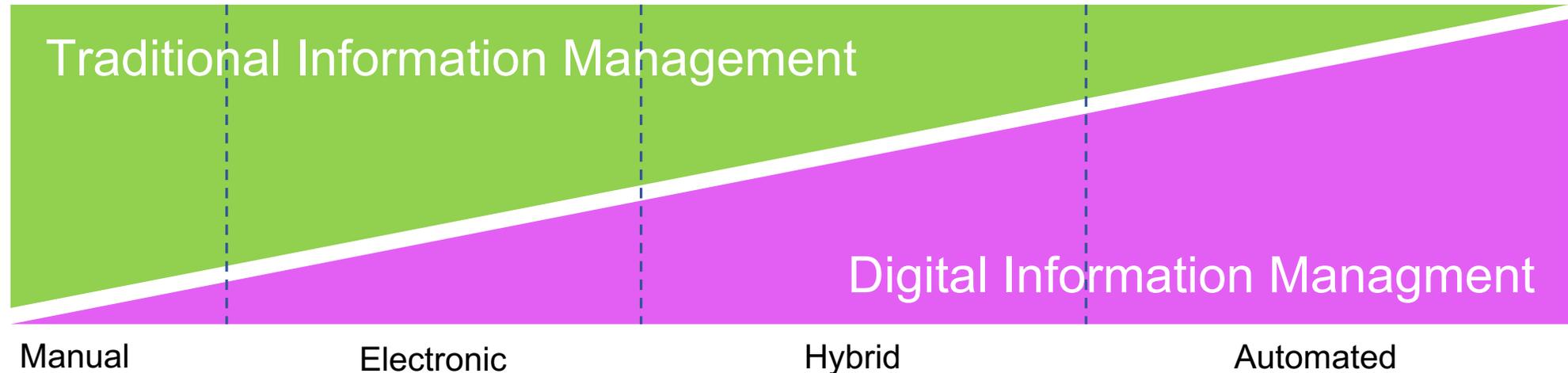


INFRAMODEL HISTORY

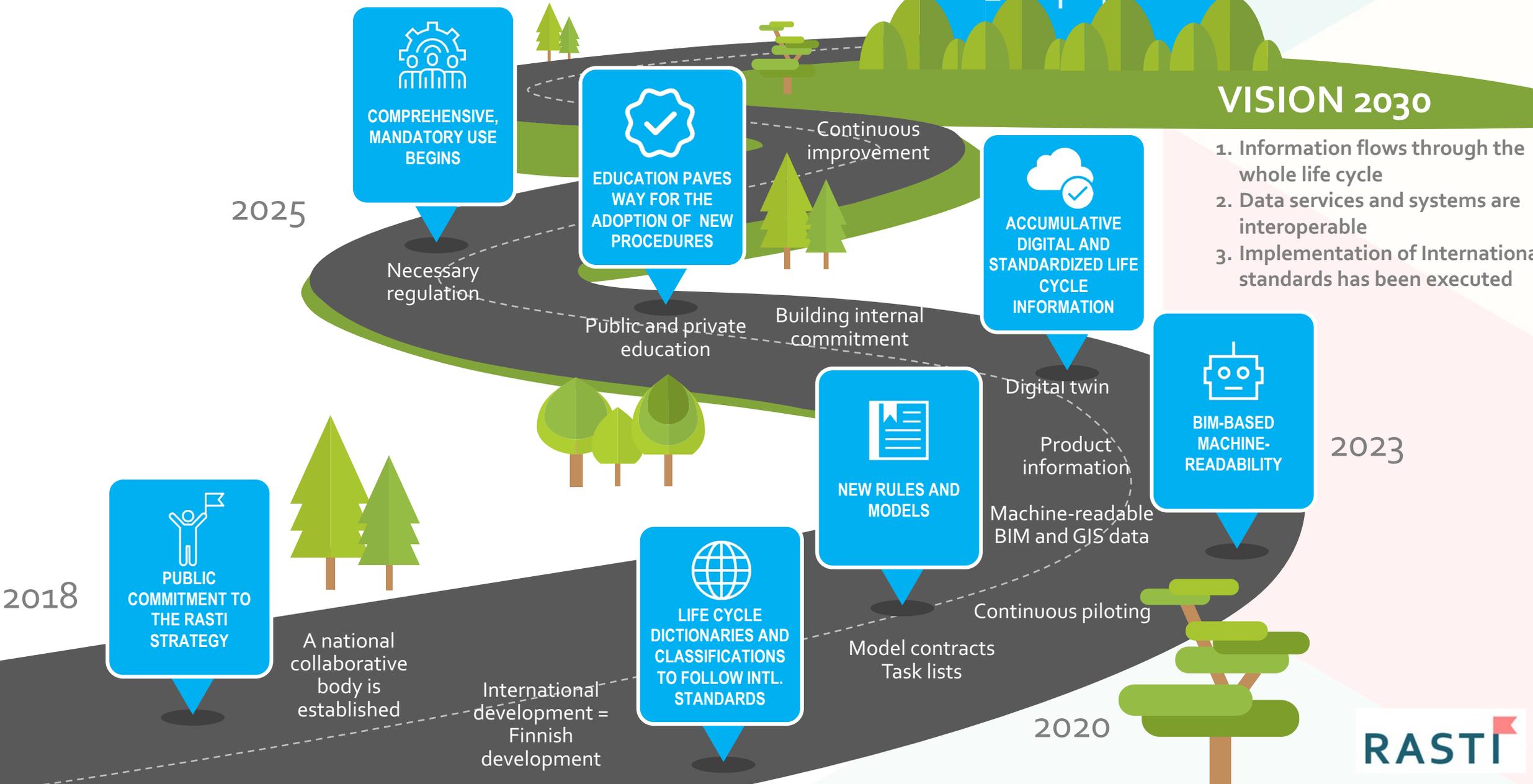
Future National Road Map

www.rastiprojekti.com

Standardized, digital information enables gradual automation of information management



Future National Road Map





infrabimopen.com

www.infrabimopen.com

InfraBIM Open collects all important InfraBIM professionals to Tampere Finland 3.-5.2.2020

Will be organised 3rd time (1st time 400 participants, 2nd time 520 participants)

Submit your presentation proposal by September 16

Join the emailing list!!!

Thank You

- Any questions?
- More information:
 - tarmo.savolainen@ftia.fi
 - www.ftia.fi
 - www.buildingsmart.fi
 - www.buildingsmart.org





VÄYLÄ