

IFHE CONGRESS 2012

USE OF BIM IN HOSPITAL PROJECTS

St.Olavs Hospital

Molde Hospital

Aalesund Hospital

Haukeland Hospital (BUSP)

Nytt Østfold Hospital

Nordland Hospital

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BIM/CAD-coordinator

COWI

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COWI AS

Otto Nielsens vei 12

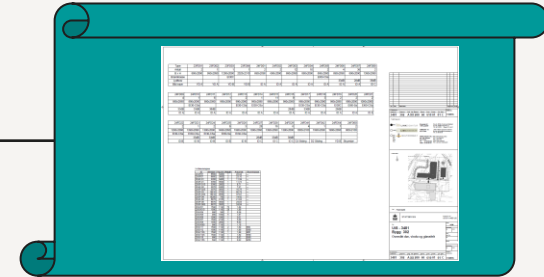
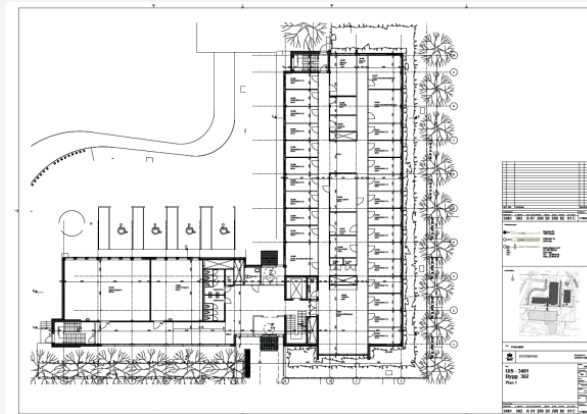
7414 Trondheim

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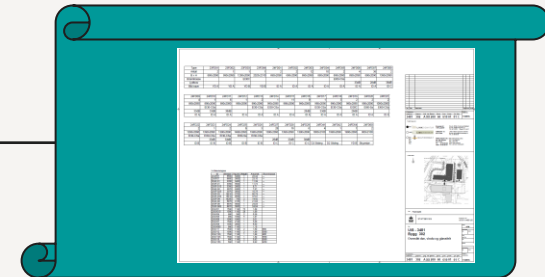
www.cowi.no

What is BIM? Building InformatjnsModel

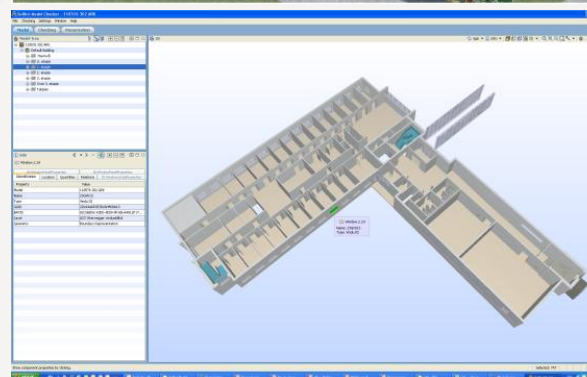
2D



3D



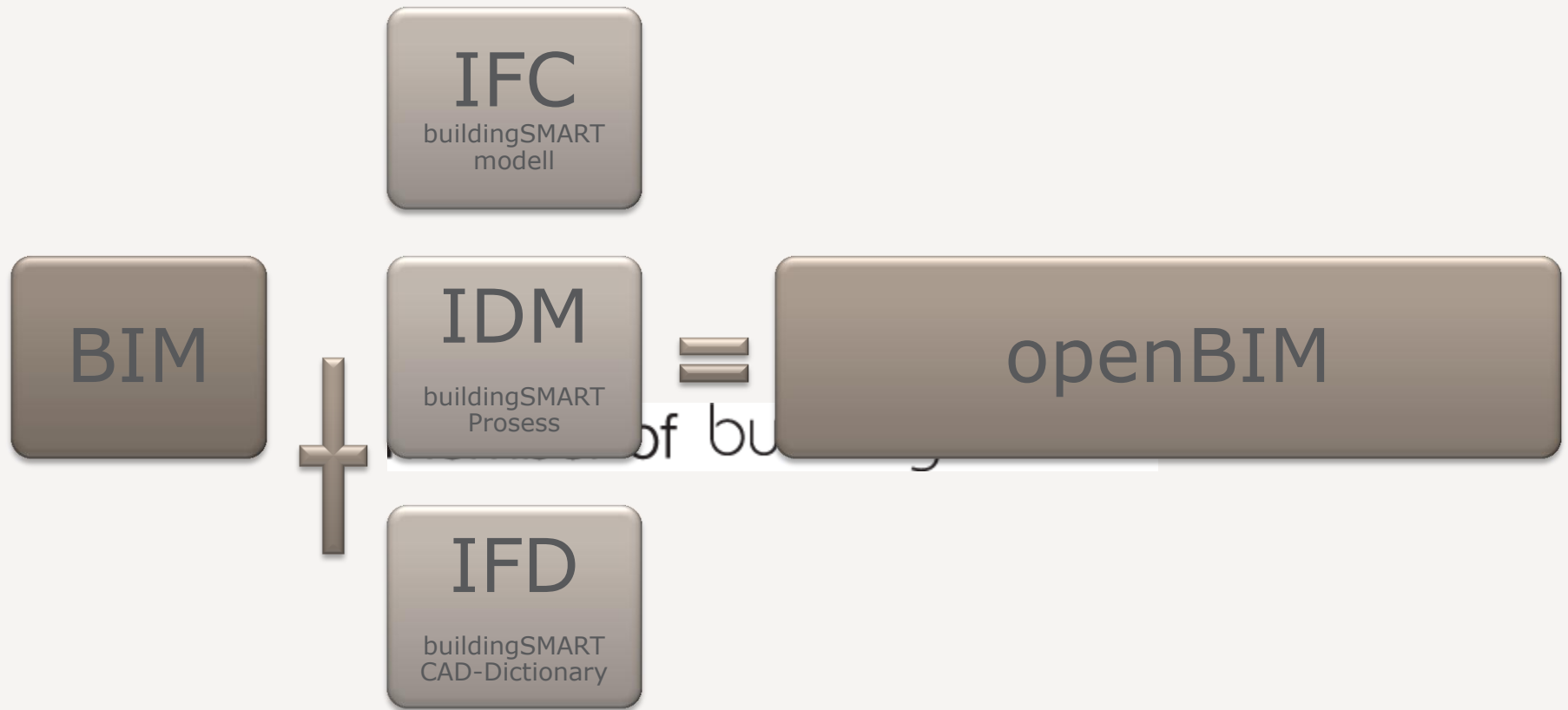
BIM = 3D + "I"



