



# NETT·ERK

## B5 | IFC for Infrastruktur

Johnny Jensen

## ≡ OM

Dette er en presentasjon av pågående aktiviteter i buildingSMART International (bSI), satt sammen for våre gjester her på Trimble brukermøte.

Det er altså IKKE en presentasjon på vegne av bSI.

Alle illustrasjoner er hentet fra  buildingSMART.  
International home of openBIM.



# IFC FOR INFRASTRUKTUR - MENNESKER

International Standards Summit, Tokyo Oct 16 - Oct 19

469 delegates from 45 countries

+70 presentations



Dashboard

Folders

Shared Folders

Favorites

Workflows

Inbox

Personal Settings

Folders > buildingSMART Summits > Tokyo Summit 2018

Tokyo Summit 2018 More Options

	Name	Size	Uploaded	Creator
<input type="checkbox"/>	10 Useful info for Delegates	91 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	21 Plenary Tuesday 16 October	318 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	22 Plenary Friday 19 October	291 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	23 Standards Committee	0 B	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	3.1 Building Room	471 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	3.2 Infrastructure Room	1 GB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	3.3 Product Room	1 GB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	3.4 Regulatory Room	184 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	3.5 Construction Room	397 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	3.6 Airport Room	36 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	3.7 Railway Room	99 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	4.1 bSI General	655 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	4.2 Software Certification	0 B	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	4.3 Professional Certification	4 MB	14/09/2018	S. Kerai-Lum
<input type="checkbox"/>	4.4 Implementors Support Group	0 B	14/09/2018	S. Kerai-Lum



# IFC og INFRASTRUKTUR

buildingSmart har i omtrent et ¼ århundre utarbeidet standarder, spesifikasjoner, veiledninger osv. som muliggjør effektiv informasjonsutveksling i den delen av bygningsindustrien som jobber med bygninger.



## other buildingSMART Standards

The other buildingSMART standards are:

- the Information Delivery Manual [IDM]
- the International Framework for Dictionaries [IFD]

buildingSMART also harvests externally developed specifications in the realm of building information modeling. The following specifications are currently acknowledged:

- BIM Collaboration Format [BCF]
- Model View Definition markup language [mvdXML]

## buildingSMART data model

Industry Foundation Classes [IFC] are the buildingSMART data model standard. IFC is the only truly open standard for BIM - it makes the difference between BIM and open BIM.

### Quick links for developers

- IFC4 Add2 release - [online](#) | [download](#)
- last IFC2x3 release - [online](#) | [download](#)

## IFC Model View Definitions

Actual implementations of IFC always focus on a purpose - the support of one or many exchange requirements. The subset of IFC corresponding to it is called Model View Definition [MVD]. They are the basis for buildingSMART certification. Additional implementer agreements ease the implementation.

### Quick links for developers

- IFC2x3 Coordination View V2.0 (most common MVD with open certification process)
- IFC4 Reference View and IFC4 Design Transfer View (buildingSMART Final Standards since July 2015 with upcoming certification process)










<http://www.buildingsmart-tech.org/specifications>



# bSI INFRAROOM – I AKTIVITET DE SISTE 6-7 ÅR

The infrastructure room's remit is to develop common principles for achieving process integration during the design, construction and maintenance phases of infrastructure development. The room believes that the development and deployment of appropriate building information models (BIM) is an important enabler for achieving the objectives.

## Infrastructure Room Steering Committee

+ Tina Perttula - Chair		+ Tristan McDonnell	
+ Jim Plume - Deputy Chair		+ Jorge Torrico	
+ Christophe Castaing - Techn Lead		+ Prof. Nobuyoshi Yabuki	
+ Ronald Bergs			
+ Phil Jackson			
+ Benno Koehorst			

<https://www.buildingsmart.org/standards/rooms-and-groups/infrastructure-room>

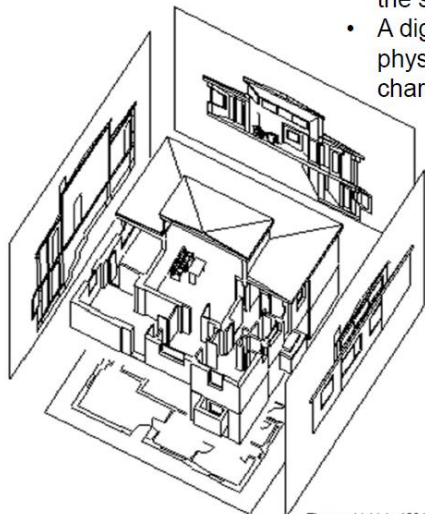


# IFC og INFRASTRUKTUR

© 1994 Thomas Liebich

BIM means:

