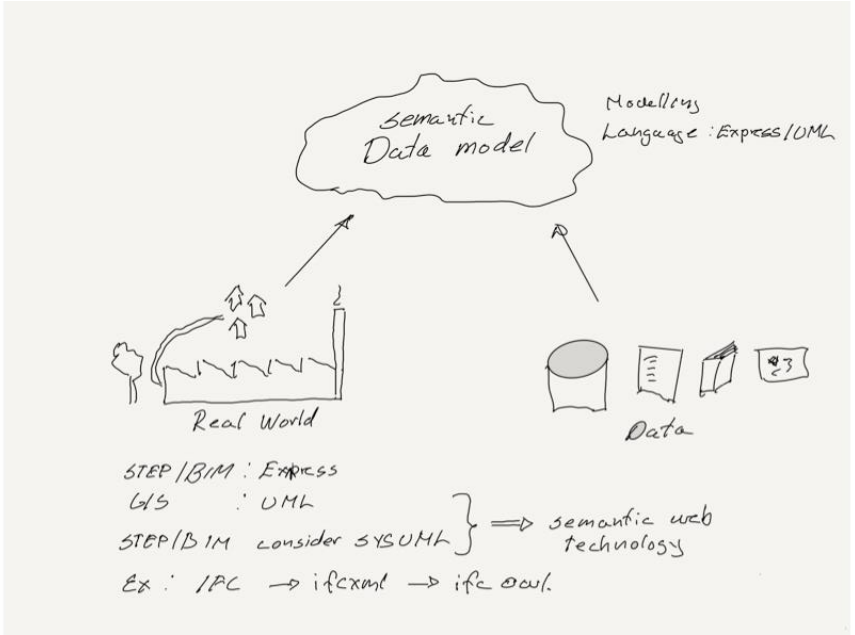
BIM standardization

ØIVIND ROOTH, DIREKTORATET FOR BYGGKVALITET, CHAIR CEN/TC442 – BUILDING INFORMATION MODELLING

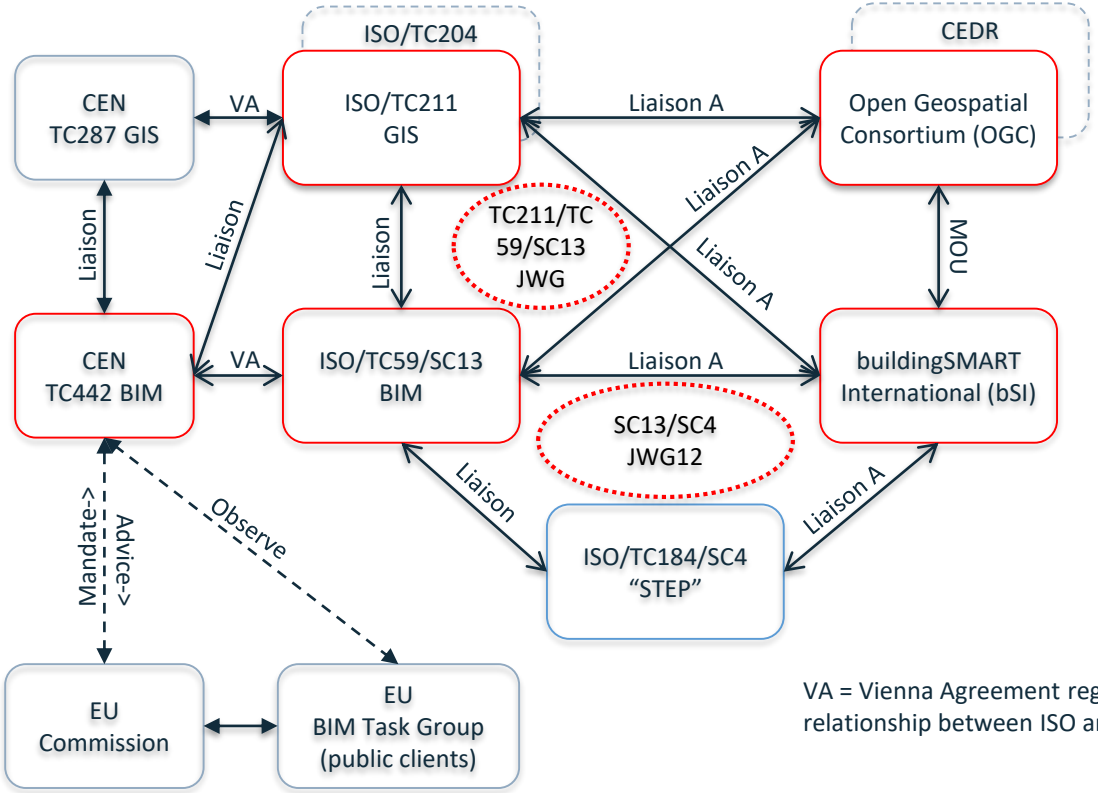
31.01.2019 BIM and Fire Safety WorkShop, Malmø

Overview international and European BIM standardization

ISO	ISO/TC59/SC13 - BIM
	ISO/TC184/SC4 - STEP
	ISO/TC211 - GIS
CEN	CEN/TC442 - BIM
Industry Concortia	buildingSMART - BIM
	OGC - GIS
National Norway	buildingSMART Norway
	SN/k 257
	SN/k 174
	SN/k 176
	National geomatic committee