The screenshot displays two overlapping AutoCAD .NET application windows. The background window, titled 'Info', shows a table with two main sections: 'IfcWindowPanelProperties' and 'IfcWindowPanel'. The 'IfcWindowPanelProperties' section has columns for Identification, Location, Quantities, Relations, and IfcWindow. The 'IfcWindowPanel' section has columns for Property and Value. The data includes Model (118576 302 ARK), Name (23GV015), Type (Windu 02), GUID (22mKasRkXEJhUhrM68A), BATID (82C06B92-43ED-4E59-9F), Layer (A23 Ytternvegger vindubst), and Geometry (Boundary Representation).

The foreground window, also titled 'Info', shows a table with two main sections: 'IfcWindowPanelProperties' and 'IfcWindowPanel'. The 'IfcWindowPanelProperties' section has columns for Identification, Location, Quantities, Relations, and IfcWindow. The 'IfcWindowPanel' section has columns for Property and Value. The data includes Building (Default Building), Floor (1. etasje), Top Elevation (2.09 m), Bottom Elevation (900 mm), Distance to Next Floor (1.41 m), Global Top Elevation (64.09 m), Global Bottom Elevation (62.90 m), Global X (86.22 m), and Global Y (81.20 m).

What is BIM? Building SMART definition



What is BIM? COWI Definition

COWI –want to use BIM to provide multidiscipline projects that go together the first time.

BIM for COWI is:

Building Information Model – a model of data carrying objects that describes the buildings shape and life cycle information. –created and managed in digital tools.

Building information Modeling – the process of creating, developing and handling a BIM (the model)

Building Information Management – the simulation, visualization, analysis, planning and contract management where BIM (the model) is the digital representation of the physical building.

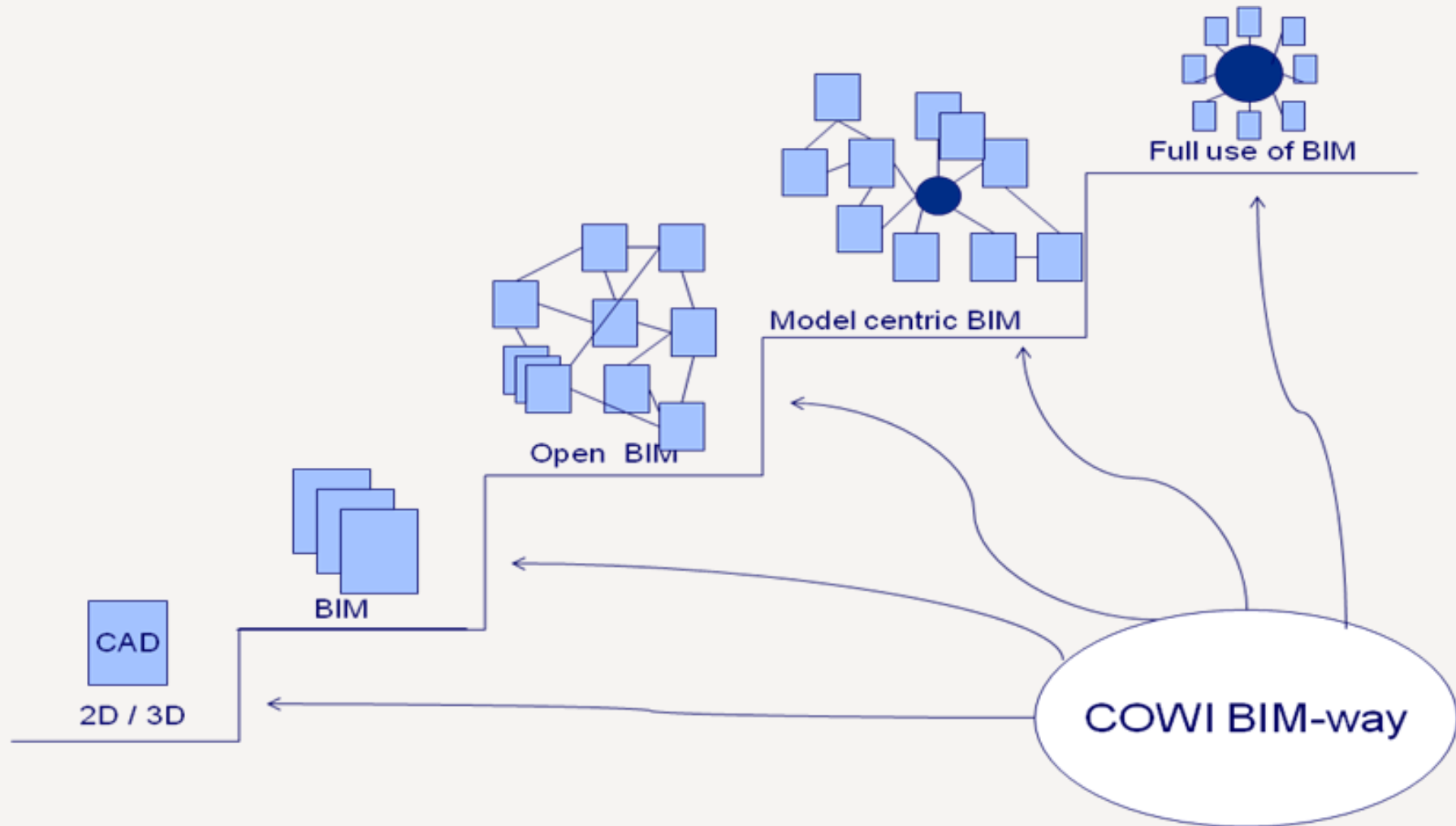
COWI provide sustainable buildings through a BIM process where we use the best suitable tools and deliver BIM on open formats – when the customer wants this.