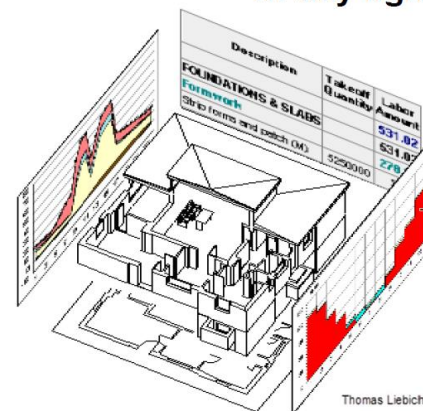
- **ALL** of the information, not just the shape
- A digital representation of physical **AND** functional characteristics of a facility



Thomas Liebich, 1994

© 1994 Thomas Liebich

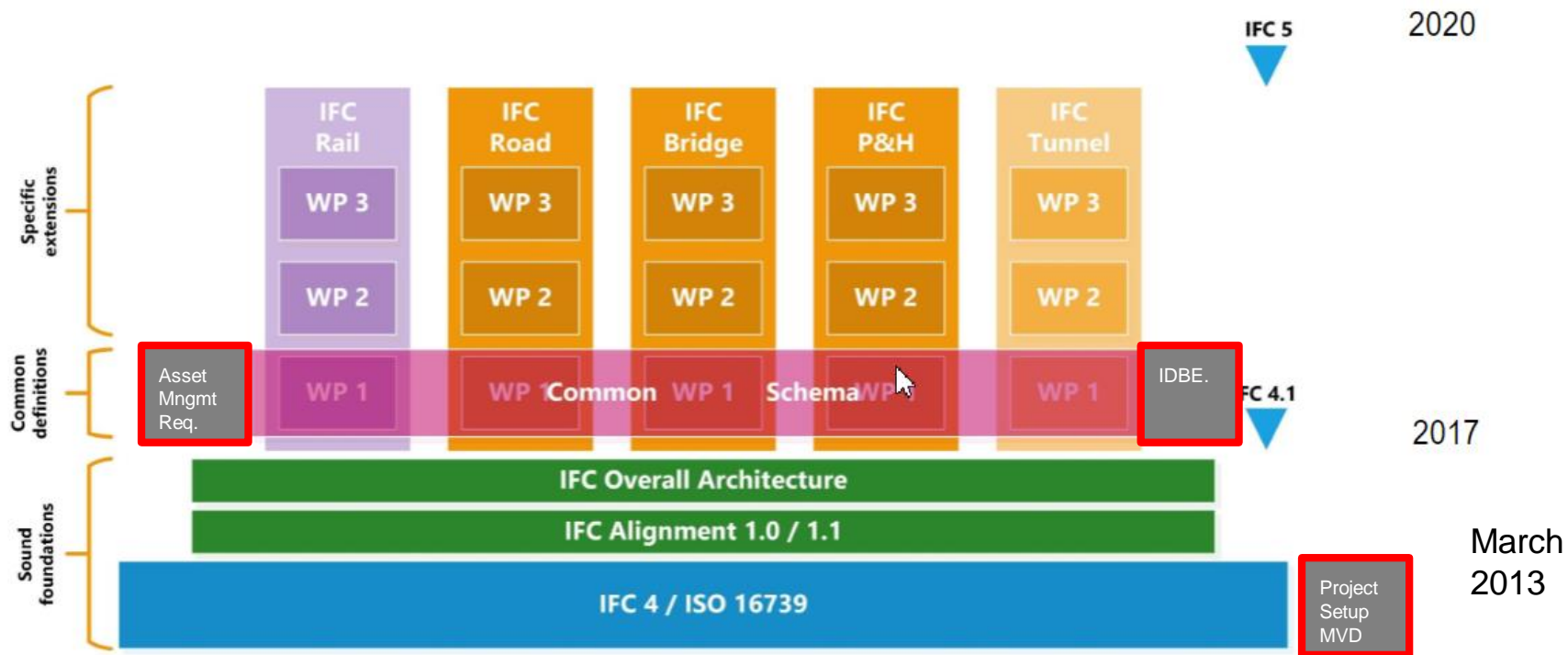
Can we get ...  
... energy prediction  
... cost certainty  
... day lighting



Thomas Liebich, 1994



# BSI INFRAROOM ARBEIDSPROGRAM









## IFC4 – LEVERT

Oppdaterte rapporter med evaluering av dagens IFC 4x1 opp mot det som ble avdekket av behov gjennom det norsk finansierte “IFG - IFC for GIS” finnes på buildingSMART Norge sin Slack kanal

IFG – IFC for GIS

2004-2005

### Progress report on a review of IFG

DIBK  
Mariboegs gate 13  
0183 OSLO



AEC3  
High Wycombe  
HP15 6HP



[Nisbet buildingSMART\\_IFC4\\_What-is-new.pdf](#)  
[Nisbet buildingSMART\\_IFG\\_presentation.pdf](#)