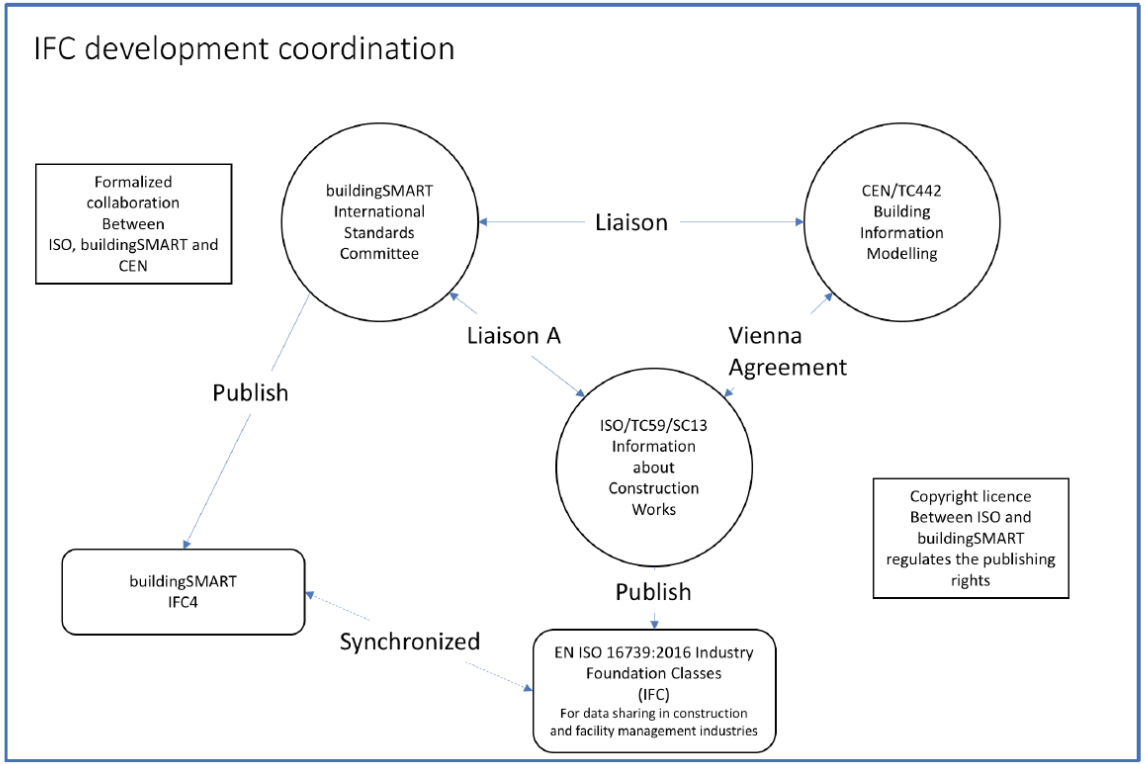


Important relations in international BIM standardisation



VA = Vienna Agreement regulates the relationship between ISO and CEN

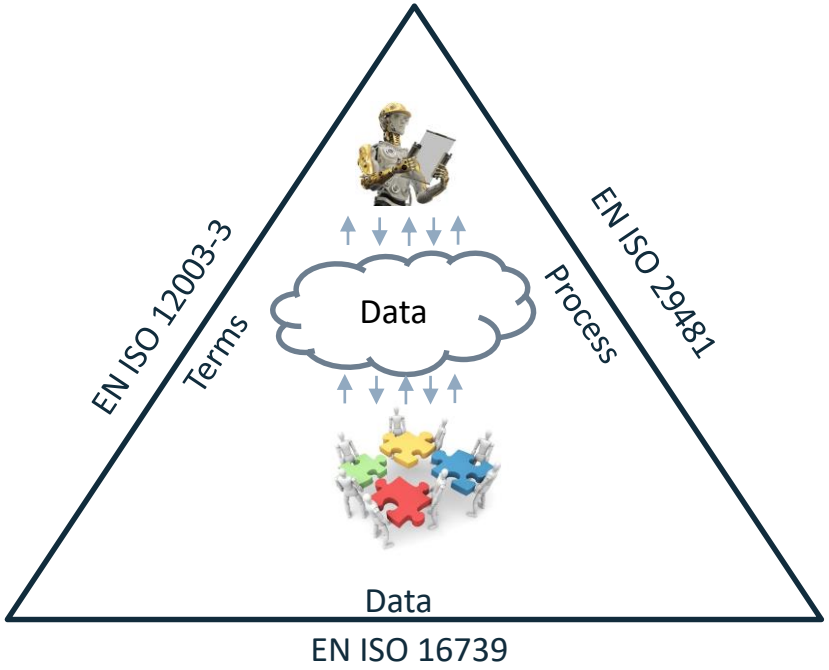
buildingSMART is the home of IFC



- buildingSMART has copyright to the IFC standard
- buildingSMART and ISO collaborate on IFC
- Important to gain synchronization between ISO and bSI IFC versions
- CEN has adopted the ISO IFC version – EN ISO 16739:2016

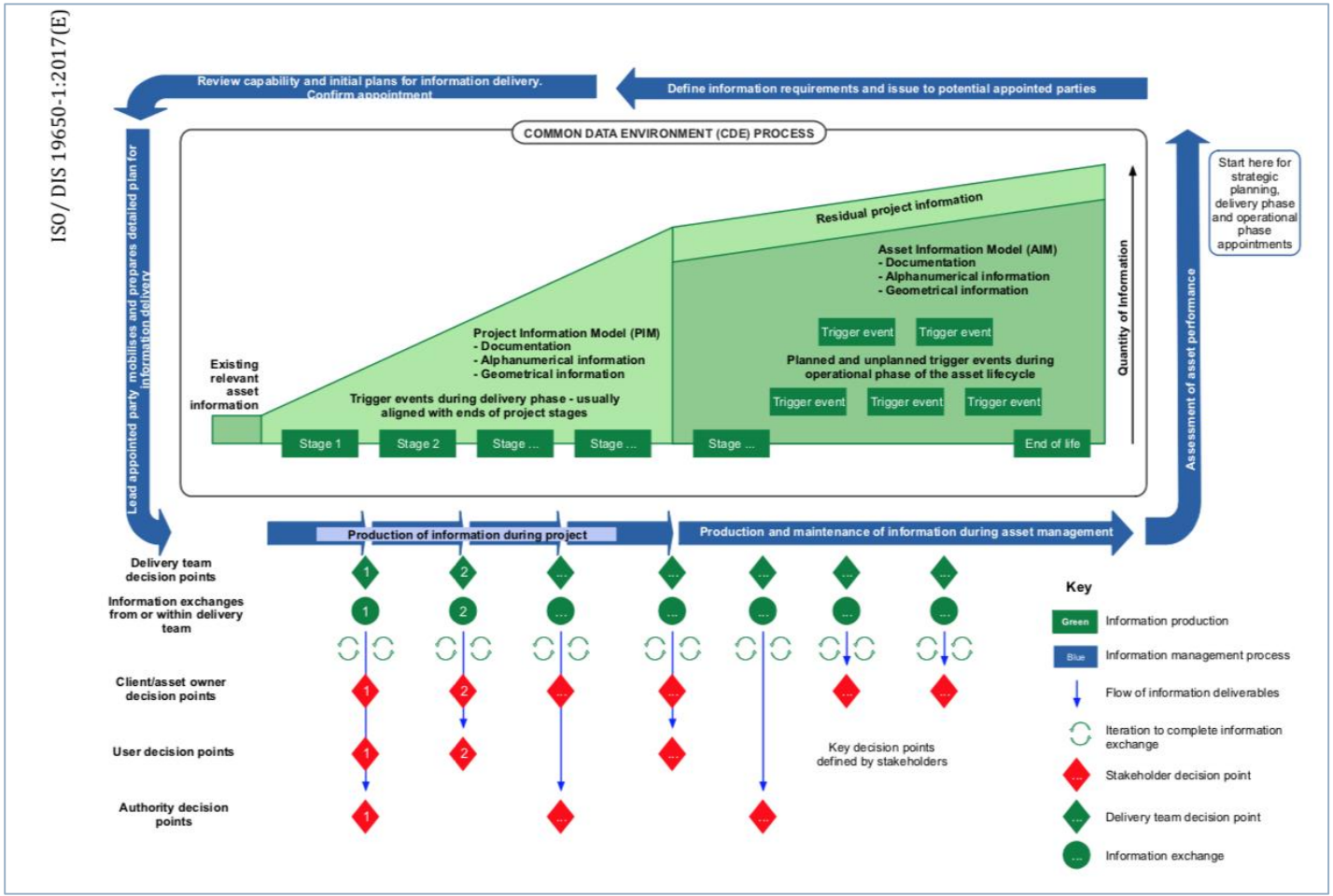
The three pillars of interoperability

Data Dictionary



Process Map and
Exchange Requirement (ER)