Why BIM

COWI way of BIM leads to competitive results. We collaborate to deliver sustainable design that goes together the first time and gives the customer the chance to decide for:

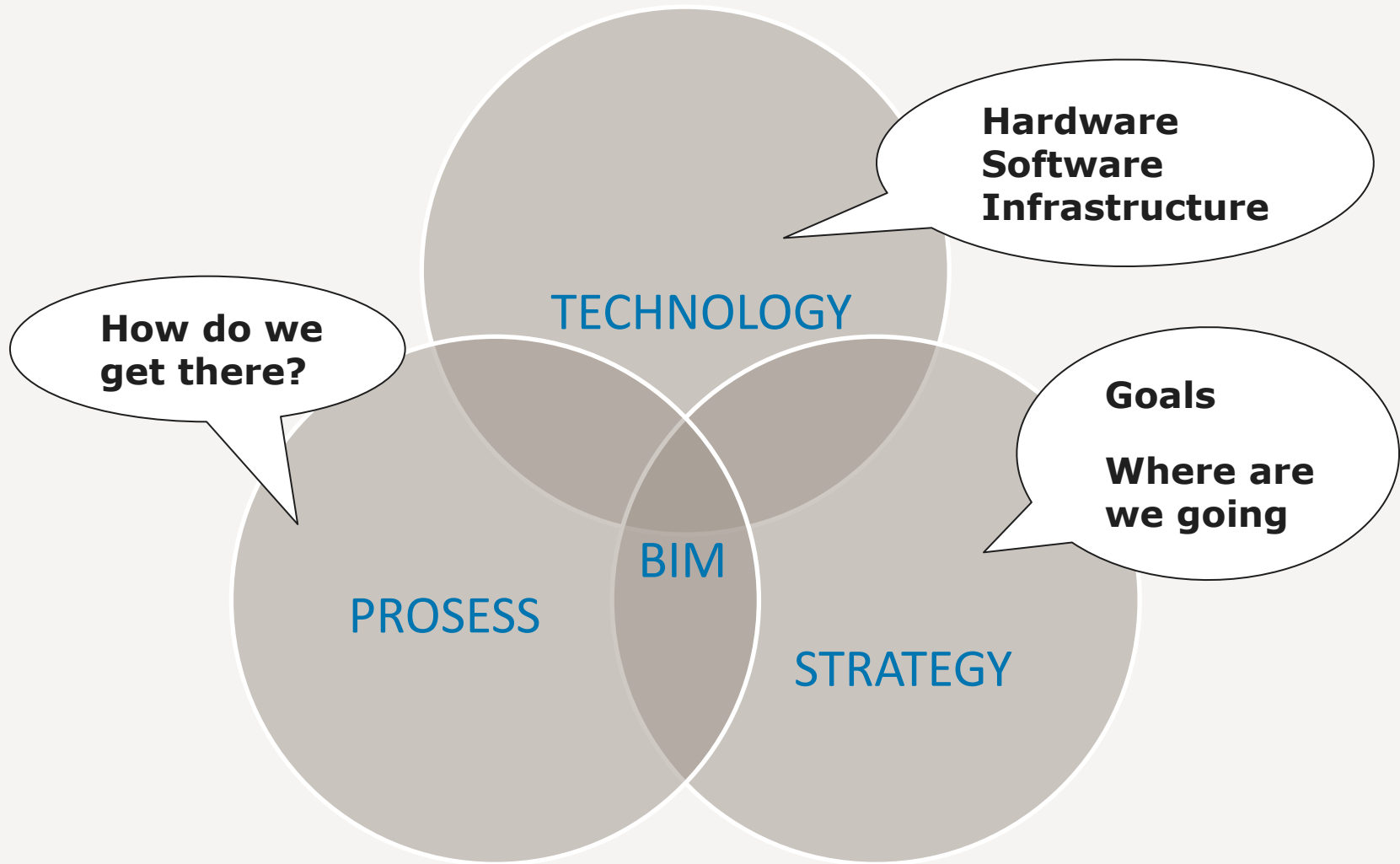
- *Sustainable sites*
- *Eco friendly buildings*
- *Energy and atmosphere*
- *Material and resources*
- *Aesthetics*
- *Indoor environmental quality*
- *Fire safe conditions*
- *Life cycle cost planning*

The Stages of BIM and openBIM



BIM

BUILDING INFORMATION MODELL



Technology

- Infrastructure
 - Internett
 - Archiving
 - Communications
- Tools
 - Hardware
 - Software
- Prosesess
 - Working methodes
 - flow of information
 - Transmittals
 - Training

Goals – Where are we going

The Client defines the level of BIM

- The design team develop models which meet their own purposes.
- The Engineers must define how they will use it, and what kind of added value they can bring
- The Client decides how the model is to be used.
 - by the decisionmakers
 - by the Facility Management

For every new stakeholder using the model, it adds to the value of it.

