CEN/TC 442
Building Information Modelling (BIM)

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IFC STRATEGY

History, achievements and challenges today, and future directions

buildingSMART Summit, 03.04.2017, Barcelona
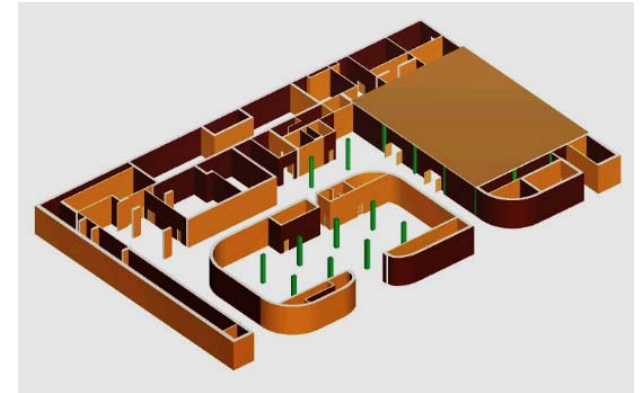
Brief history of IFC

1995 – idea was born

1996 – earliest prototype

1999 – first implemented release
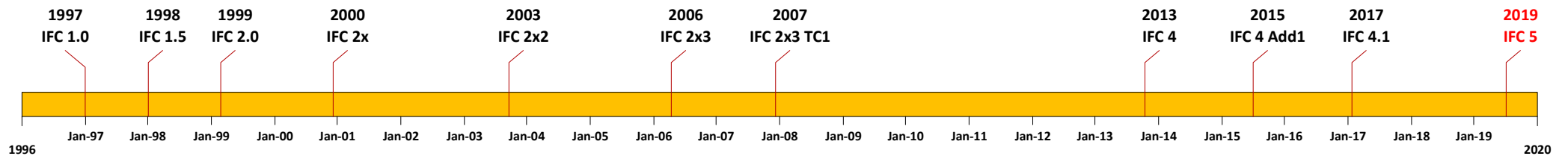
…

Today

- Over 200 software applications supporting

- Over 40 certified software applications

- Real construction projects using

- Client demanding

- Strong demand to expand beyond

First IFC exchanges ~ 1998

IFC Development Timeline

20 years of experience

1997
IFC 1.0

1998
IFC 1.5

1999
IFC 2.0

2000
IFC 2x

2003
IFC 2x2

2006
IFC 2x3

2007
IFC 2x3 TC1

2013
IFC 4

2015
IFC 4 Add1

2017
IFC 4.1

2019
IFC 5

1996   Jan-97   Jan-98   Jan-99   Jan-00   Jan-01   Jan-02   Jan-03   Jan-04   Jan-05   Jan-06   Jan-07   Jan-08   Jan-09   Jan-10   Jan-11   Jan-12   Jan-13   Jan-14   Jan-15   Jan-16   Jan-17   Jan-18   Jan-19   2020

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IFC in a nut shell

Industry Foundation Classes (IFC)

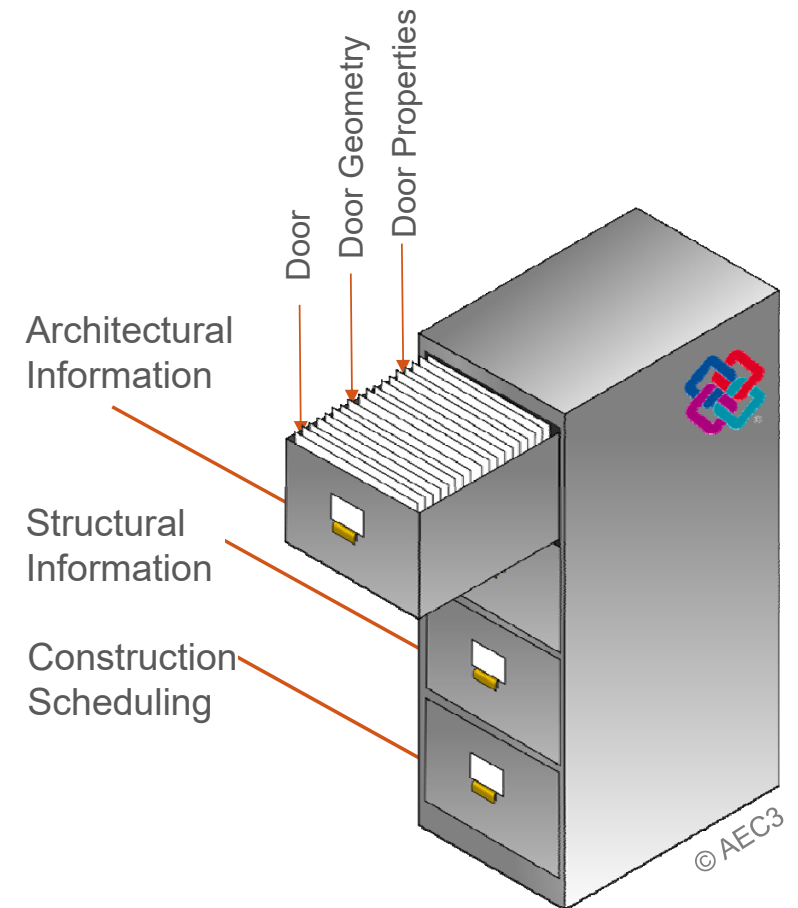- ## What does it define?

  Schema for structured information

  Syntax for exchange (SPF, XML, …)

  Unique repository for all construction related information (elements, relationships, properties)

- ## What does it not define?

  Scope for software implementation

  Scope of information needs from use cases

Door
Door Geometry
Door Properties

Architectural Information

Structural Information

Construction Scheduling

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IFC in a nut shell

Model View Definition (MVD)