Data Model



DIREKTORATET FOR BYGGKVALITET

EN ISO 19650 :2018 Information Management using Building Information Modelling

Norwegian leadership in CEN and ISO

ISO/TC59/SC13
Information about construction work

- Chair: Mr. Jøns ar Sjøgren
- Secretary: Ms Lisbet Landfald, Standards Norway

3

standard norge

CEN/TC 442
Building Information Modelling

- Chair: Mr. Øivind Rooth
- Secretary: Ms Lisbet Landfald, Standards Norway

9

standard norge

CEN/TC 442 – Building Information Modelling

DIREKTORATET FOR BYGGKVALITET

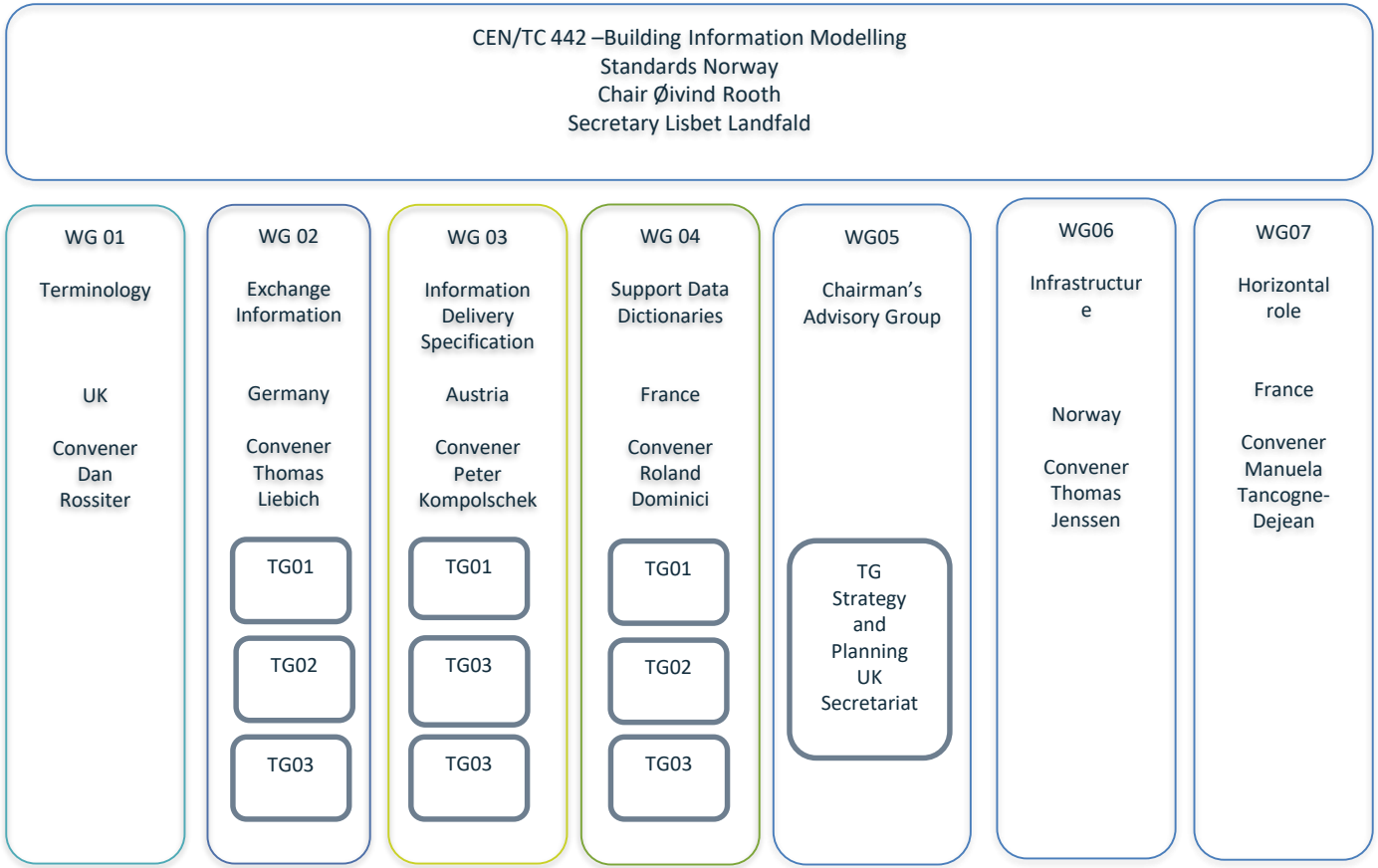
SCOPE CEN TC 442

Building Information Modelling

Standardization in the field of structured semantic life-cycle information for the built environment.

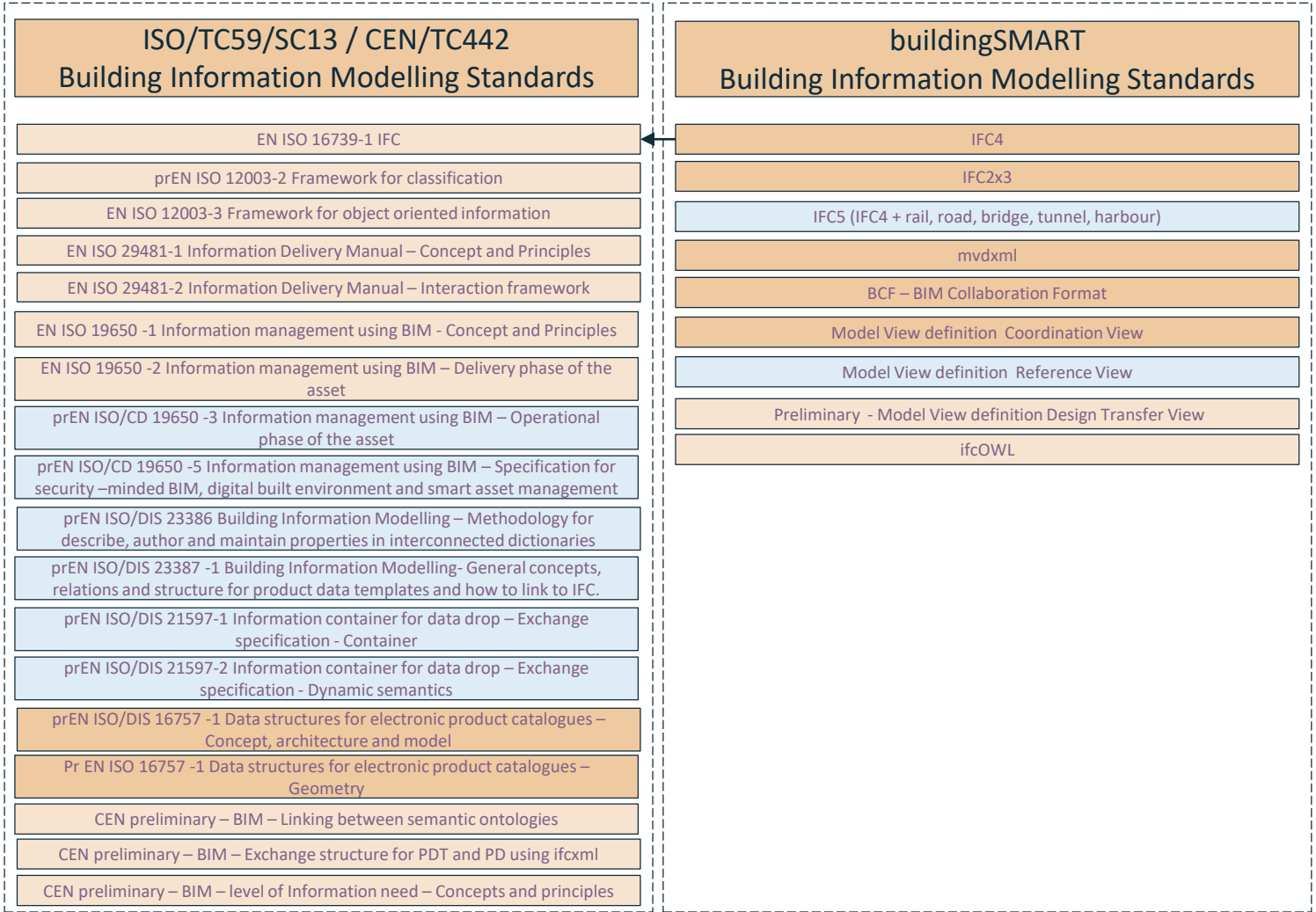
The committee will develop a structured set of standards, specifications and reports which specify methodologies to define, describe, exchange, monitor, record and securely handle asset data, semantics and processes with links to geospatial and other external data.

Structure of CEN/TC 442



CEN/TC442 – WG Task Groups overview

- **WG2 – Exchange Information**
  - TG 1 – Level of Information Need (Marzia Bolpogni, IT)
  - TG 2 – EN ISO 21597-1 and –2 Iinterlinked containers for data drops. Vienna Agreement, ISO lead. (Henk Schaap, NL)
  - TG 3 – Product Data Template Exchange Format (Aengenvoort, D)
- **WG 3 - Information Delivery Specification**
  - TG 1 – EN ISO !9650 guidelines (Manfred Huber CH/Marie Claire Coin F)
  - TG 2 – BEP and EIR (Steen Sunesen NO /Steven Hamil UK)
  - TG 3 – EN ISO 29481 guidelines (Tomi Henttinen FI)
- **WG4 – Support Data Dictionaries**
  - TG 1 – Methodology to Author and Maintain Properties (Frédéric Grand, F)
  - TG 2 - Structure of Product Data template (Espen Schulze, NO)
  - TG 3 - Linking between sematic ontologies (Benno Koehorst, NL)



DIREKTORATET FOR BYGGKVALITET

Published

In progress

Preliminary

buildingSMART develop the IFC model standard. ISO use the IFC (data) standard as fundaition for Building Information Modelling (use data as information in processes and decision support.


buildingSMART®
Regulatory Room Road Map

Definitions

BIM – Building Information Modelling
Use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions

Open BIM
BIM using open international standards

IFC – Industry Foundation Classes
Open international standard data schema for BIM model developed by buildingSMART and approved by ISO

GIS – Geographic information system
Framework for gathering, managing, and analysing geographic data.