# PROJECT SETUP MVD - KLAR FOR GODKJENNING

- Vol1 Geo referencing  
BIM\_v1.2.pdf
- Vol 2 Process  
Model\_v1.4.pdf
- Vol 3 Case Studies\_v0.3.pdf
- MSI Exchange  
Requirements\_v0.4.pdf

Bygger på en norsk  
beskrivelse / metodikk

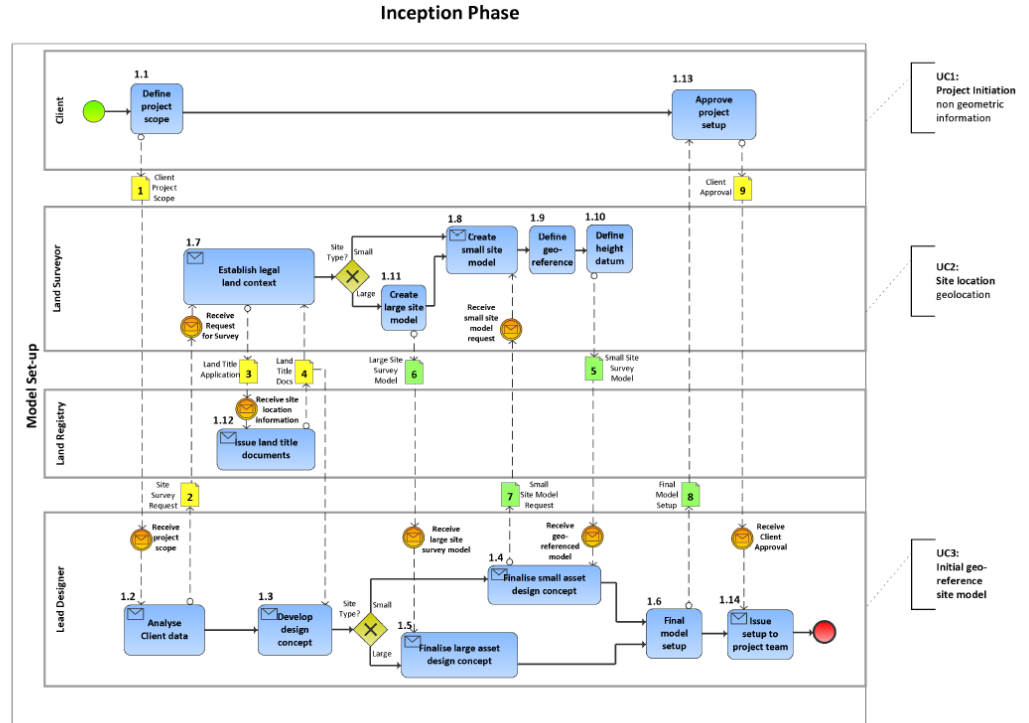


Figure 1: Model Setup Process Model, version 1.4, 23 Jun 2017



## IFC ALIGNMENT - LEVERT

- Prosjektet er avsluttet og leverte en spesifikasjon som nå er en del av det offisielle IFC 4x1 skjemaet
- First IFC extension project to address infrastructure works
- Common resource for road and rail construction, bridges, tunnels...

An alignment is used to define a reference system to position elements mainly for linear construction works, such as roads, rails, bridges, and others. The relative positioning along the alignment is defined by the linear referencing methodology. NOTE See ISO 19148 Geographic information – Linear referencing for general definitions about linear referencing.



# IFC ALIGNMENT DEPLOYMENT - LEVERT

## Geografisk

- Australia
- Benelux
- Tyskland
- Frankrike
- Sverige
- Spania
- Russland
- Kina

## Software leverandører

(ingen nevnt ingen glemt)

- Lokale
- Globale

## Ulike aktører/roller

- Byggherrer
- Entreprenører
- Rådgivende

## ☰ IFC ALIGNMENT DEPLOYMENT - LEVERT

- Et middel for å komme ut av «Høne og Egg situasjon»
  - Ingen tør å kreve det om ingen software kan levere det
  - Ingen lager software som støtter det om ingen krever det.
- Flere formål
  - Fungerer spesifikasjonen som tenkt?
  - Lar den seg implementere av software leverandører?
  - Spre kjennskap til og kunnskap om spesifikasjonen