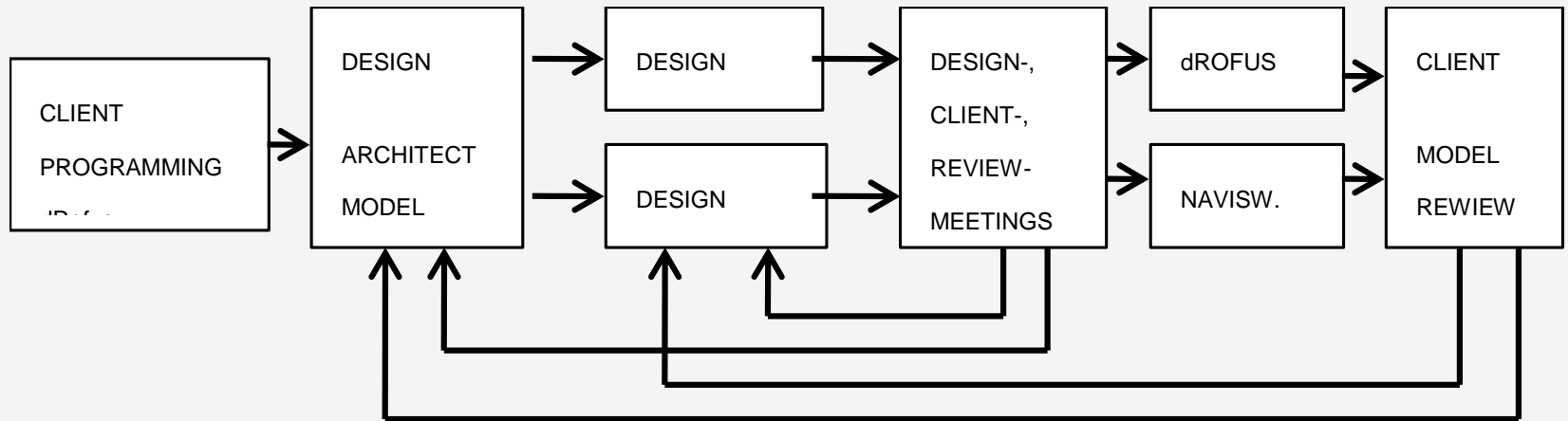
Defining the level of BIM - Think new

6	
Facility Management	How to use the end product. FM, training,
Construction	Contractors benefits. Planning, cost control,
Planning	JIT & LEAN construction
Design	QA of design. Reduction of errors. Better decisionmaking, early design,
Defining demands	Better decisionmaking. Which level of BIM to use.

How do we get there - Documents

- BIM Manual
 - How to utilize the model, and what to put in it
 - One common part & one part for each MC
- CAD manual
 - Adjusted to BIM-project
- Naming Conventions
 - files
 - folders
 - families
 - objects
 - Systems

WORKFLOW



The value of tagging increases the earlier it is done

Designphase	<ul style="list-style-type: none">• Design & Balancing• Massing & Calculation
Planning	<ul style="list-style-type: none">• P & ID• Project planning
Construction	<ul style="list-style-type: none">• Procurement• Commisioning
Facility Management	<ul style="list-style-type: none">• As-built• Facility management