GML – Geography Markup Language
XML grammar defined by the Open Geospatial Consortium (OGC) to express geographical features. GML serves as a modelling language for geographic systems as well as an open interchange format for geographic transactions on the Internet.

CDE – Common Data Environment
Agreed source of *information* for any given *project* or *asset*, for collecting, managing and disseminating each *information container* through a managed process.

IDM – Information Delivery Manual (EN ISO 29481-1&2)
Technical documentation that describes an Use Case and the information needed to perform operations defined in the Use Case.

IDM is standardized on high level. It is put in use thru imp guidelines and templates.

Use Case
Defines requirements of activities and transactions for a certain purpose in user friendly form. Use Case can be a part of IDM.

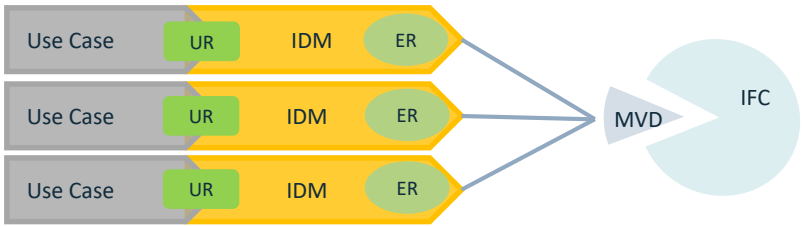
UR – User Requirements
Result from a Use Case is User Requirements that describe required data to fulfil the Use Case Purpose.

ER – Exchange Requirement
Detailed specification of the information specified in IDM (ER is a part of the IDM).

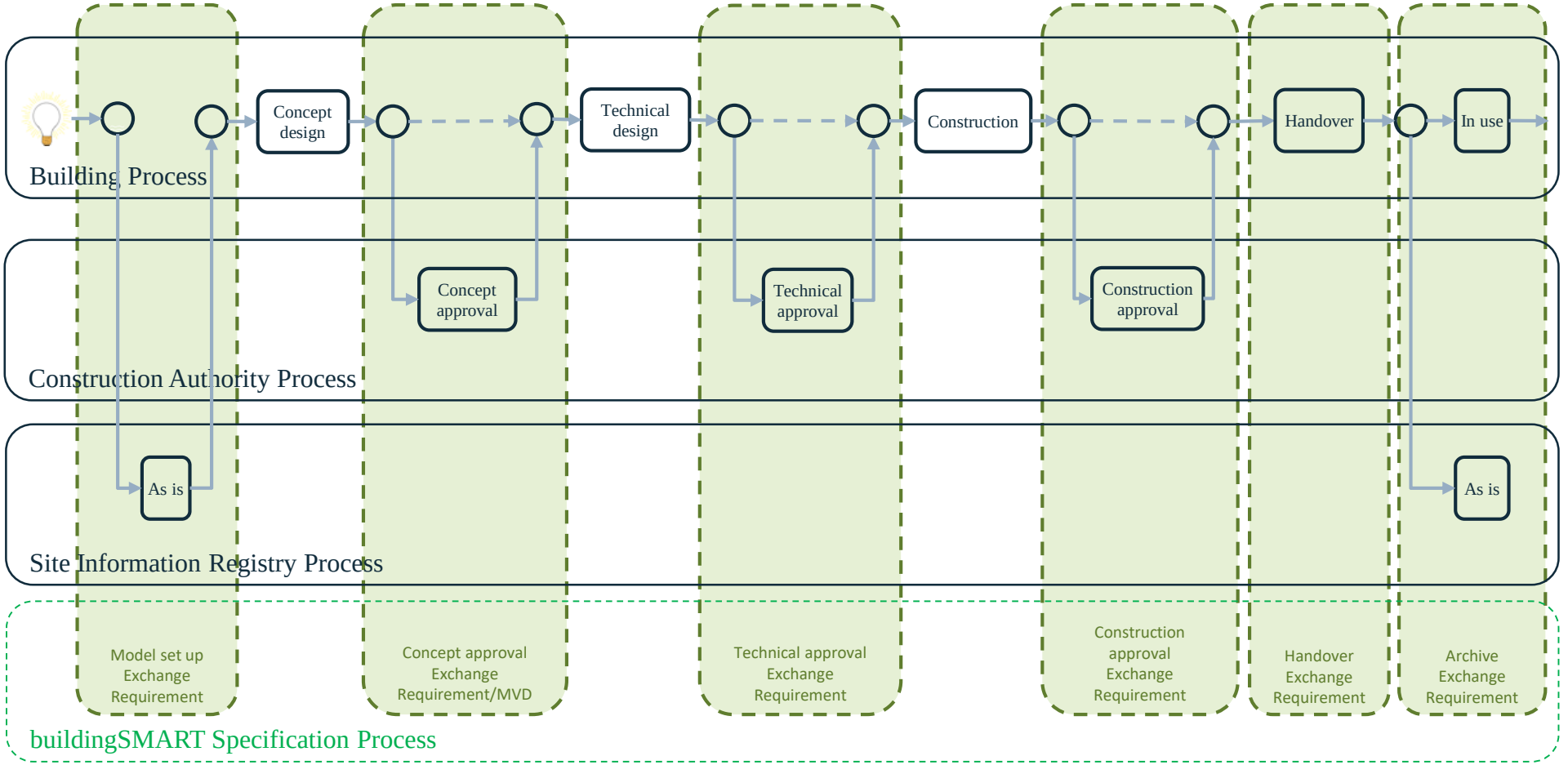
Specific ER is depending on regulations and other local requirements. It must be standardized on national or local level.

MVD – Model View definition
Agreed subset or filter of the IFC schema that is needed to support Exchange Requirements.

One MVD is wide enough to cover multiple IDM's.



Generic regulatory permit process for construction

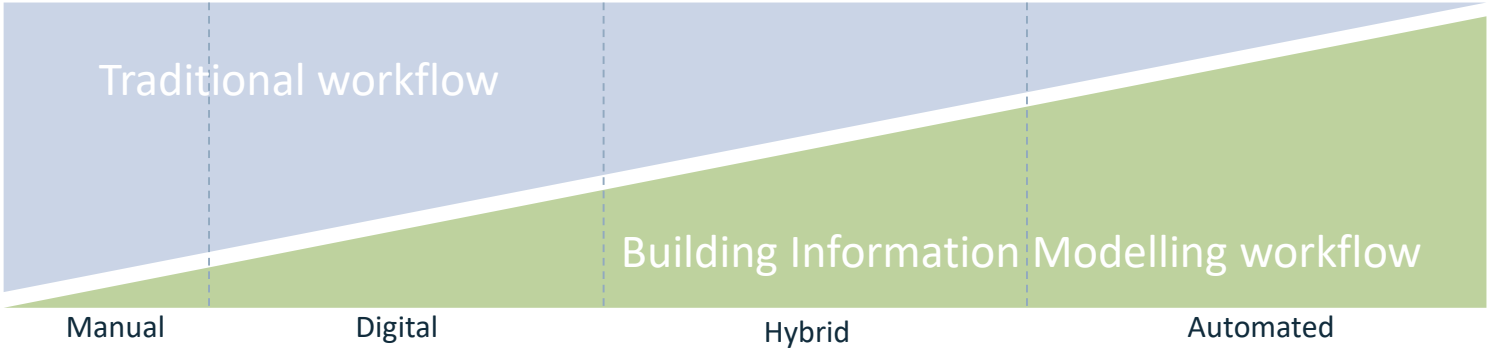


Vision

Automated Regulatory Processes

Strategy

Support gradual change in workflow from manual to automated to safeguard the legal perspective



Objective

The road map have a practical approach using use cases. In a generic regulatory use case all the information is in digital format. The subject of the application is model based and is delivered in international, open standard format. This can be an integrated BIM/GIS model based on IFC, GML or both or other relevant standards. All application data that exist in registries and databases is filled in automatically.