- **What does it define?**

  Based on all provided by IFC +

  Scope for software implementation

  Filter of the repository for relevant information for a serious of use cases

- **What does it not define?**
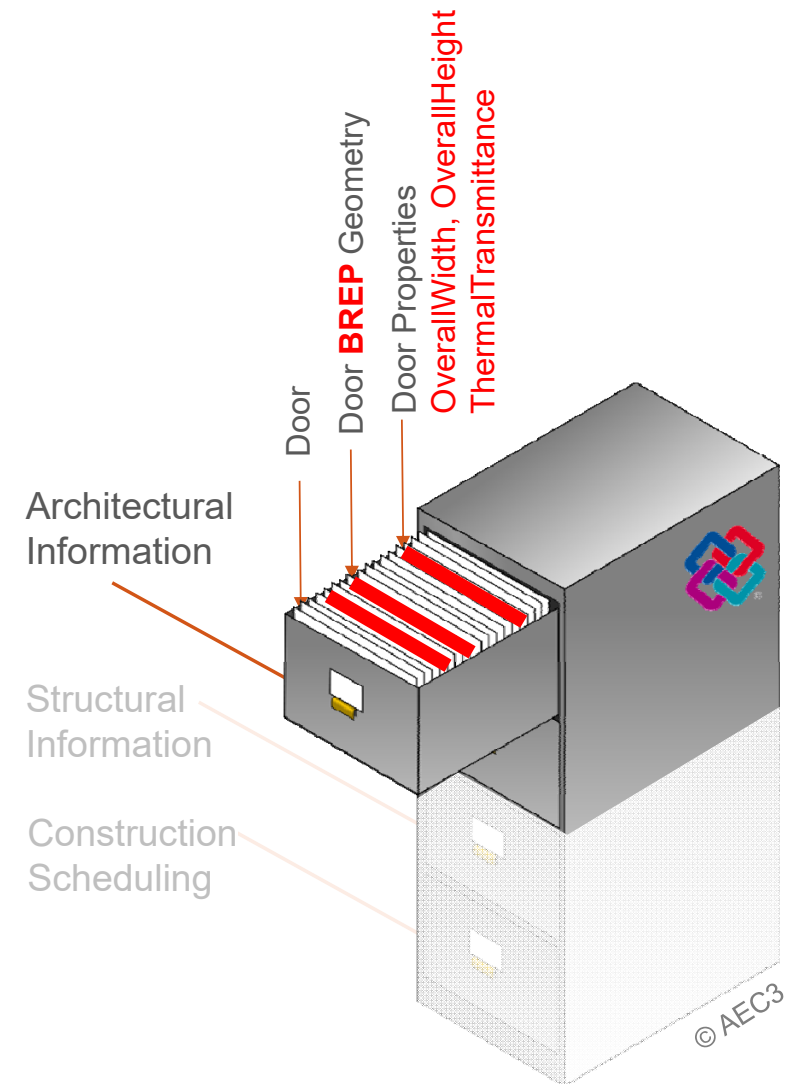
  Scope of information needs from use cases

Door
Door Geometry
Door Properties

Architectural Information

Structural Information

Construction Scheduling

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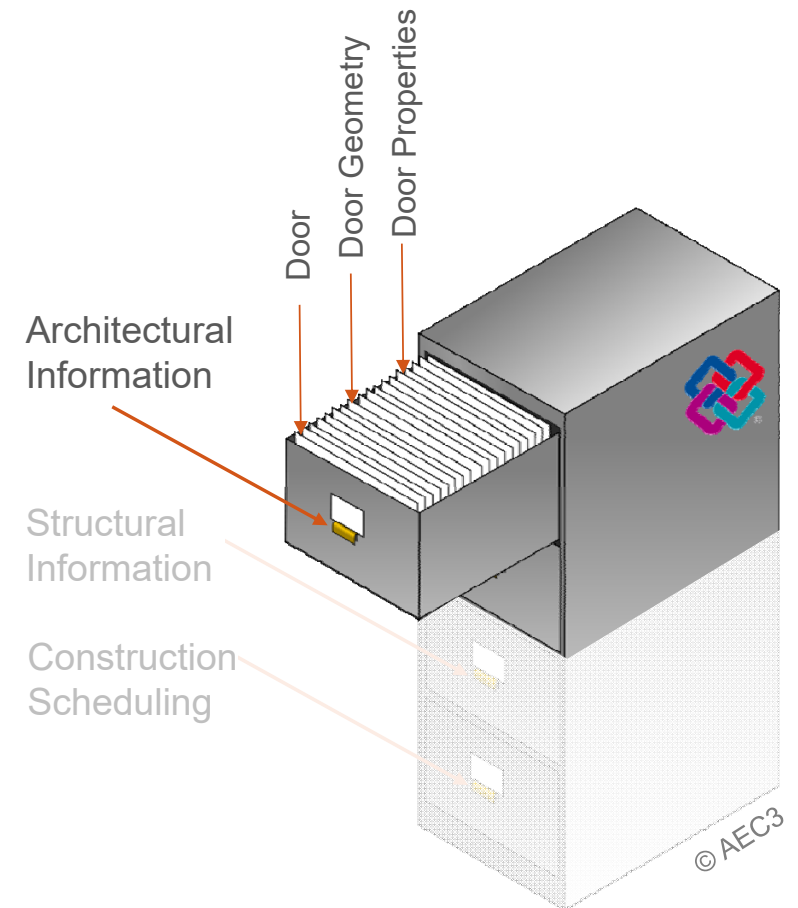
IFC in a nut shell

Exchange requirement (ER)

- What does it define?

  Based on scope of Model View Definition +

  Information required for defined use case

  Information needed at particular milestone

- What does it not define?

  Registration of properties in dictionaries

Door
Door **BREP** Geometry
Door Properties
OverallWidth, OverallHeight
ThermalTransmittance

Architectural Information

Structural Information

Construction Scheduling

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IFC in a nut shell

Data dictionary (bSDD)

- **What does it define?**

  Unique definitions of properties

  Global identifier for properties

  Multilingual support for properties

- **What does it not define?**

  Product information

  Property values

  Property exchanges

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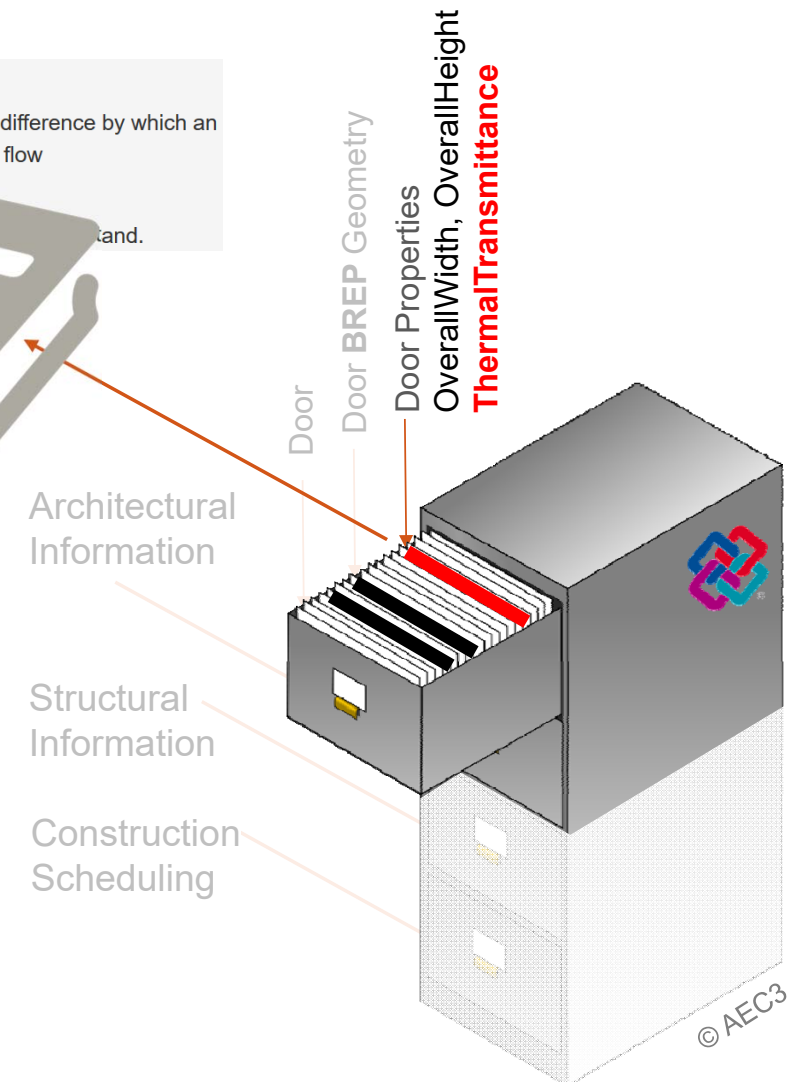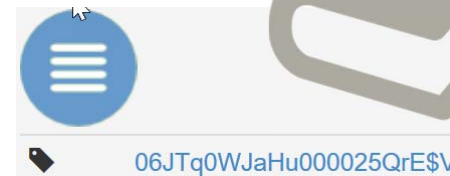
IFC in a nut shell

BIM Collaboration Format (BCF)

- What does it define?