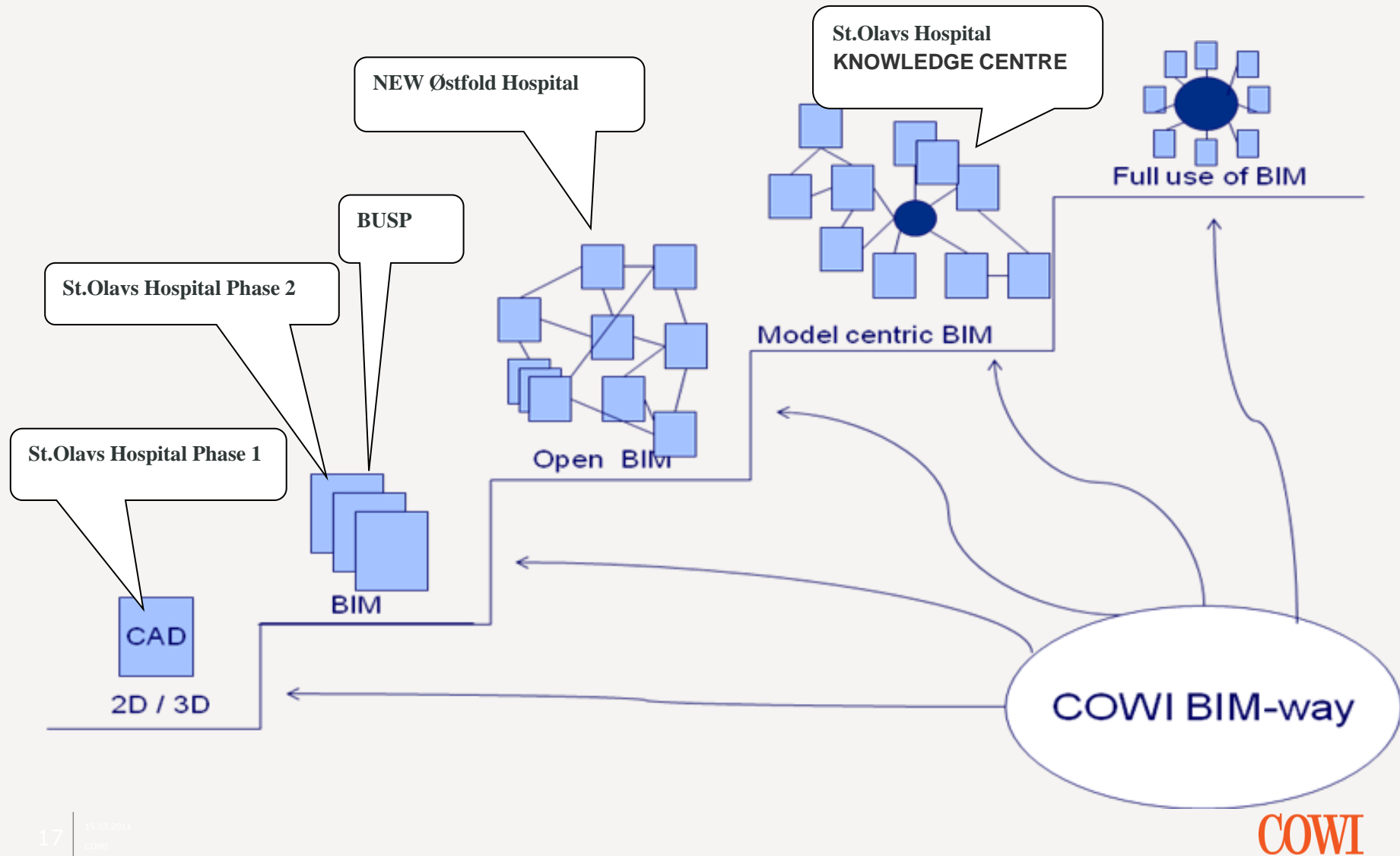
Working methodes - Navis Works

Manages large files	All 3D files for the entire Hospital be linked into the same 3D - file
Visual control	<p>Check if the design intent is met by the Contractor</p> <p>Make Walk-throughs for decision makers</p>
Clash Control	<p>Clash control is mainly for the Contractor, but should be performed at certain milestones.</p>
Planning in 4D	<p>Import Project plan in NW-Timeliner</p> <p>Simulate digital building proses</p>

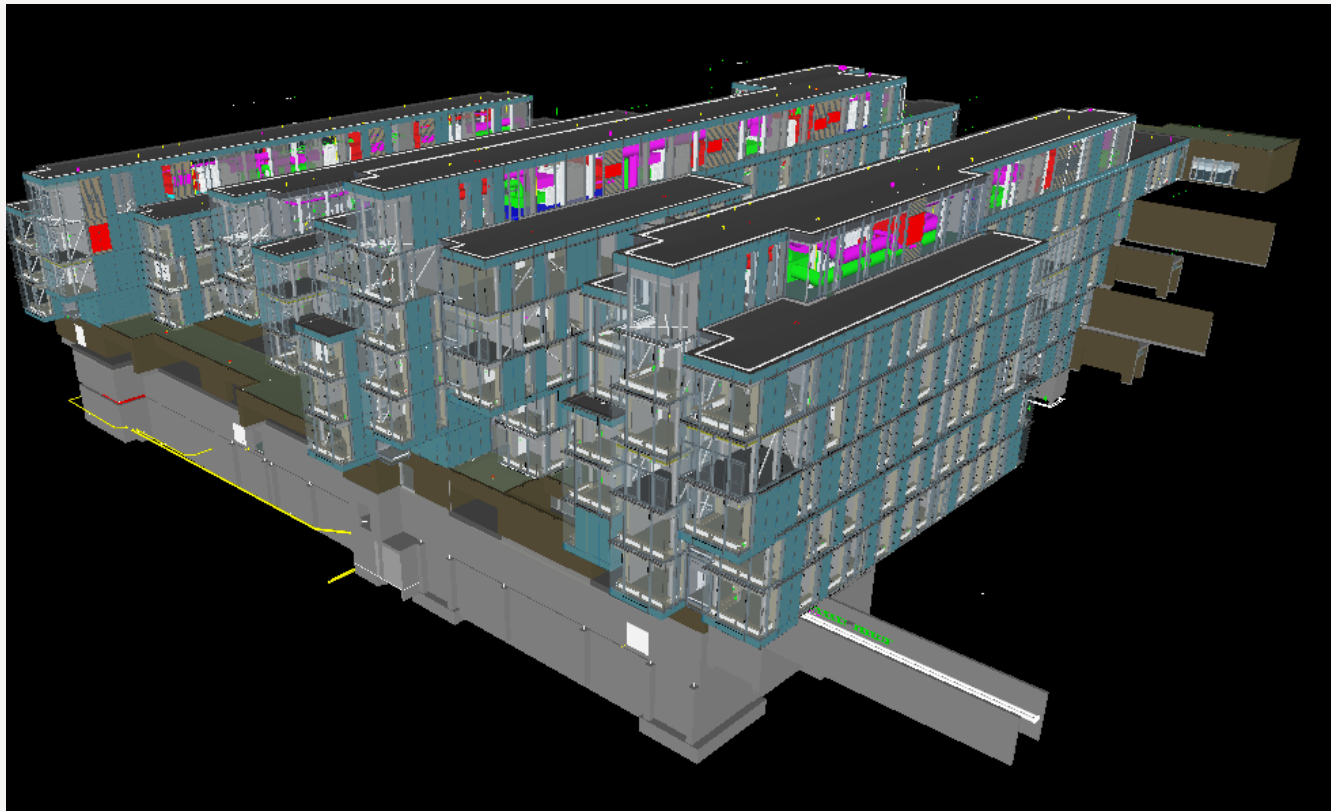
Working methodes - Solibri

Manages large files	All IFC- files for the entire Hospital be linked into the same 3D NW- file
Visual control	Check if the design intent is met by the Contractor
Clash Control	Clash control is mainly for the Contractor, but should be performed at certain milestones.
Tools for Meetings	Prepare a Solibri-file with viewpoints that matches the Agenda. Comments and followup is done in an XML-file

The Stages of BIM and openBIM



BUSP – HAUKELAND HOSPITAL



BUSP – HAUKELAND HOSPITAL

- > Client Helse Bergen
- > Size, Area / NOK: ca. 25.000 m²/ 1.310 mill. NOK
- > Engineering, COWI: Electrical, HVAC, Fire, Acoustics

- > Software :
 - ARCH: Revit Architecture
 - Construction: Revit Structure
 - HVAC: AutoCAD Architecture + MagiCAD
 - Electrical: AutoCAD Architecture + MagiCAD
 - interaction: Navisworks

BUSP – HAUKELAND HOSPITAL

➤ BIM-prosesses used in the project:

- During the Designphase the "BIM-model" from all diciplins was updated every fortnight and distributed via *Helse Bergen's* webhotel.
- The model was used in projectmeetings for visualization and to inform the Client
- In projectmeetings the model was used to detect conflict areas and to find good solutions to the problems.
- The Model was presented to future users in information meetings.
- The Contractors was presented the Model on the Tenderconference and got access to the model through the tender documents.
- *Helse Bergen* is planning to use TIDA as a collector of FDVU-documentation. The Supplier of TIDA is testing if information in the IFC-models to can be transferred to TIDA.

BUSP – HAUKELAND HOSPITAL

➤ Good Experiences

- Given the complexity of the buildings, a 3D model including informations helped get an understanding of the various implications of the desitions being made.
- For the engineers the detailed Architect model helped planning the best technical solutions.

➤ Not so good Experiences

- Helse Bergen's procedure for naming technical system was desided on very late in the prosess, which lead to additional work.
- It is still not possible to extract information from the IFC models to TIDA
- The Architects designprosess was too close to the MEP design in time.
- Lack of 3D-objekter in some objectdatabases f.eks. gass

..... NØS-NEW ØSTFOLDHOSPITAL



HELSE SØR-ØST

COWI

arkitektgruppen
nytt østfoldsykehus

NØS-NEW ØSTFOLDHOSPITAL

- > Client: Helse Sør Øst / PNØ (Prosjekt Nytt Østfoldsykehus)
- > Size,Area/ NOK: 82.500 m² / 5.090 MNOK
- > Engineering, COWI: HVAC, Electrical, Construction, Fire, Acoustics, Landscape, WWS, Design Management, Energy & Environment

- > Software :
 - ARCH: Revit Architecture
 - Construction: Revit Structure
 - HVAC: AutoCAD Architecture + MagiCAD
 - Electrical: AutoCAD Architecture + MagiCAD
 - Coordination: Solibri & Navisworks

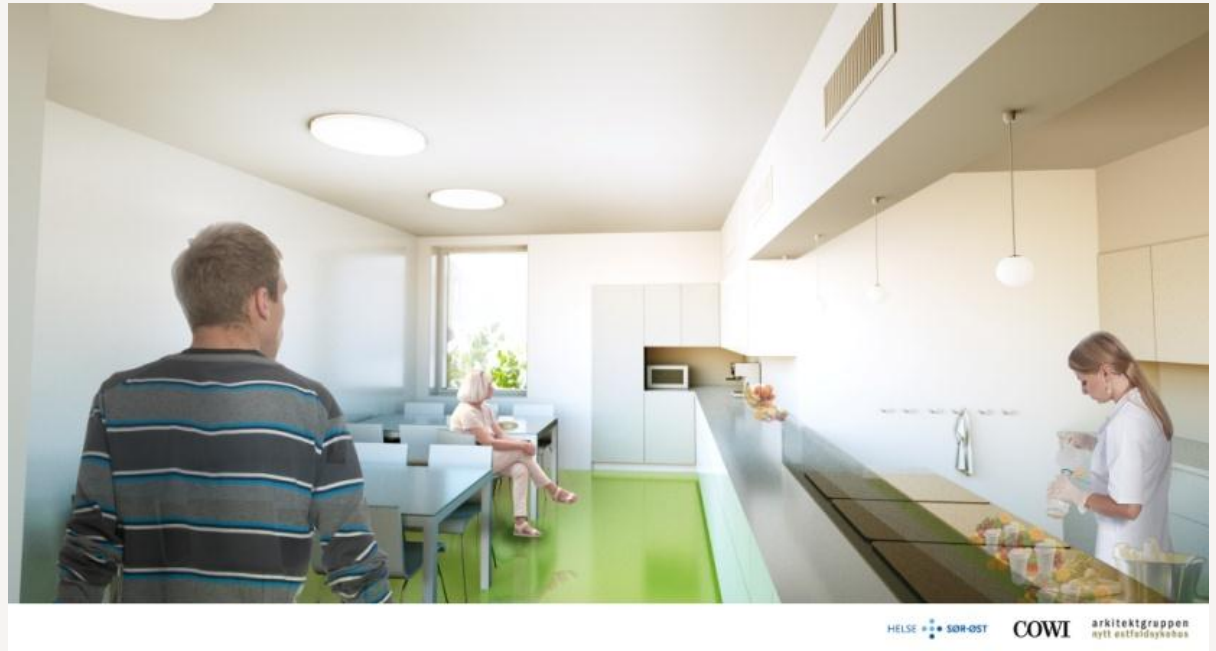
..... NØS-NEW ØSTFOLDHOSPITAL

BIM-prosesses used in the project:

- A Solibrimodell is made from all designmodels is issued every week and used in:
 - Meetings
 - Quality controls
 - Internal interdiscipline controls
- Synchronization of room-numbers and-names, area, equipment etc. between Architectmodel and Room database (dRofus)
- Export of Information from dRofus into the engineering models
- Visualization of projectplans through Navis Works Timeliner
- Energy calculations (IDA Ice)
- Massing and G-Prog
- Virtual buildings for testing

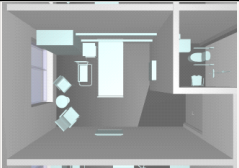
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- Further BIM-prosesser planned used:
 - Visualization for contractors, used in meetings etc.
 - Revit server



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Good Experiences: Visualisering in meetings with nurses and Doctors
Create minutes of meetings/ define responsibility in Solibri

COWI		01 Standardrom, master								
NYTT ØSTFOLD SYKEHUS - KALNES				arkitektgruppen nytt østfoldsykehus				HELSE SØR-ØST		
Modell navn		09.01 Føde barsel								
Bruker/kontrollør										
Firma										
Dato		June 22, 2011								
1050403000A230X000		Date: 2011-06-16 12:21:40 Application: Autodesk Revit Architecture 2011 IFC: IFC2X3								
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1050403000V000X000		Date: 2011-05-27 10:45:17 Application: MagicCAD HPV2010.5 SR-1 IFC: IFC2X3								
<p>Q&A of concepts / Use of Solibri for Clashcontrol</p> <p>Reviews of Alternatives</p>										
Møte nr.:										
01 Standardrom, master										
Nr.	Id	Rom nr.	Dato	Kontr.	Bilde	Møtets forslag til endringer i rom	Ansvar	Tiltak	Tiltak utført	Status
1	14	Rom 09.01.009 Sengerom	20-Jun-2011			Skap for pårørendeseng må påfodres i side for radiatorrør langsmed ydervæg.				Open

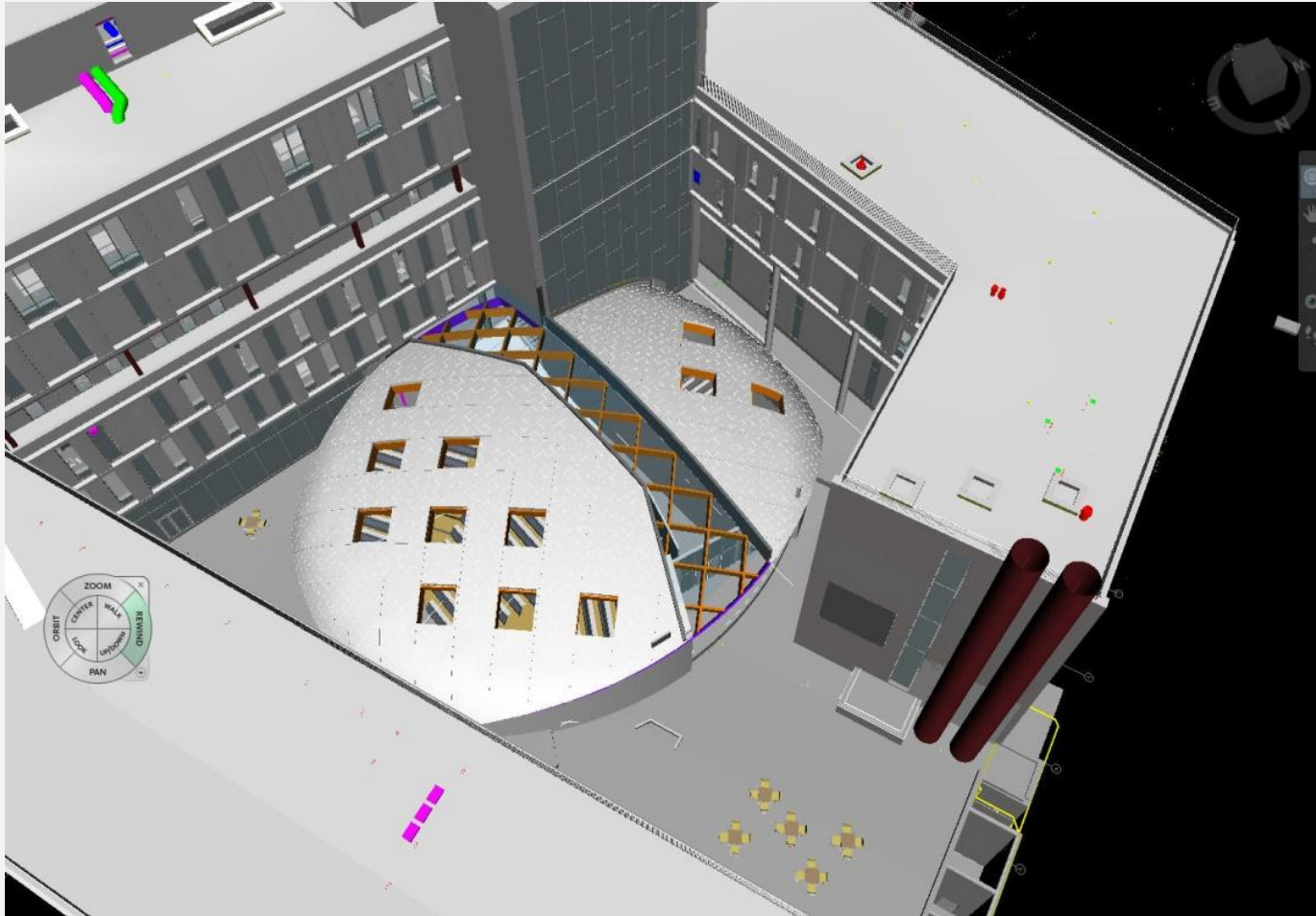
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➤ Not so good Experiences

- Large number of various designer Software
- Time consuming export to IFC-files
- High use threshold in Solibri clash detection
- High demands on Hardware
- IT-solution is not optimal for design teams on multiple locations.



ST/Olavs Hospital / KNOWLEDGE CENTER



St.OLAVS HOSPITAL , KNOWLEDGE CENTER

- > Client: Helsebygg Midt-Norge
- > Size, Area / price: 17 800 m2 / huskostnad kr. MNOK 385
- > Engineering, COWI: HVAC, Electrical, Construction, Fire, Acoustics and geotechnical Engineering

- > Software :
 - ARCH: Revit Architecture
 - Construction: Revit Structure
 - HVAC: AutoCAD Architecture + MagiCAD
 - Electrical: AutoCAD Architecture + MagiCAD
 - Coordination: Navis Works, Solibri Model Checker, Modellserver – Jotne EPM, IFC-modell m/viewer

..... Knowledge Center, COORDINATION

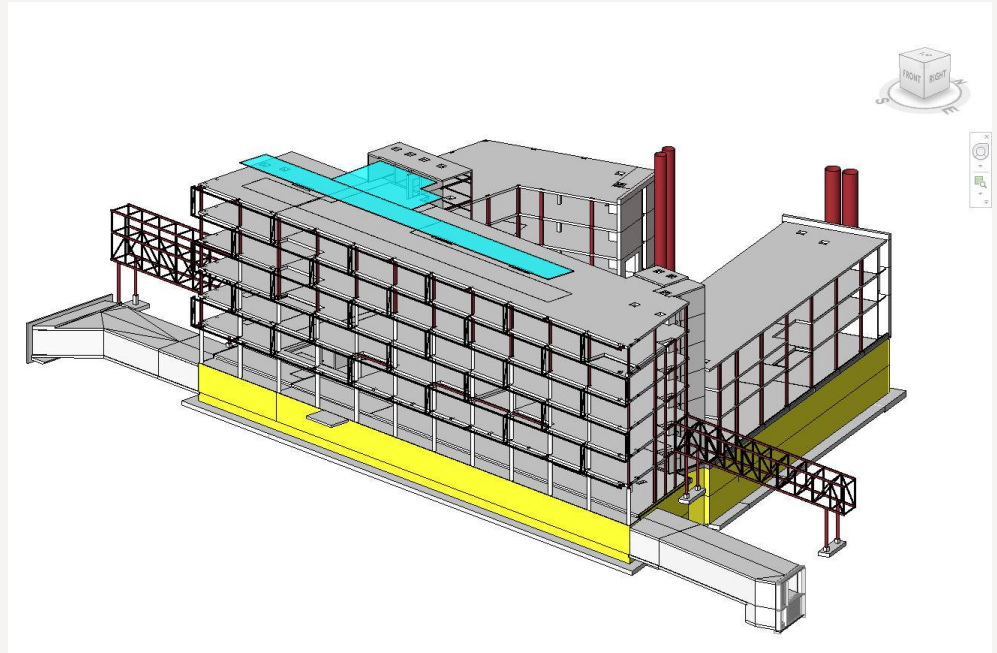
- Project office in Design Phase (SH1 og SH2)
- IFC-exsport to modelserver every fortnight
- ICE-meetings with model review
- Involving planning (VDC)
- "Takt"-plan in DP for interdisciplinary coordination
- Model Review

..... Knowledge Center, COORDINATION

- BIM-forum
- Productspecific objects i SH1
- supplier Clarifications
- IFC-model, konvertering og eksport
- Property sets / objektstruktur
- Structur / "mapping" in model server (systems)

..... Knowledge Center

- Good Experiences:
 - interdisciplinary coordination
 - involving Contractors
 - User Clarifications
 - Exchange informations
 - Not so good Experiences
 - Timeconsuming
 - IFC-exsport is timeconsuming
- Exchanging different fileformat



Summary

BIM is not something we do if we have the time

For the BIM-project to be successful every participant must define how they can benefit from BIM

For every action there is a interaction

Make a activityplan for when to put each information in the model, based on when it is needed to produse the next

Use every oportunity to play the 3D-model

Meetings, Workshops, presentations

When it is known that the model exists, encreases the demand for it.