One specific regulatory process is planning and building approval.

Maturity map construction permit process with BIM

DIREKTORATET FOR BYGGKVALITET

Communication by mail or e-mail. Data exchange by forms, drawings and maps. Digital (e.g. pdf), paper or combined.

Key word describing the stage: Paper, pdf, people to people communication, manual

No ambitions

Manual

Current implementation in most countries worldwide

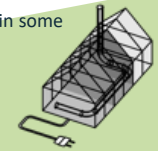
Digital communication and data exchange between authorities and asset owners and the construction value chain. Increasing interoperability and automated data control.

Key word describing the stage: Digital communication, reuse of public data, 3D models for visual use, xml, partly automated, open BIM, existing legislation

Low hanging fruits

BIM initiation

Current implementation in some countries



Advanced BIM

Hybrid

Current pilot projects in a few countries

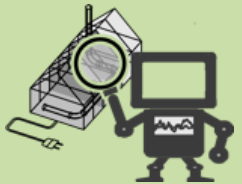
Interoperable data exchange with CDE and relevant private and public databases Automated regulatory control and permit.

Key word describing the stage: Integrated, BIM, automated, robot, machine readable and interpretable regulations, open standards, digital friendly legislation

Long term ambitions

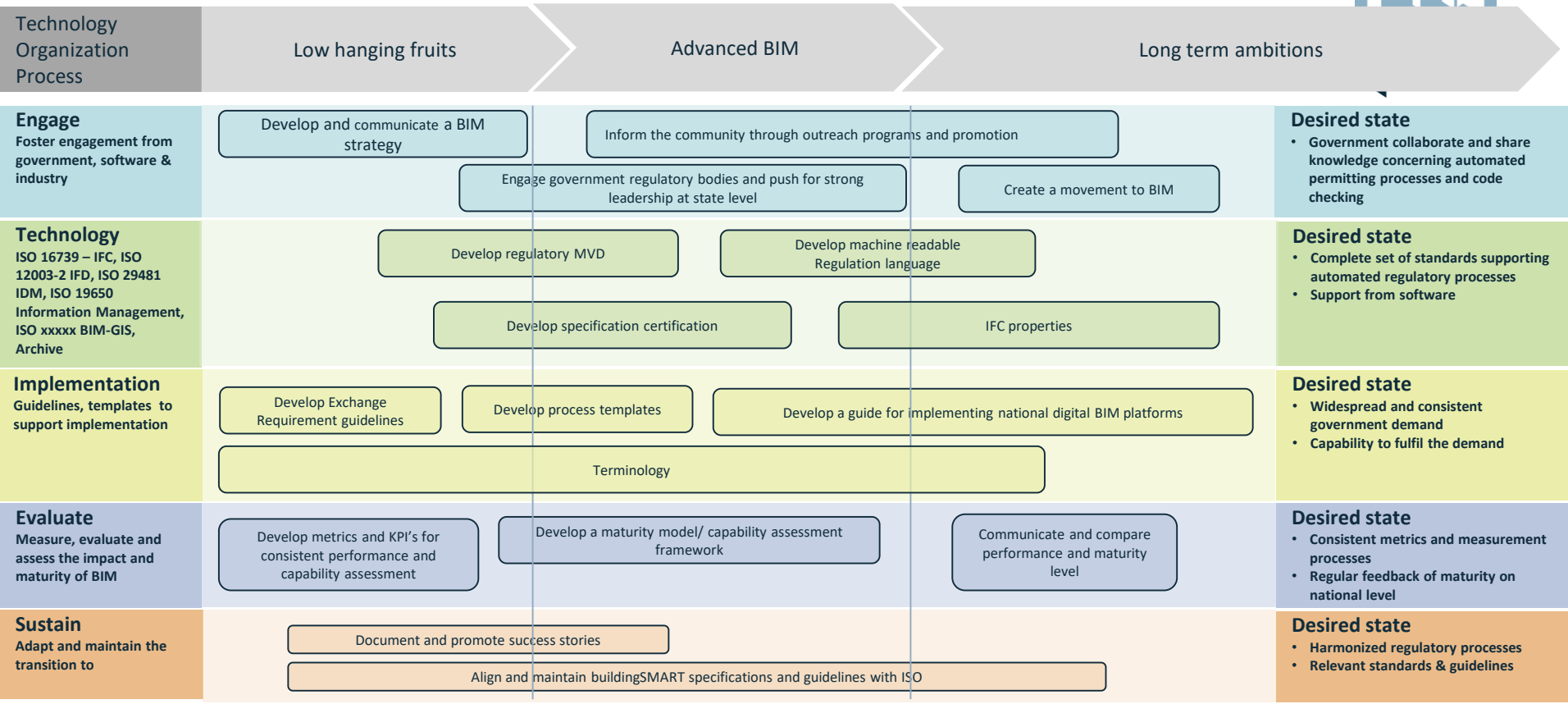
Automated

A few research projects

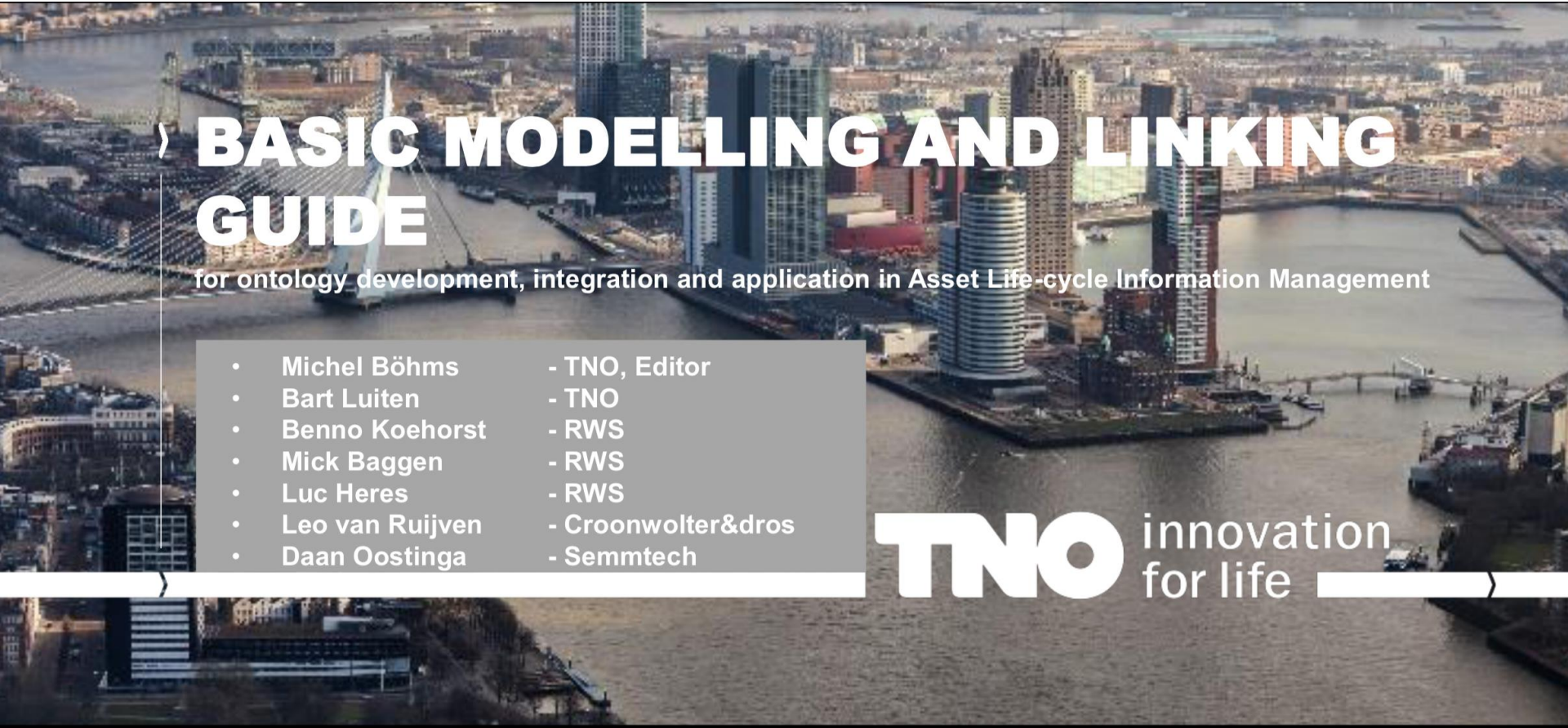


Roadmap to automated regulatory processes in construction through BIM

Inspired by buildingSMART Canada Roadmap



Example on activity in CEN/TC442 relevant for Regulatory



BASIC MODELLING AND LINKING GUIDE

for ontology development, integration and application in Asset Life-cycle Information Management

- Michel Böhms - TNO, Editor
- Bart Luiten - TNO
- Benno Koehorst - RWS
- Mick Baggen - RWS
- Luc Heres - RWS
- Leo van Ruijven - Croonwolter&dros
- Daan Oostinga - Semmtech

TNO innovation for life

BACKGROUND

FOLLOW-UP OF V-CON, BSI LDWG WORK & CEDR-INTERLINK

- V-Con Modelling and Linking Guide for Semantically-enhanced Linked Data, Version, 28. February 2017, Michel Böhms (Ed.), Lars Wikström, Olle Bergman, Bart Luiten.

- Modelling and Linking Guide (MLG), Recommendations for the application of W3C Linked Data (LD) and Semantic Web (SW) concepts and technologies in the AEC/FM industry sector, bSI Technical Room, Linked Data Working Group (LDWG), Version: 29. June 2017, Michel Böhms (Ed.), Ana Roxin, Lars WikStröm, Sander Stolk, Pieter Pauwels, Jakob Beetz, Seppo Törmä, Leif Granholm, Peter Bonsma, Hans Schevers, David Price, Eilif Hjelseth.

- INTERLINK Modelling and Linking Guide
  - Applied in European Road OTL (EUROTL), www.roadotl.eu
  - Selection of the “Simple Modelling Style” in here and further extension/harmonization with many other experts and end-users in the field.

INTERLINK winner of the buildingSMART award 2018

TOKYO

ONTOLOGIES FOR ASSET LIFE-CYCLE MANAGEMENT

- Ontology* development, integration and application in Asset Life-cycle Information Management (ALIM) in the Built Environment, including buildings, civil infrastructures (like bridges, viaducts, tunnels and sluices), public spaces and cables & ducts.
- Covering relevant information for stakeholders:
  - **Asset Owners/Managers**
  - Their clients & partners (ministries, carriers etc.)
  - Legislation/Regulation bodies
  - **Their contractors and engineering firms involved in asset creation & maintenance**
  - Supply chain industry (manufacturers, traders, product data providers)
  - Umbrella organizations
  - Software developers/vendors

* sometimes referred to as Object Type Library (OTL)

Example on CEN/TC442 liaison CEN/TC activity

LIAISON CEN/TC442 ← → CEN/TC126/WG12

CEN/TC126 decides that the scope of WG12 will be:

a) to list all the acoustic quantities following the instructions of prEN ISO 23386 (Building Information Modelling and other digital processes used in construction – Methodology to describe author, and maintain properties in interconnected dictionaries). This forms a dictionary of acoustic properties that then correctly can be used in databases. The work will also guide the work of WG 4 of CEN TC 442.
b) to define the Level Of Information Need in building information modelling for acoustic engineering (Level of Information, Level Of Geometry, Level Of Documents).

The decision was taken by unanimity.

DECISION 06/2018 – CEN/TC 126 Limelette 6 Subject:

PWI – E-Technical report - Data dictionary of acoustic properties for BIM (building information modelling) CEN/TC126 decides that a PWI for a data dictionary of acoustic properties for BIM (building information modelling) will be registered in the CEN/TC126/WG12 work programme. The decision was taken by unanimity.

DECISION 07/2018 – CEN/TC 126 Limelette 7 Subject:

PWI – Technical report – Level Of Information Need (LOIN) in building information modelling for acoustic engineering

CEN/TC126 decides that a PWI for a Level Of Information Need (LOIN) in building information modelling for acoustic engineering will be registered in the CEN/TC126/WG12 work programme. The decision was taken by unanimity.

LIAISON CEN/TC442 ← → CEN/TC126/WG12

GUID	Group of properties	Symbol	Units	Symbols of the property in a given property group	Method of Measurement	Name in ENGLISH	Definition in language N (ENGLISH)	Description in language N (plain language)	example	Physical quantity (used in the definition)	DIMENSION	Visual	Number of values	Data type	Dynamic	Function
GUID 1	ACOUSTICS SI OF BUILDING ELEMENTS AIRBORNE SI	R	dB	(R EN ISO 10140-2)	EN ISO 10140-2 (2010) Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation	sound reduction index R	The sound reduction index R is equal to ten times the common logarithm of the ratio of the sound power, W1, that is incident on the test element to the sound power, W2, radiated by the test element to the other side. In a dedicated laboratory construction and mounting of the testelement that both comply to the requirements in the EN ISO 10140-standards, this can equally be derived from the formula R=L1-L2+10lg(S/A) dB. With S is the area of the free test opening in which the test element is installed, in square metres.			none	0000000	none	21 to describe (X100 = value for the quantity at 100 Hz) X50, X63, X80, X100, X125, X160, X200, X250, X315, X400, X500, X630, X800, X1000, X1250, X1600, X2000, X2500, X3150, X4000, X5000		No	none
GUID 2	ACOUSTICS SI OF BUILDING ELEMENTS AIRBORNE SI	L_1	dB	(L1 EN ISO 10140-2)	EN ISO 10140-2 (2010) Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation	energy average sound pressure level in the source room	L1 is the energy average sound pressure level in the source room, in decibels;			none	0000000	none	21 to describe (X100 = value for the quantity at 100 Hz) X50, X63, X80, X100, X125, X160, X200, X250, X315, X400, X500, X630, X800, X1000, X1250, X1600, X2000, X2500, X3150, X4000, X5000		No	none
GUID 3	ACOUSTICS SI OF BUILDING ELEMENTS AIRBORNE SI	L_2	dB	(L2 EN ISO 10140-2)	EN ISO 10140-2 (2010) Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation	energy average sound pressure level in the receiving room	L2 is the energy average sound pressure level in the receiving room, in decibels;			none	0000000	none	21 to describe (X100 = value for the quantity at 100 Hz) X50, X63, X80, X100, X125, X160, X200, X250, X315, X400, X500, X630, X800, X1000, X1250, X1600, X2000, X2500, X3150, X4000, X5000		No	none
GUID 4	ACOUSTICS SI OF BUILDING ELEMENTS AIRBORNE SI	$D_{n,e}$	dB	($D_{n,e}$ EN ISO 10140-2)	EN ISO 10140-2 (2010) Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation	element-normalized level difference Dn,e	Dn,e is the level difference corresponding to a reference value of absorption area in the receiving room with sound transmission through the small technical element only; this level difference is evaluated from Dn,e = L1-L2+10lg(A0/A). With A0 is the reference absorption area, in square metres (for the laboratory, A0 = 10 m2). A small technical element is a building element, excluding windows and doors, with an area of less than 1 m2, which occurs in a certain number of discrete sizes and transmits sound between two adjacent rooms or between one room and the outdoors independently of any adjoining building elements			none	0000000	none	21 to describe (X100 = value for the quantity at 100 Hz) X50, X63, X80, X100, X125, X160, X200, X250, X315, X400, X500, X630, X800, X1000, X1250, X1600, X2000, X2500, X3150, X4000, X5000		No	none
GUID 5	ACOUSTICS SI OF BUILDING ELEMENTS AIRBORNE SI	R_w	dB	(R_w EN ISO 717-1)	EN ISO 717-1 (2013) Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation (ISO 717-1:2013)	Weighted sound reduction index Rw	Single-number quantity for airborne sound insulation rating value of **building elements**, in decibels, of the reference curve at 500 Hz after shifting it in accordance with the method specified in this part of ISO 717. It is derived from one-third-octave band values of the sound reduction index R measured as to EN ISO 10140-2:2010. The sound reduction index R is equal to ten times the common logarithm of the ratio of the sound power, W1, that is incident on the test element to the sound power, W2, radiated by the test element to the other side. In a dedicated laboratory construction and mounting of the testelement that both comply to the requirements in the EN ISO 10140-standards, this can equally be derived from the formula R=L1-L2+10lg(S/A) dB. With S is the area of the free test opening in which			none	0000000	none	1		No	none