  Electronic messages when using models, e.g.
  Request for Information, Request for Change

  Small transactions associated (e.g. suggested
  new/updated properties)

- What does it not define?

  Product information

  Date exchanges or hand overs

Add door property
"Fire rating"= 90min

Door BREP Geometry

Door Properties
OverallWidth, OverallHeight
ThermalTransmittance

Door

Architectural
Information

Structural
Information

Construction
Scheduling

BCF transaction

IFC exchange

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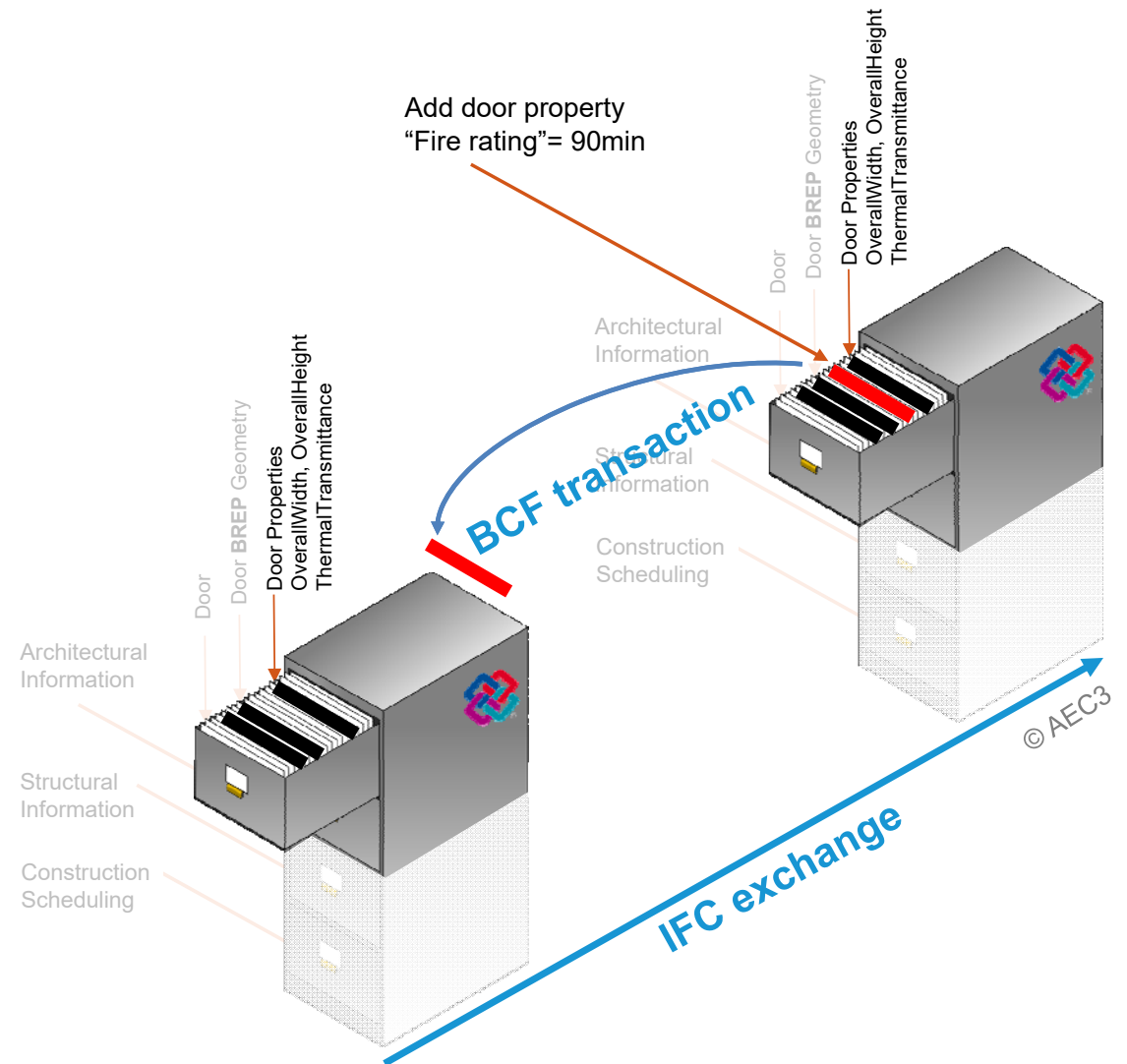
IFC – under the hood