Konklusjon Ja, IFC Alignment fungerer

Erfaring: Litt flere vet litt mer etter enn før prosjektet



# IFC INFRA OVERALL ARCHITECTURE - LEVERT

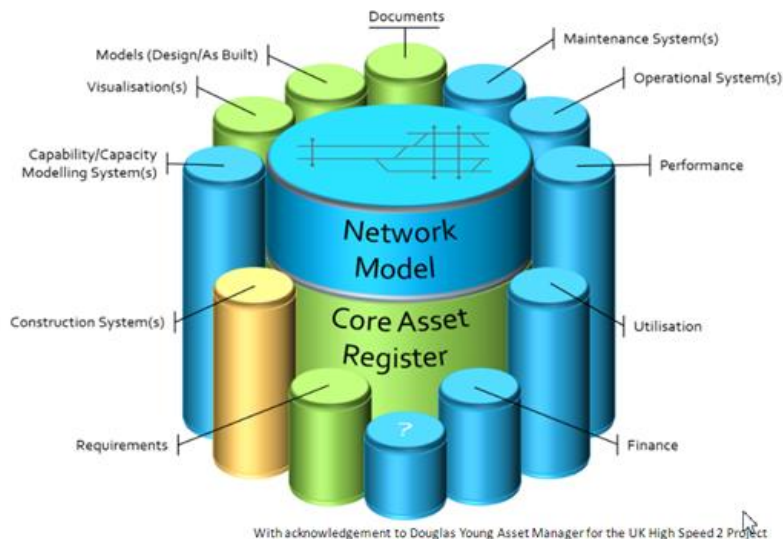
## Viktig «Infraroom indremedisinprosjekt»

- TIN etter modell av TIN i GML 3.3
  - Flere overgangskurvetyper
- The IFC-Infra overall architecture project was initiated to provide a common basis for the upcoming projects for extending IFC for the infrastructure domain, including IFC-Road, IFC-Rail and IFC-Bridge.
  - It was created in response to the observation that national initiatives in the field had created diverging approaches in a number of aspects that require a unified process in order to avoid inconsistencies in the IFC data model.
  - The project was set up to provide recommendations for developing extensions and to provide basic data structures mandatory for all infrastructure extension



# BIM REQUIREMENTS FOR ASSET MANAGEMENT - LEVERT

Et annet viktig «Infraroom indremedisinprosjekt»



## Infrastructure Asset Managers BIM Requirements

Technical Report No. TR 1010

Author:

Phil Jackson, on behalf of buildingSMART International Infrastructure Room

Version 1:  
published 2018 / 01 / 09

Delivering the information 'Asset Managers' need  
and can trust using openBIM™



Rapport tilgjengelig.

Og om du skal lese bare en  
bSI rapport i ditt liv så bør du  
velge denne



## IFC COMMON SCHEMA

Styrer det som er fellesnevnerne og som skal løses likt enten det er en del av en vei eller en jernbane

Fagdisipliner

- Earthworks
- Geo Science / Geo Engineering
- Drainage etc.





## IFC COMMON SCHEMA

IFC Spatial Structure (som egentlig er prosjektstruktur)

- Project-Site-Building-Storey => ???

Har ikke funnet en måte som alle innenfor infrastruktur ser som den ene åpenbart riktige som alltid passer inn i et prosjekt

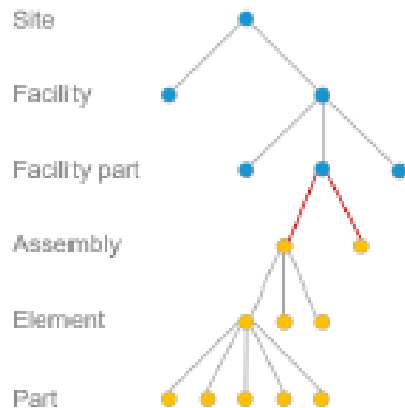


Figure 1 Spatial structure (blue) vs. element breakdown (orange) (source: Spatial Structure Questionnaire, 2018)



## IFC COMMON SCHEMA

### Modellerings metodikk

- Mal for brukstilfeller
- UML

### Verktøykjede

- UML -> Expresss
- Excel PSET -> XML Pset definition

Den maskinlesbare IFC spesifikasjonen har til nå vært laget av et fåtall personer. Med dagens aktivitetsnivå har metodikk og verktøykjede måttet forbedres betydelig. Betydelig IFC Rail bidrag



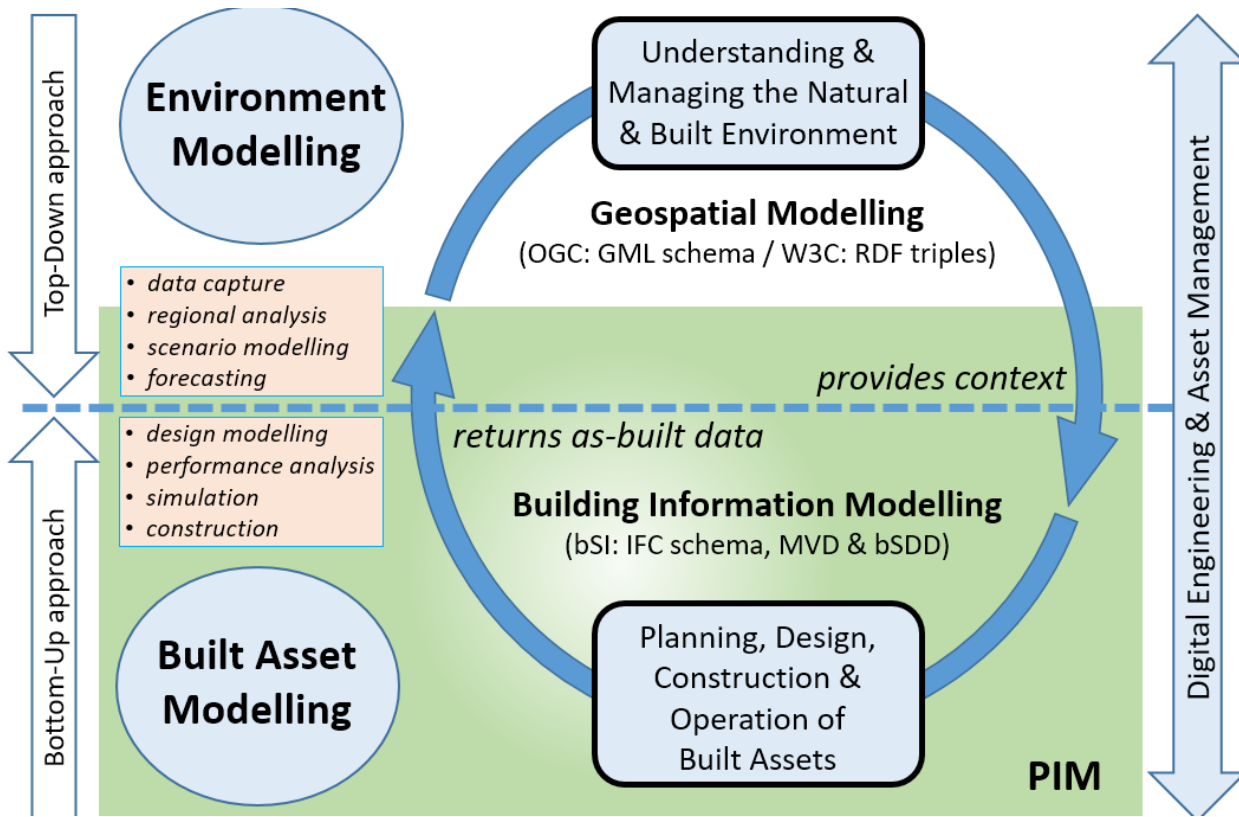
# IDBE - INTEGRATED DIGITAL BUILT ENVIRONMENT

## OGC/bSI Collaboration Work Group





# IDBE - INTEGRATED DIGITAL BUILT ENVIRONMENT





# IDBE - INTEGRATED DIGITAL BUILT ENVIRONMENT

## IDBE – Recent Events

- Munchen IDBE Workshop (19-20 April 2018)
- Tokyo bSI Summit (23-26 Oct 2018)
- Paris Geotechnics Workshop (22-24 Jan 2019)
- Singapore IDBE Summit – OGC Meeting (28 Feb 2019)
- Dusseldorf IDBE Geotech Workshop (29 March 2019)
- Heerbrugg IDBE Rail Workshop (1-2 April 2019)

Kommer snart(?) en rapport som oppsummerer erfaringer / lærdom så langt  
Pågår også et ISO prosjekt



# IFC RAIL - ONGOING IN bSI RAILWAY ROOM

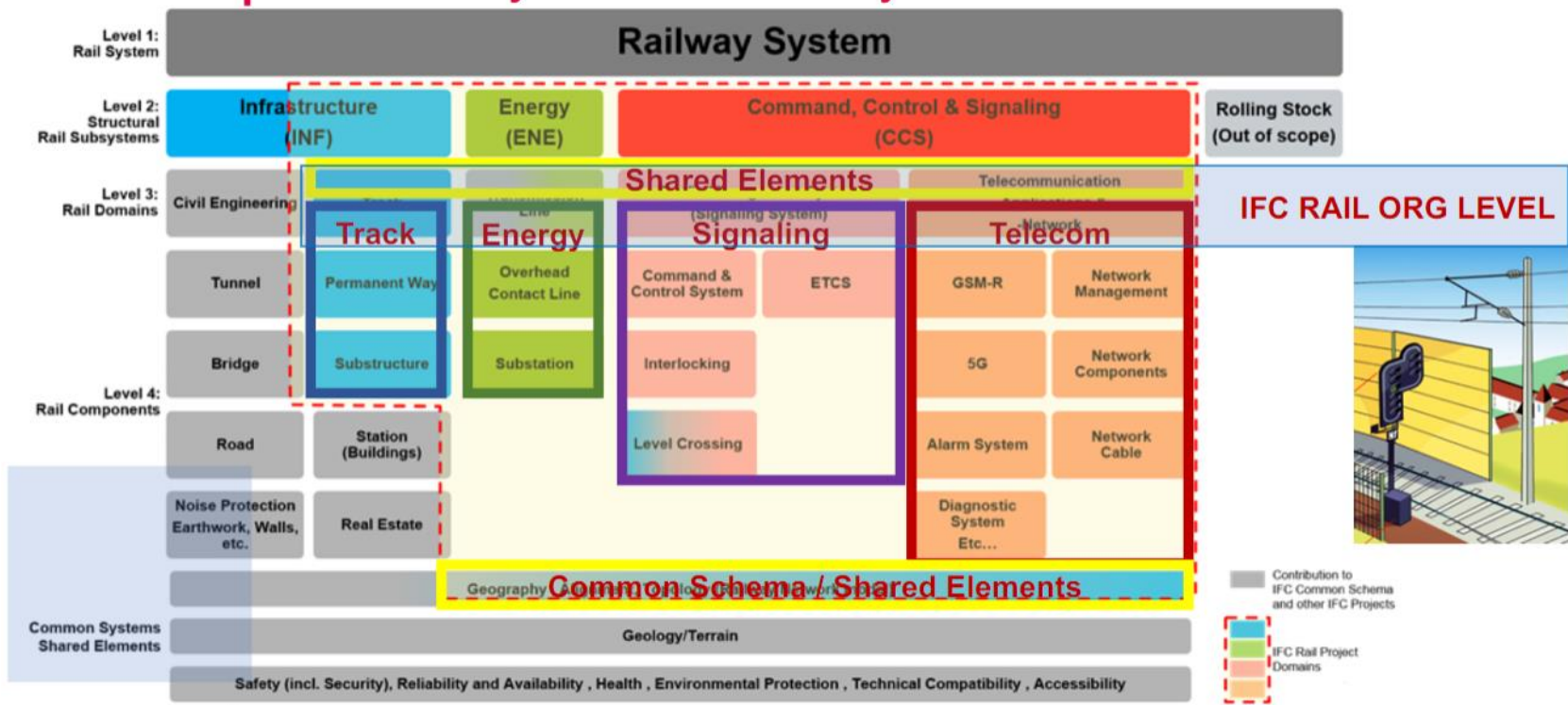


Founding RWR at bSI Summit Paris 03/2018





# IFC RAIL - ONGOING IN bSI RAILWAY ROOM



# ☰ IFC ROAD - FULLFØRT FASE 1 Krav Analyse

## Brukstilfeller

- Innenfor / utenfor prosjektomfang
- Prioritet av det som er innenfor

## Taksonomi

- “If the concepts in the mind of one person are very different from those in the mind of the other, there is no common model of the topic and no communication”  
— (Taylor and Fiske 1975)
- Ulike ord for det samme - Samme ord for forskjellige ting



# ☰ IFC ROAD - FULLFØRT FASE 1 Krav Analyse

## Geometry

- Identifisere det som ikke allerede er støttet med IFC4
- “Flatebeskrivelse - bredde / helling”

## Prosesdiagram

- For å identifisere informasjonsutvekslingsbehovene (input for mvd arbeide i fase 2)

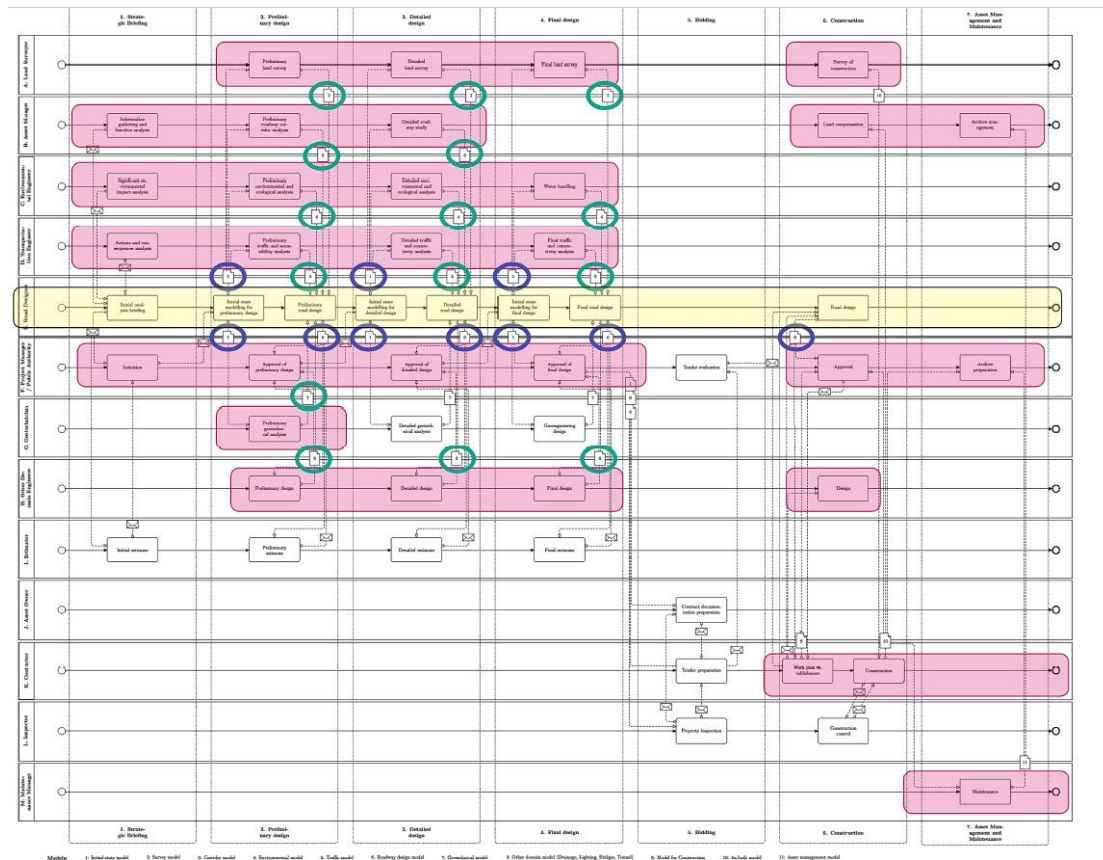


# IFC ROAD - FULLFØRT FASE 1 Krav Analyse

## Prosesdiagram



Informasjons-  
utveksling mellom  
identifiserte aktører





# IFC ROAD - PÅGÅENDE FASE 2 Implementasjon

## **IFC Road Expert Panel: Draft Conceptual Model**

Join us for a webinar on May 31, 2019, at 12:00 PM CEST.

[Register now!](#)

Calling all IFC Infrastructure Experts,

Join us for our next Expert Panel where we will present the progress of our draft conceptual model as part of the IFC Road extension for infrastructure.

Share this invitation amongst your network!

Draft documentation will be made available to those who register two weeks prior to the webinar. We kindly ask you to review this material and provide your feedback no later than 2019-05-29.

During the webinar, there will be a limited chance to ask questions directly to the project team. There will also be an additional opportunity after the webinar to provide feedback on the proposal. If you are unable to participate, a recording of the webinar will be sent out after the event to all those who have registered.

Kind Regards,

Infrastructure Room Administrator, on behalf of the IFC Road Project.

buildingSMART International

# ☰ IFC ROAD - PÅGÅENDE FASE 2 Implementasjon

Konseptuell modell - (Tema for expert panel 31 mai)

- UML
  - Kommuniserer bedre og med flere enn med EXPRESS-G
  - Med nye verktøy kan en generere express schema

Utvide IFC express skjema og spesifikasjon

- Unngå utilsiktede kompatibilitetsbrudd!
- Så få utvidelser som mulig

Utarbeide Model View Definition - MVD

- bSI Software sertifiserer for håndtering av MVD

# ☰ IFC ROAD - PÅGÅENDE FASE 2 Implementasjon

## Utarbeide Property Set Definitions - PSET

- De egenskaper som ikke er globalt gyldig/ akseptert eller ikke alltid nødvendig og av den grunn ikke bør tas med i skjemaet.

## Utarbeide eksempelfiler

- Uansett hvor gode spesifikasjoner en lager så er det eksempler alle vil ha
  - Utviklere av software
  - Anvendere av ferdig software

# IFC BRIDGE - LEVERT SOM IFC 4.2

- Previous IFC-Bridge work, and national IFC Bridge related developments:
  - France MINnD
  - USA FHWA
  - China CRBIM IFC Rail
  - Korea KICT IFC Road

The screenshot shows the 'buildingSMART® Forums' interface. At the top, a red banner contains the logo. Below it, a blue dashboard area displays statistics: '1 New Topics', '1 Unread Notifications', and '9 New Posts'. A 'Popular Topics' section is also visible. The main content area features a post titled 'Schema IFC4.2' dated 'October 24'. The post title is 'Feedback on the IFC4.2 Draft' by user 'André Borrmann'. The text of the post reads: 'Dear International IFC community, The IFC-Bridge extension is ready for inspection. Please provide feedback on IFC 4.2 DRAFT in this forum until November 30th, 2018. You can find the schema and the HTML doc as well as the conceptual model underlying the extension here:'. Below the text are icons for a heart (1), a comment bubble (0), and a user profile picture. A 'Read More' button is located at the bottom right of the post content.

# ☰ IFC BRIDGE DEPLOYMENT / PILOT - UPCOMING



U.S.A. State Departments of  
Transportation (AASHTO)

Test Implementation of IFC4.2 (Bridges)

Vendors:

Autodesk

Trimble

ALLPLAN

Bentley

Solibri

???

# IFC PORTS AND WATERWAYS (tidl PORTS AND HARBOURS)

Svært tverrfaglig.

- Geoteknikk/Hydrologi
- “Kinematic envelope”

Fase 1 Levert

Fase 2 Pågår



Open Maritime Infrastructure  
Summary Report

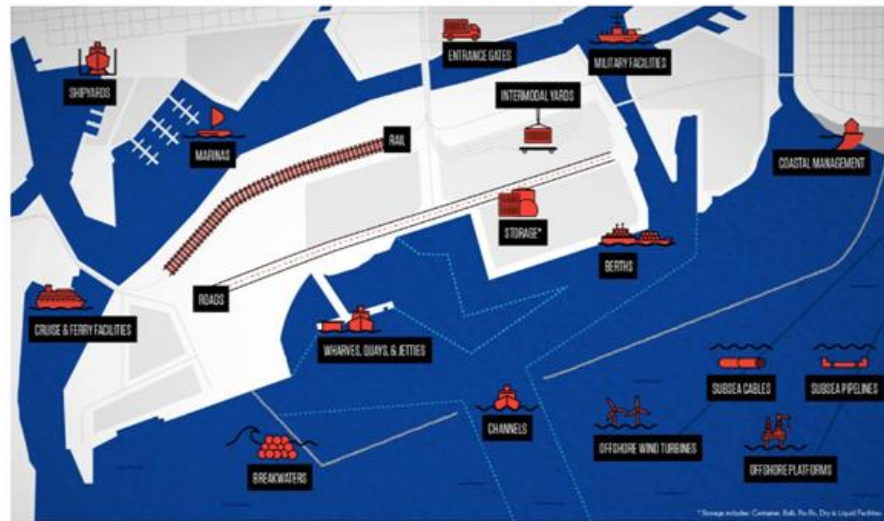


Figure 2: Harbour and port locations



# IFC TUNNEL - I OPPSTARTSFASEN

- En arbeidsgruppe har jobbet lenge (årevis) med å etablere prosjektet.
- Stor interesse i mellom-Europa
- Mer interesse koblet til Jernbane enn veg

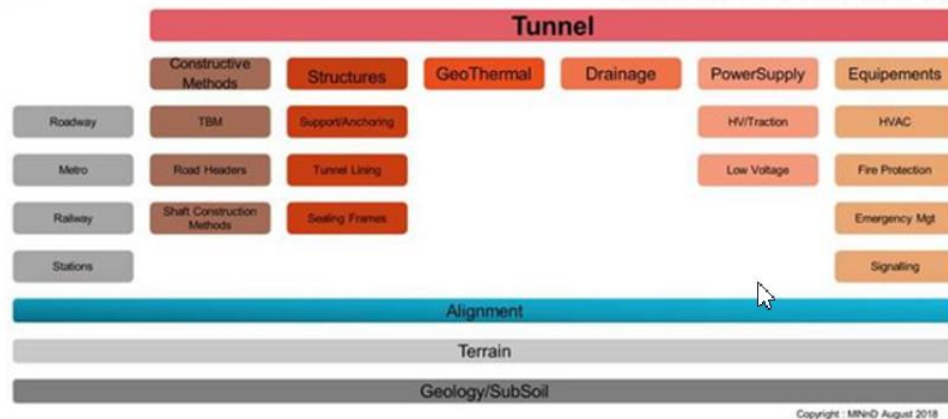


Figure 2 - Packages within or related to IFC Tunnel scope



# SPØRSMÅL

Andrew Sheil

InfraRoom Project Coordinator and Administrator  
infrastructure@buildingSMART.org



[News](#) [Get Involved](#) [Contact \(email\)](#)



buildingSMART® Forums



Welcome to the buildingSMART® International Community Forums

Enhancing the experience of end users, software developers, and other industry experts in the use, development, and implementation of buildingSMART International standards and the technologies that support them.

all categories ▶

all tags ▶

Latest

New (1)

Top

Categories

+ New Topic

Topic

Category

Users

Replies

Views

Activity

# ≡ ANNET

InfraBIM Open by buildingSMART Nordic  
January 15th – 16th Tampere, Finland





**NETT·ERK**