LIAISON CEN/TC442 ← → CEN/TC126/WG12

Preliminary notes accompanying the future working document

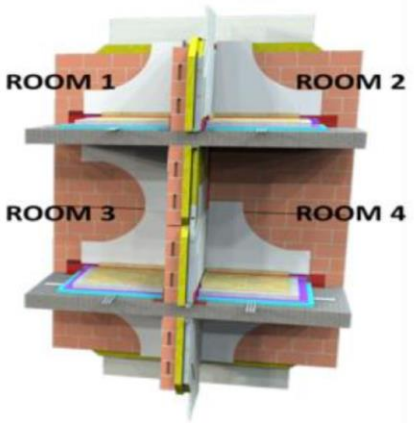
LOIN in Acoustics

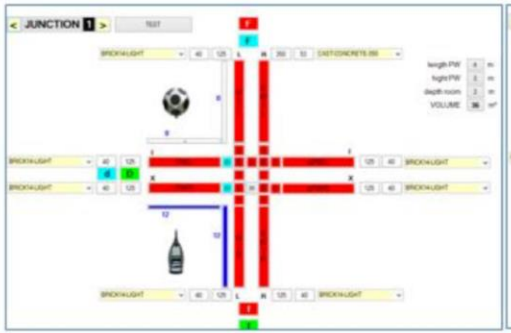
Support of CEN\TC 126\WG12 for the task group CEN\TC 442\WG2\TG1 LOIN as a first technological discipline

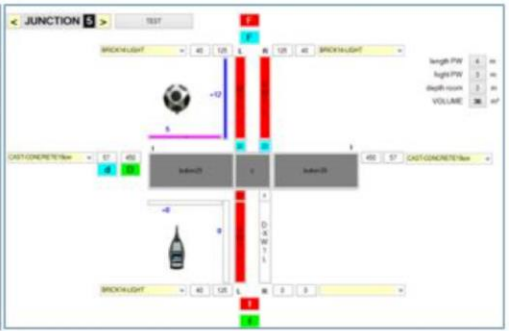
Bart Ingelaere June 2018

I. LOI / LOG of the BUILDING

(1) Description of the function of every room in the building
(2) Possibility to detect which room is adjacent to which other room
(3) Detection of all junctions (see point II) in the building
(4) Detection of each junction that have an impact (see introduction) on the sound transmission between two adjacent rooms

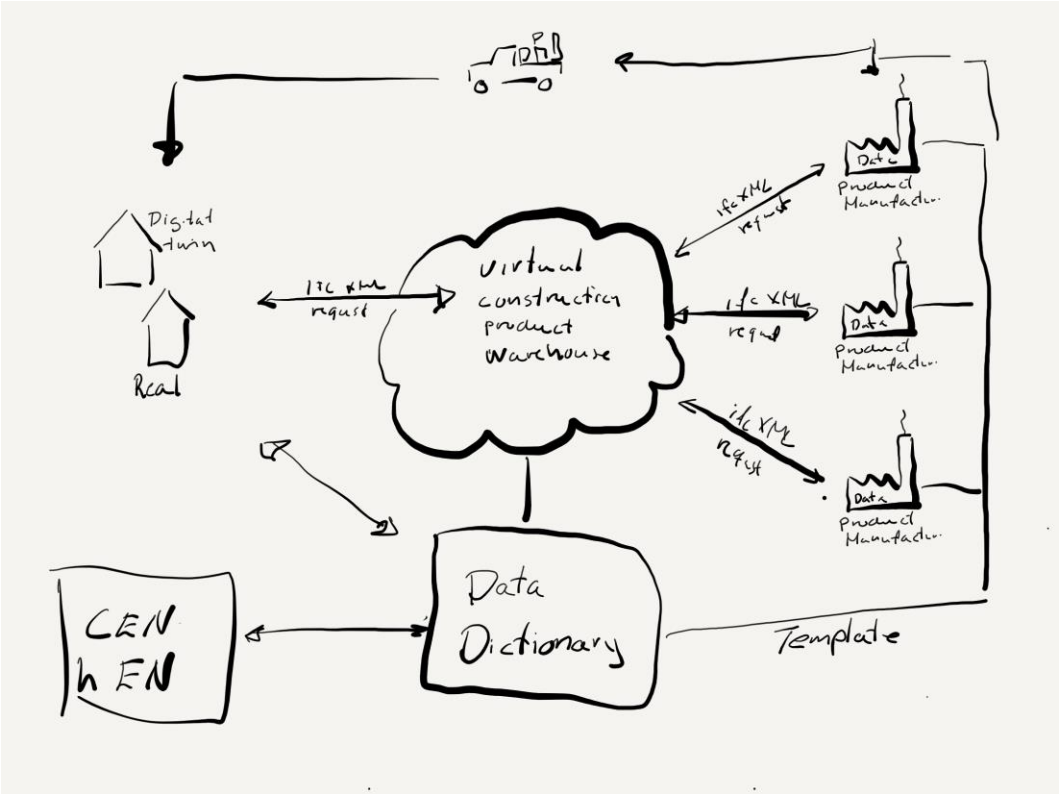




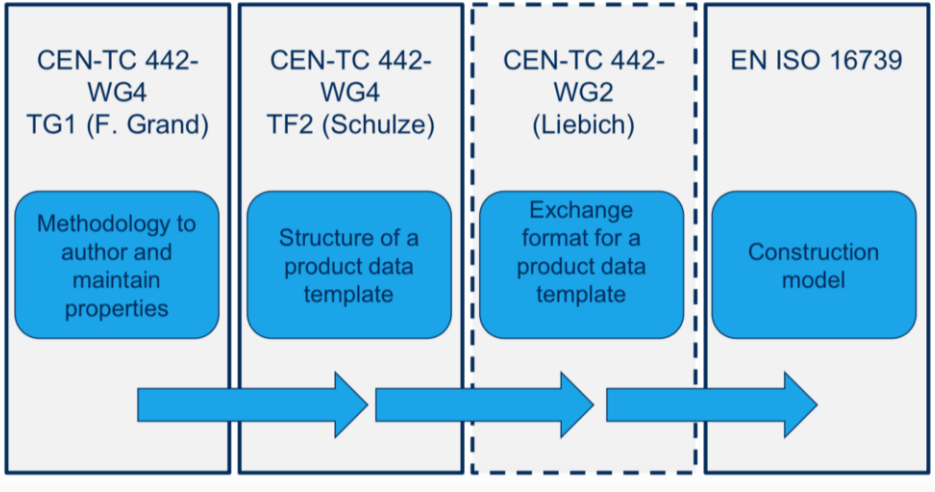


Activity example: Product data Templates in Norway

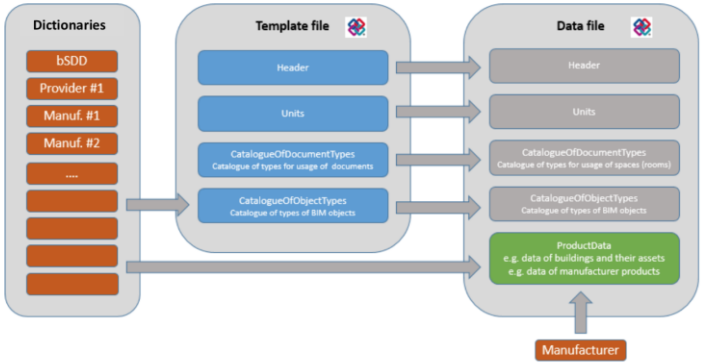
Common EU marked for Construction Products