Meta schema behind IFC
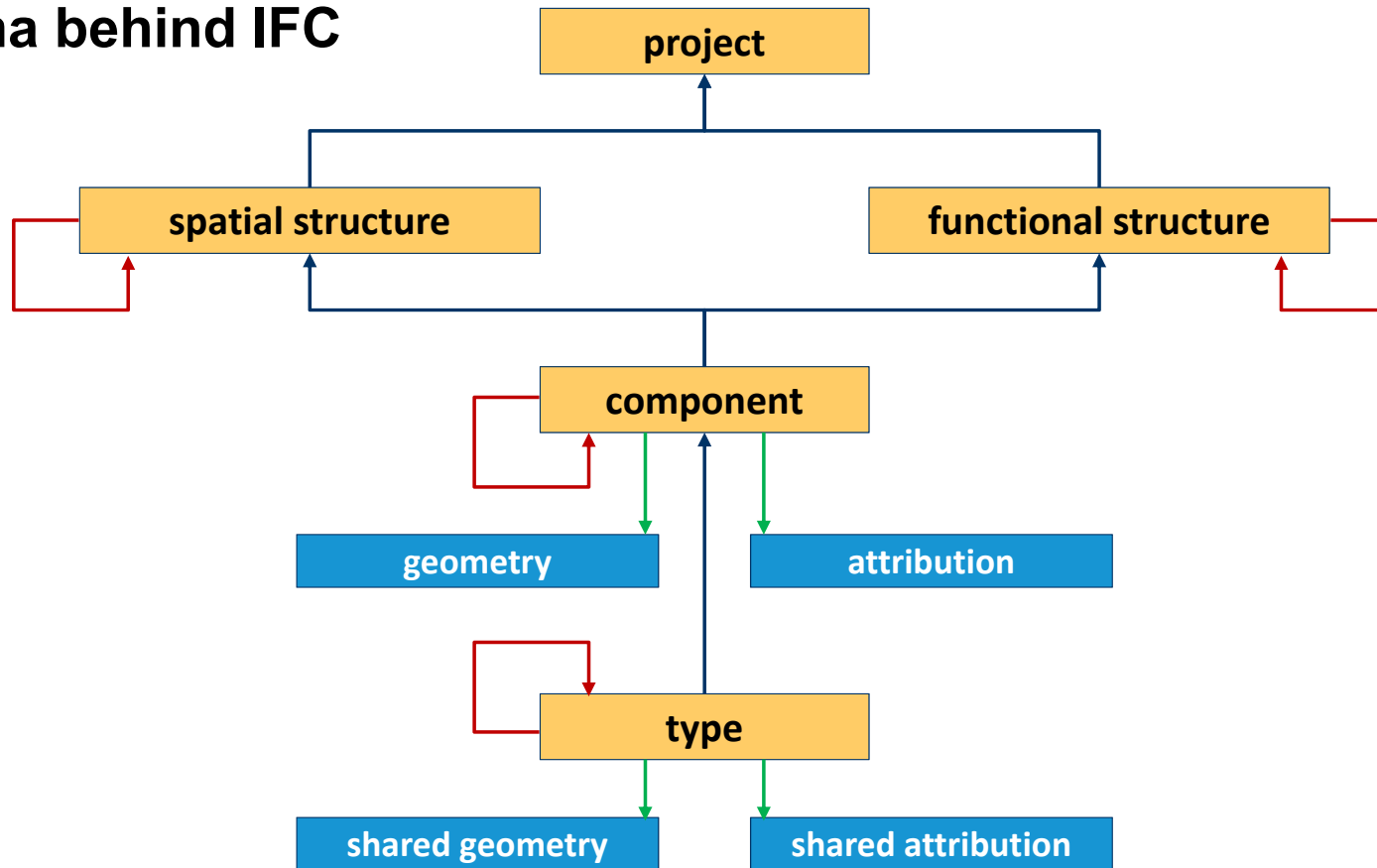
IFC – what's in typically (here: MVD Coordination View)

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Works fine today – IFC for model referencing and checking
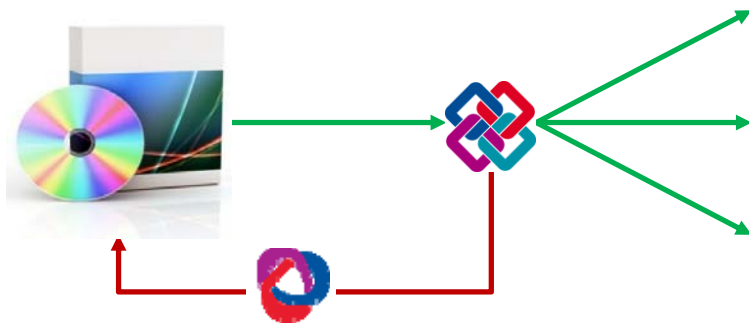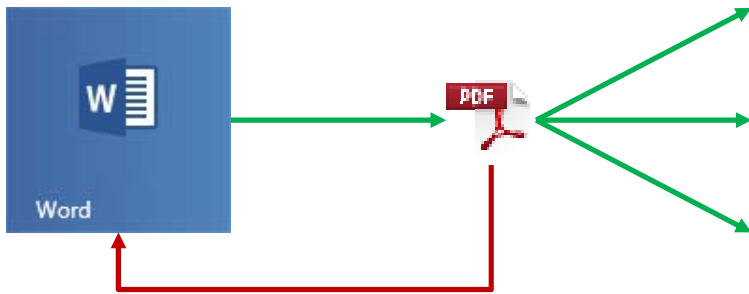
Use IFC as intended

- Exchange and share BIM Models !
- No replacement of own software format
- Handle change management by BCF

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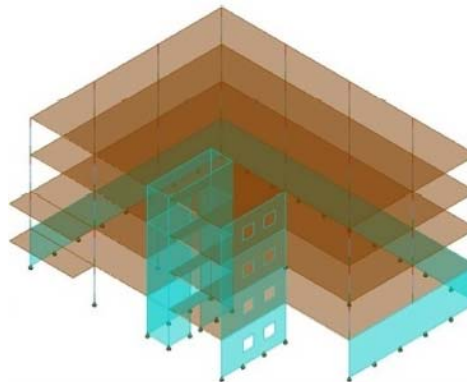
Other Model View Definitions

Again, there is no single "all-in-one" IFC implementation

- "Full IFC" is a repository of schema definitions for all disciplines and life cycle
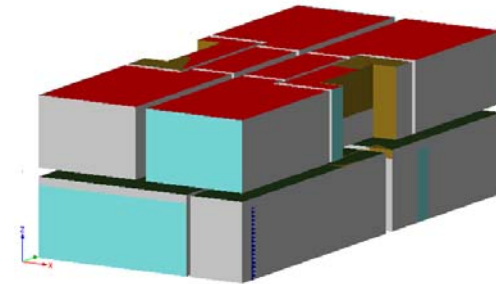- "IFC Model View Definition" is a subset, that satisfies one or many purposes

Any IFC implementation implements 1..n Model View Definitions
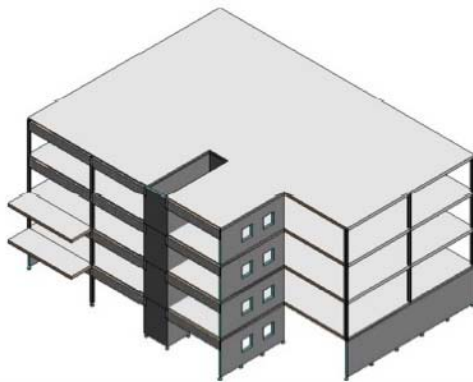
| IFC Coordination View | IFC Structural Analysis View | IFC Thermal Analysis View |

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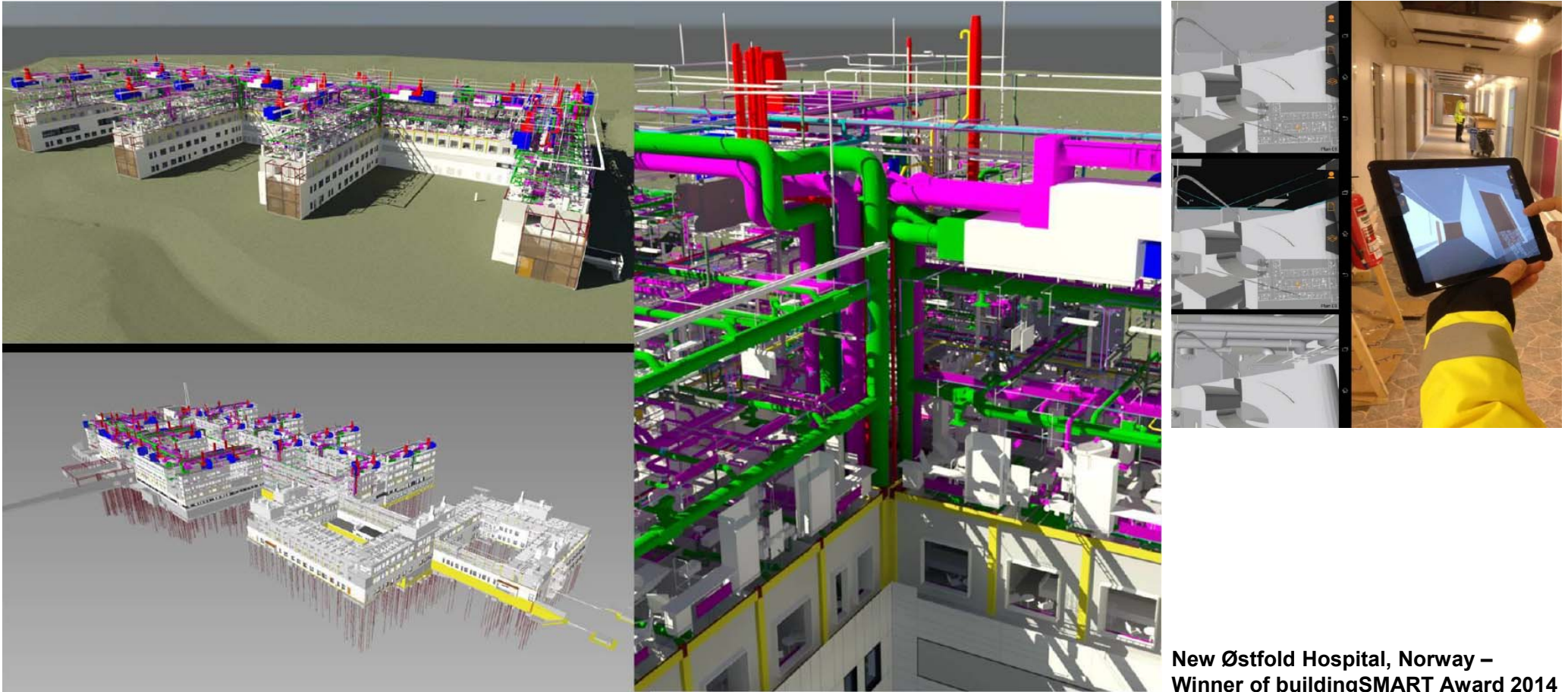
Success stories

**New Østfold Hospital, Norway –
Winner of buildingSMART Award 2014**

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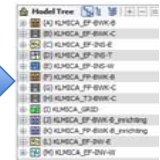# Success stories

ICA Lounge, Schiphol Airport – as shown in buildingSMART Airport Room

IFC

BCF

IDM

COBie

Success stories

Neubau Felix Platter Spital

TRADITIONAL DOCUMENTATION

- Difficult to gather, edit and update
- Storage space is an issue
- Vanishes through project phases

DIGITAL DOCUEMENTATION

- Easy to access (online)
- documents can be retrieved from mobile devices
- Easy to edit and update
- Ideal for Facility Managers

Felix Plattner Spital, Basel, BAM
Winner of buildingSMART Award 2014
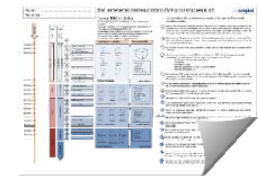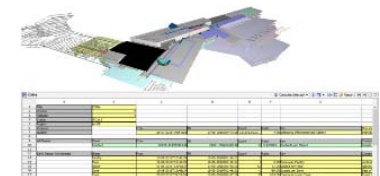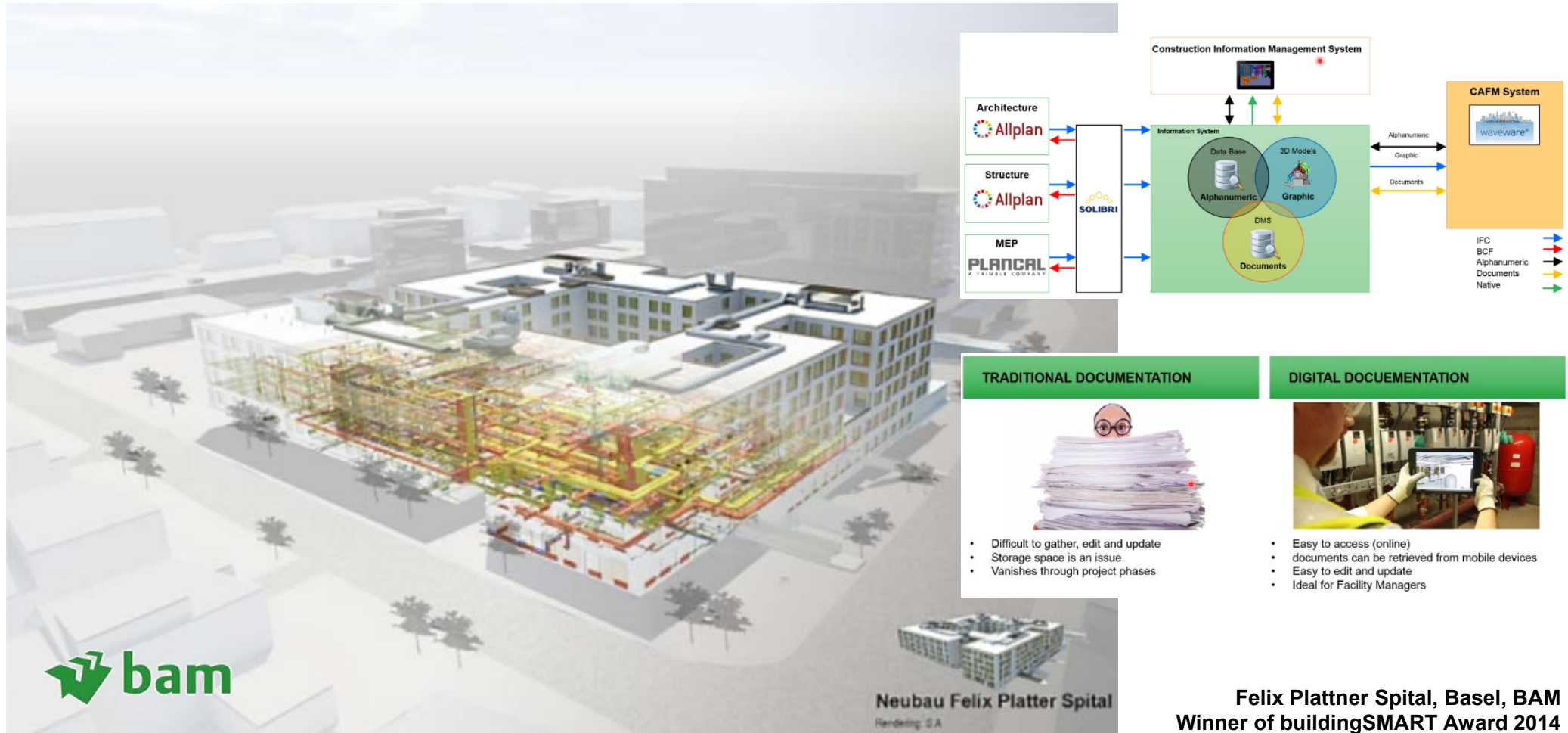
Upcoming challenges and developments

How to manage growths?

- One IFC Schema
  - → Can be maintained

- Up to 10? IFC Model View Definitions
  - → Difficult to maintain

- Up to 100++ ? IFC Exchange Requirements
  - → Impossible to maintain
    (within current technology boundaries)

Framework

- Unified international development
  - → Better Tool Support (ifcDoc)
  - → More use of external definitions

- Enable more diverse developments
  - → Tool driven, computer readable (mvdXML)
  - → Some unified international, some local

- Requires technology shift
  - → Short term, dynamic declarations by mvdXML
  - → Long term, pull (query) instead of push (files)

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IFC Release Strategy

IFC4   **Major Releases**

.1   **Minor Release**

Add 1 **Addendum Releases**

RC1   **Internal Releases**

Platform	Extension	Addendum	Internal version	Published Major Release	Published Minor Release	Express Schema ID	Published	Current Status
1	0	0		IFC 1.0		n/a	Dez. 96	Retired
1	5	0		IFC 1.5		Ifc150Final	Jan. 98	Retired
1	5	1		IFC 1.5	ADD1	Ifc151	Aug. 98	Retired
2	0	0		IFC 2.0		IFC20_longform	Okt. 99	Retired
2	1	0		IFC2x		IFC2X_FINAL	Okt. 00	Retired
2	1	1		IFC2x	ADD1	IFC2X_FINAL	Okt. 01	Retired
2	2	0		IFC2x2		IFC2X2_FINAL	Mai. 03	Retired
2	2	1		IFC2x2	ADD1	IFC2X2_FINAL	Jul. 04	Retired
2	3	0		IFC2x3		IFC2X3_FINAL	Dez. 05	Retired
2	3	1		IFC2x3	TC1	IFC2X3_FINAL	Jul. 07	Official
4	0	0		IFC4		IFC4	Feb. 13	Retired
4	0	1		IFC4	ADD1	IFC4	Jun. 15	Retired
4	0	2		IFC4	ADD2	IFC4	Jul. 16	Official
4	1	0	1	IFC4.1	RC1	IFC4X1	Dez. 15	Retired
4	1	0	2	IFC4.1	RC2	IFC4X1	Sep. 16	Retired
4	1	0	3	IFC4.1	RC3	IFC4X1	Mrz. 17	Candiate

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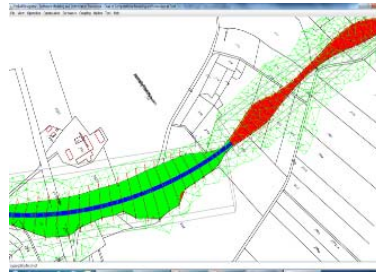buildingSMART
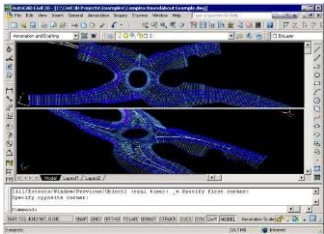International home of openBIM

Fork and Merge in upcoming IFC developments

Parallel work

- IFC4 → building, products
- IFC4.1 → Alignment, Terrain
- IFC4.x → if needed e.g. Bridge
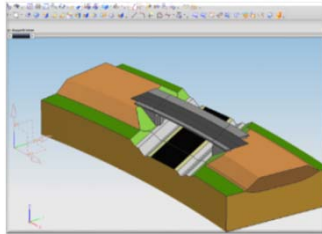- IFC5 → Infrastructure

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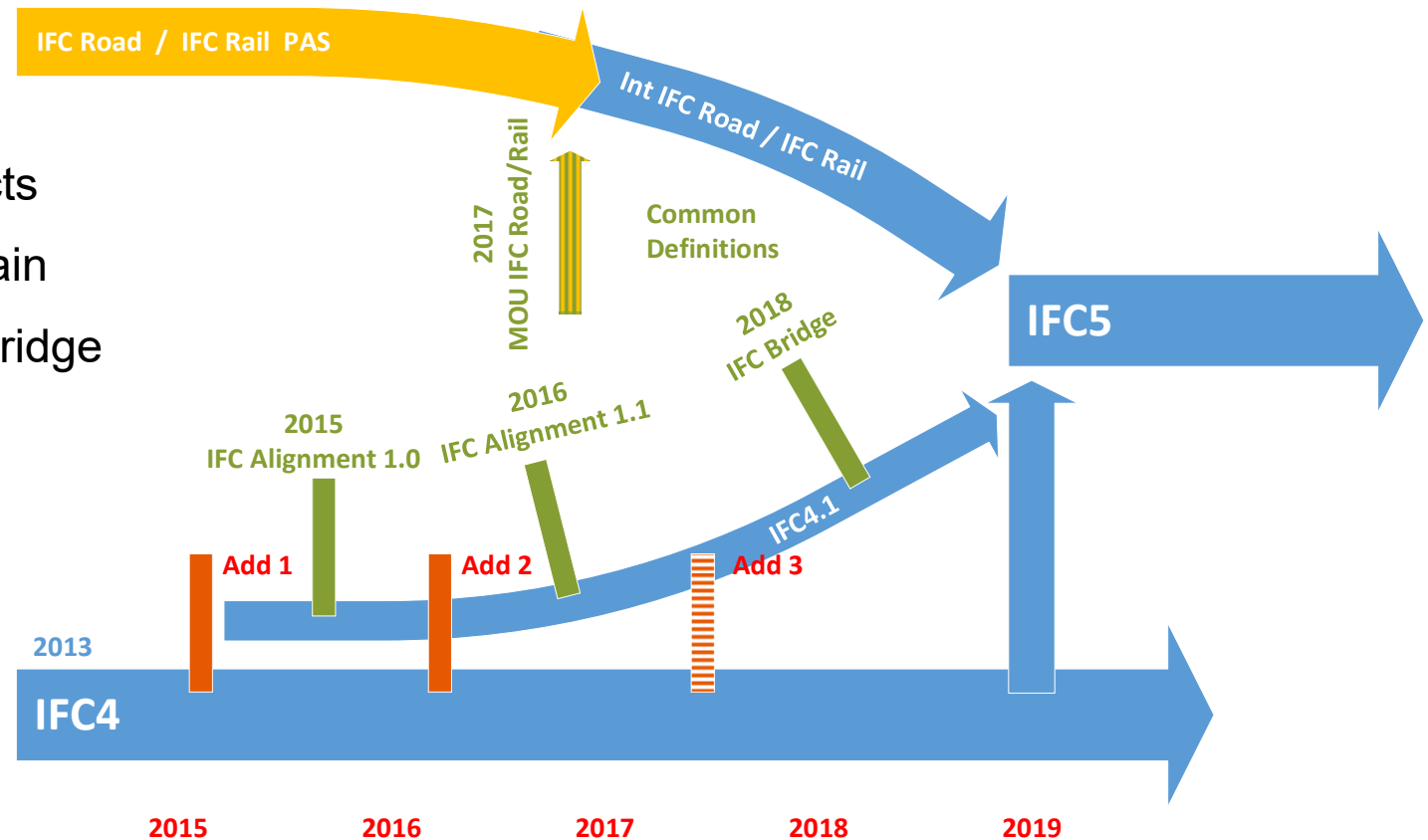
Scope of IFC 5 – focus of supporting infrastructure work

Alignment
Common baseline

Roads
IFC-Road

Bridges
IFC-Bridge
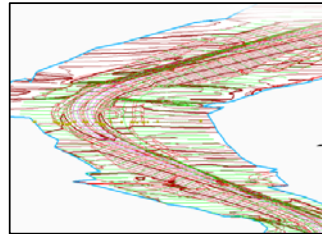
Railways
IFC-Railway
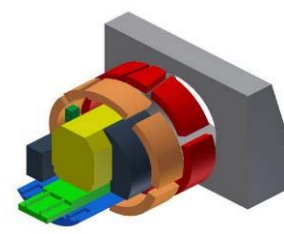
Tunnelling
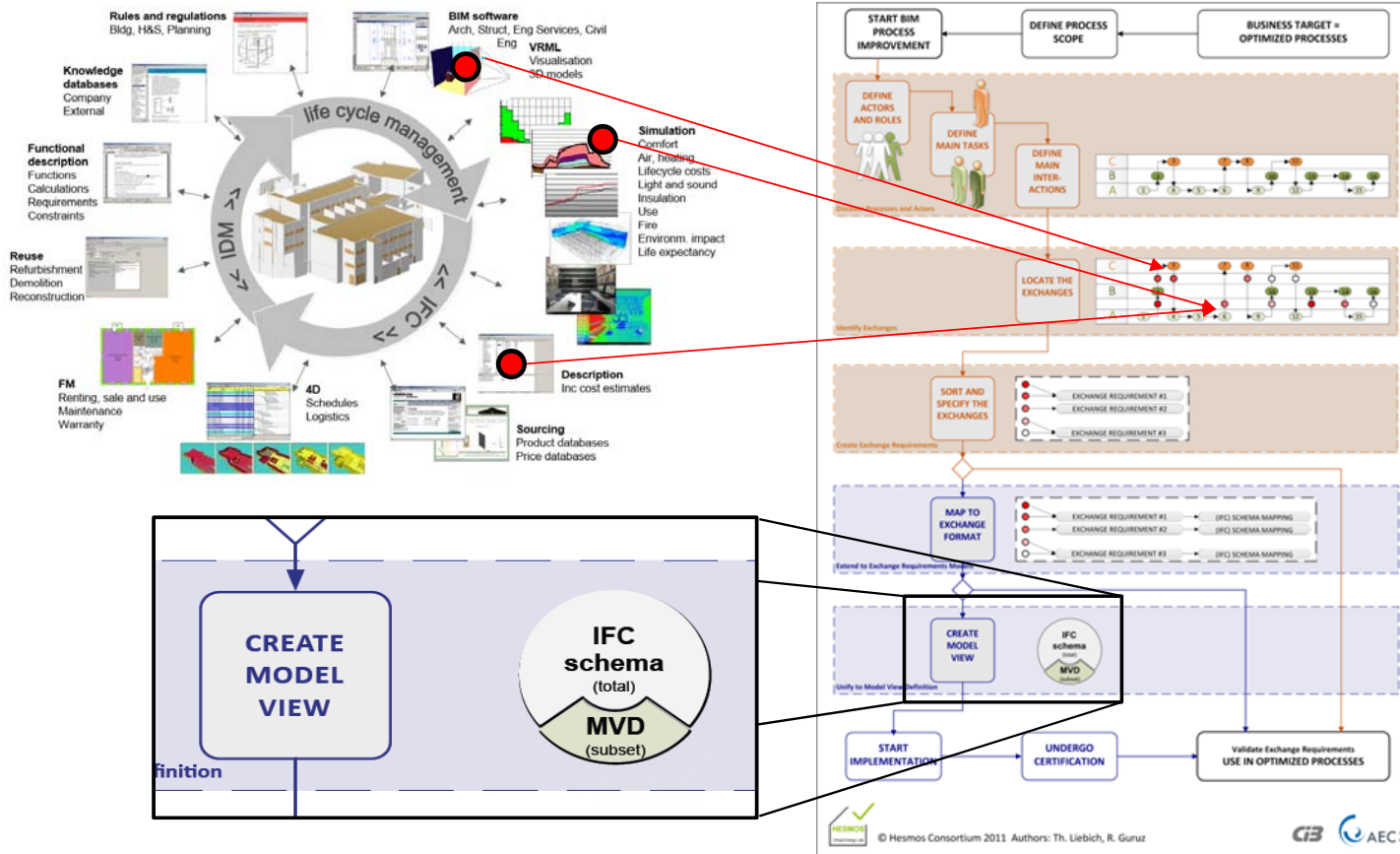IFC-Tunnel

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Project structure towards IFC5
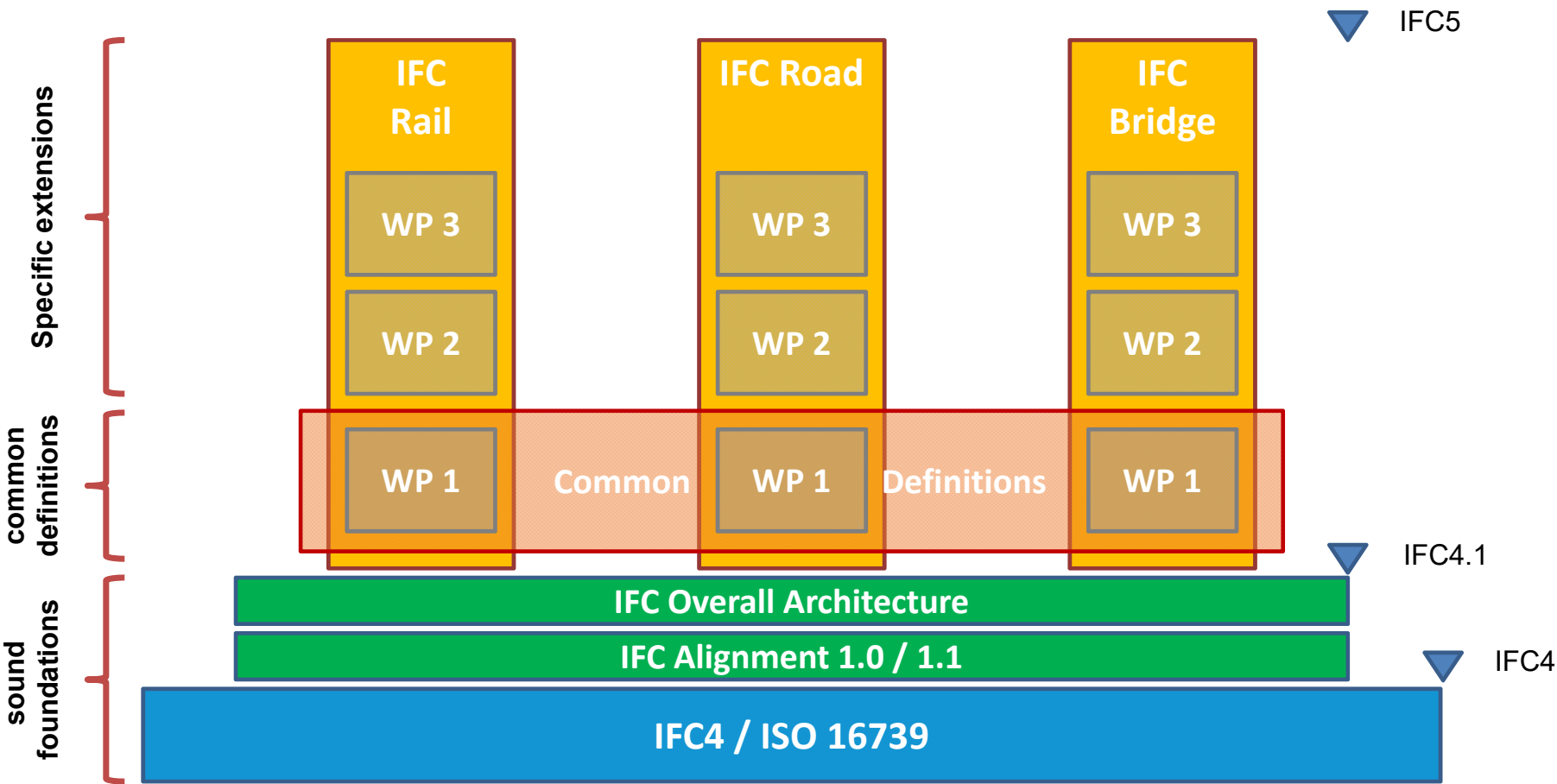
buildingSMART/IFC and formal standards

buildingSMART paths the way

ISO, CEN, national standards adopts already harmonised standars

ISO 16739   EN ISO 16739   DIN EN ISO 16739
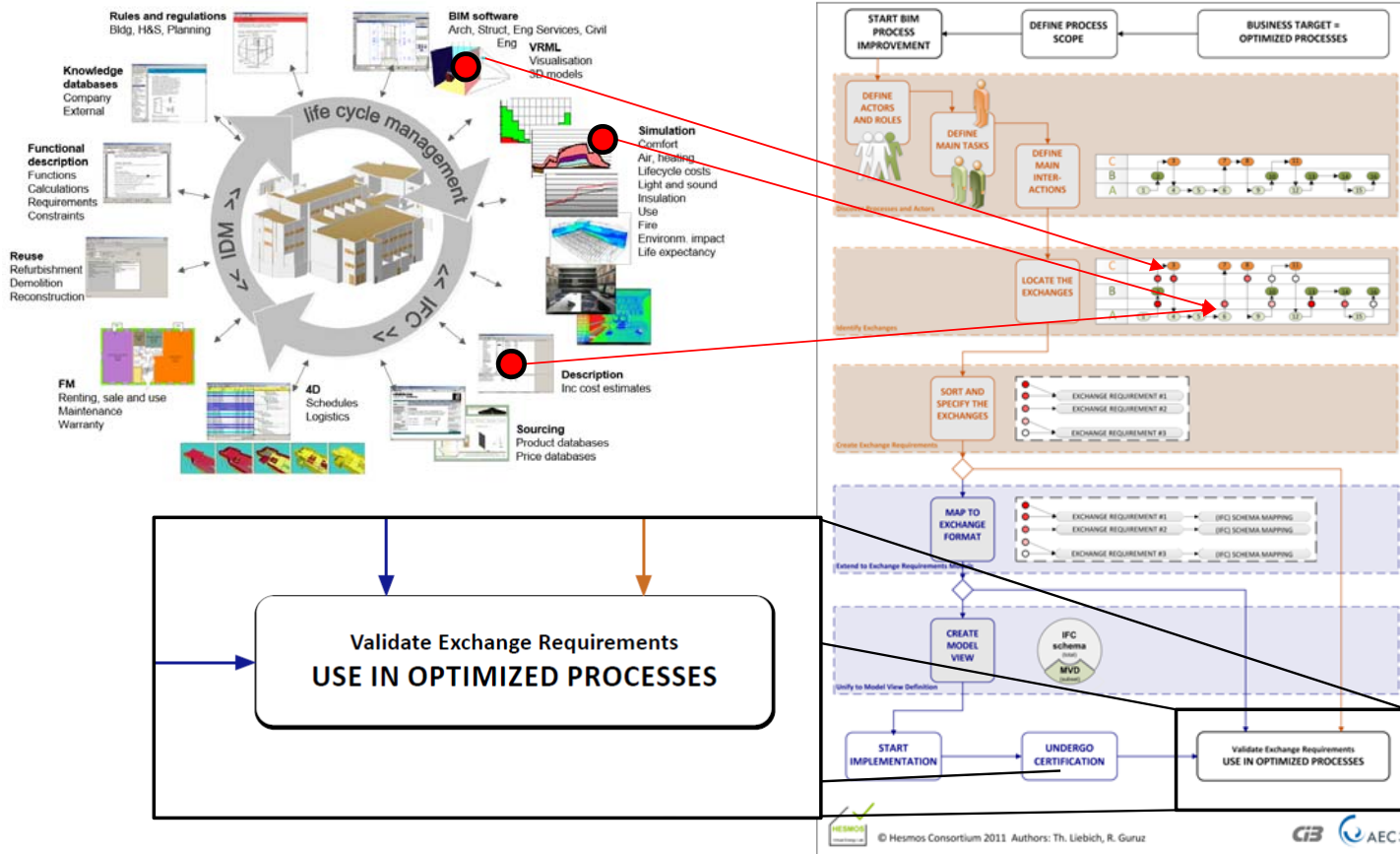   BSI EN ISO 16739

mvdXML – purpose 1: filter IFC Schema and data

Specify implementable subsets mvdXML to generate MVDs

- Generate documentation
- generate IFC subset schemata
- filter IFC Data sets

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mvdXML – purpose 2: validate IFC deliverables

Validate IFC based deliverables against the chosen MDV

- Generate checking rules

Challenges for future IFC works

Scope

- Infrastructure: road, rail, bridge, tunnel, others

- Manufacturer templates and products plus parametrics

- Handover to Facility Management

Technology

- XML, JSON, RDF, OWL → open linked data

- Easier entry points → open buildingSMART Toolbox

- Beyond data files → IFC based Queries for cloud based working

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