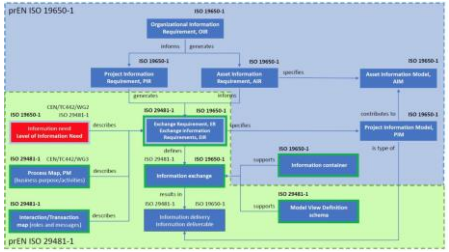


Relationship between CEN/TC442 product data WI

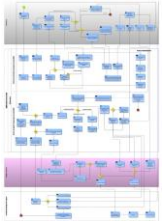


Product Data projects within CEN/TC442





WG2/TG1
Level of Information Need



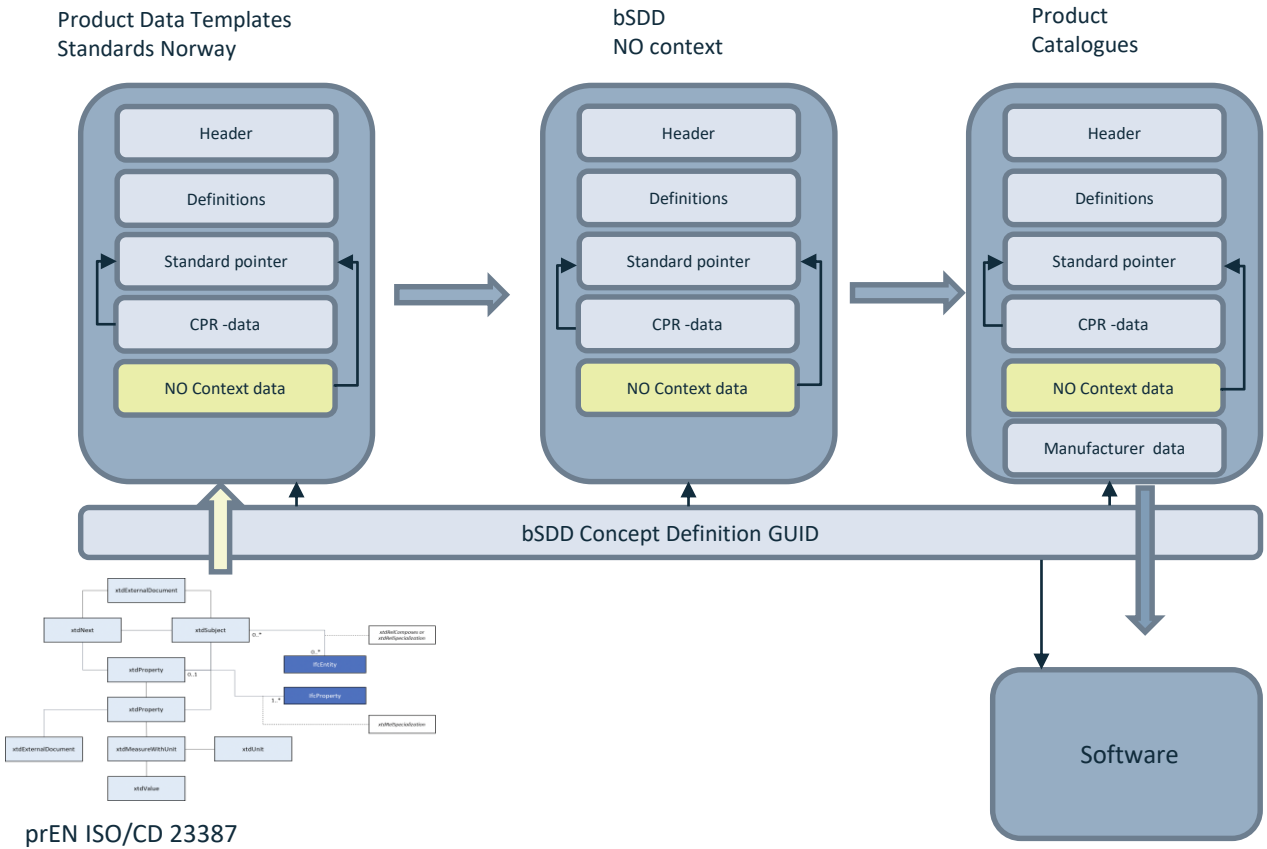
WG4/TG1
QA Process

WG4/TG2
Generic data structure for PDT

```
<IfcSimplePropertyTemplate id="133670" GlobalId="2gWUvQ3HT2FFUkpq4QgzE3"
      Name="Country of Production" Description="Description of Property3"
      TemplateType="p_enumeratedvalue" PrimaryMeasureType="IfcText" pos="3">
      <Enumerators>
            <EnumerationValues>
                  <IfcLabel-wrapper pos="0">NO</IfcLabel-wrapper>
                  <IfcLabel-wrapper pos="1">DE</IfcLabel-wrapper>
                  <IfcLabel-wrapper pos="2">A</IfcLabel-wrapper>
            </EnumerationValues>
      </Enumerators>
</IfcSimplePropertyTemplate>
```

WG2/TG2
Transport of product data using IFCxml

Product Data – Implementation in Norway

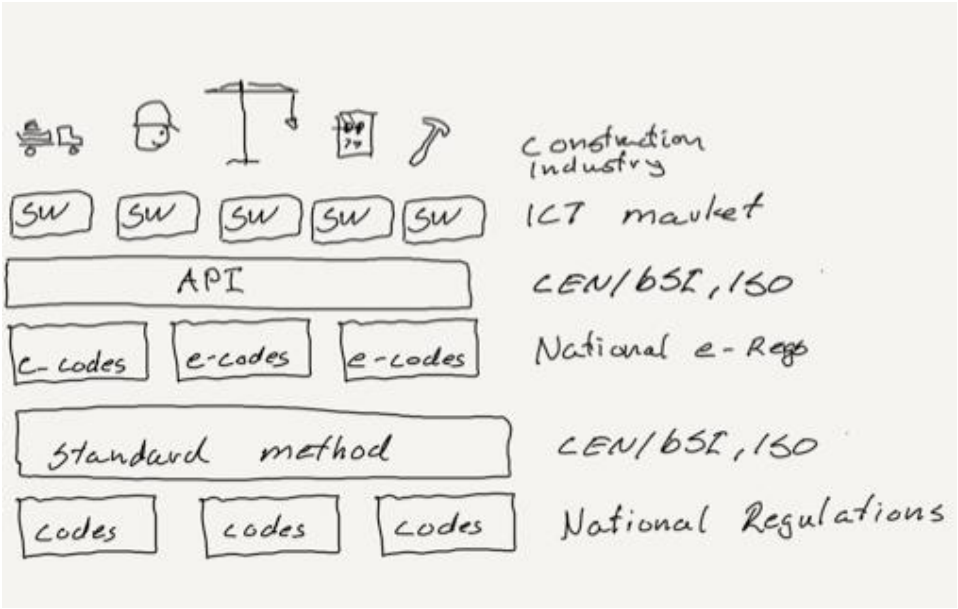


prEN ISO/CD 23387

Nordic collaboration

Topic for Nordic collaboration

- Building regulations are politic and not so easy to standardize/harmonize
- How to make existing regulation machine readable and interpretable is possible to standardize
- Share ideas and knowledge is possible
- Shared technical platforms is possible



www.dibk.no

DIREKTORATET FOR BYGGKVALITET

Thank you for your attention

Følg oss på: