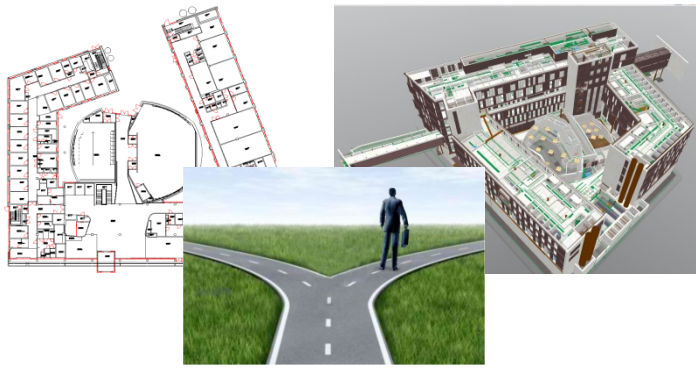
Jotne Information Technology

EDMmodel Server™

a system to manage lifecycle information from precinct planning to FM

and

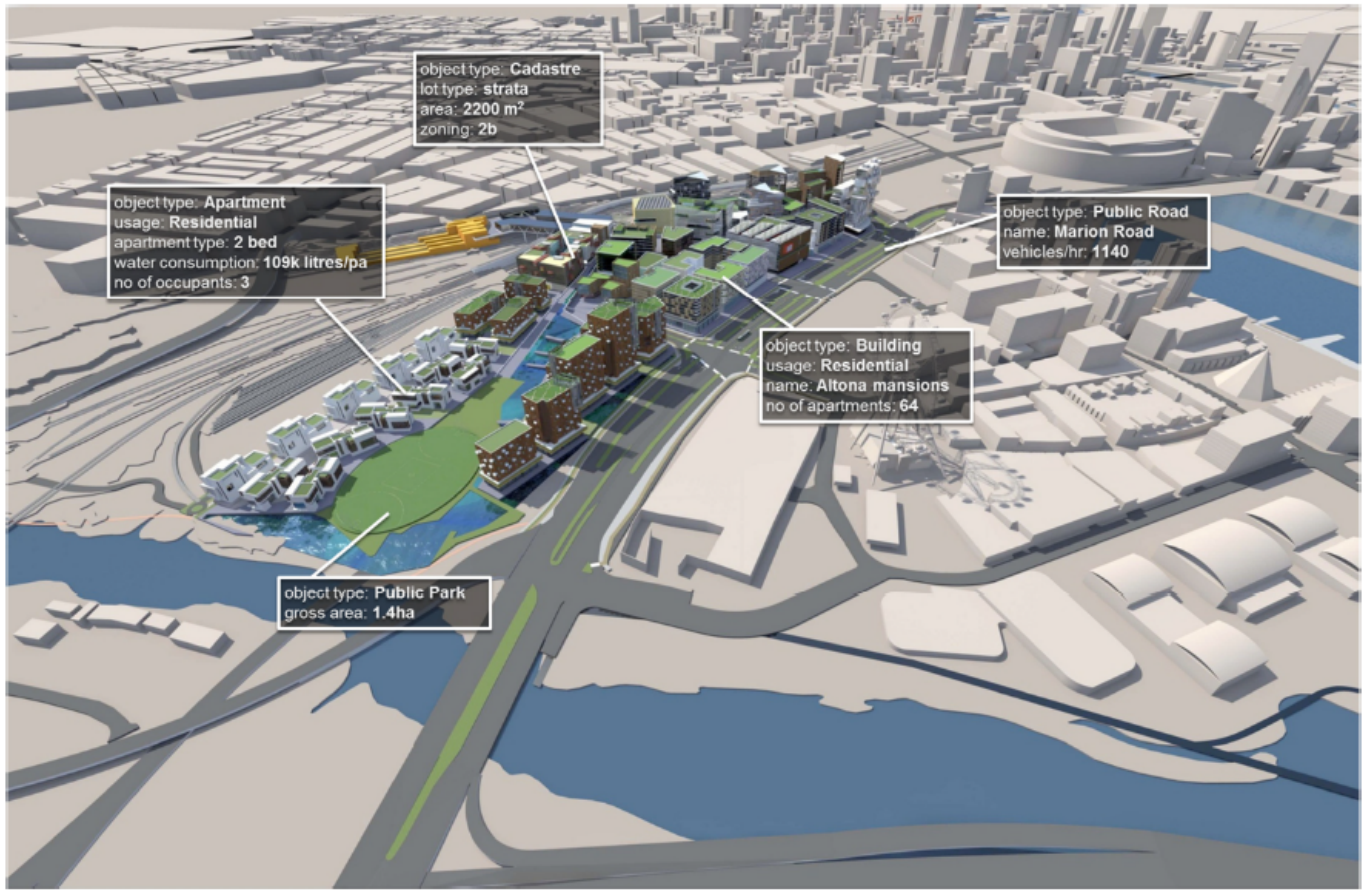
a status report from work with Kiewit Corp US and Helse Midt-Norge



Jotne EPM Technology AS, Oslo, Norway
Jorulv Rangnes: jorulv.rangnes@jotne.com

From Precinct design to operation

BIM everything, before and for design and operation
Use open standards - buildingSMART
Drastically reduce (not eliminate) drawings as source of information



BIM/VDC

- BIM/VDC is also Building Information Management, leading into Virtual Design and construction Master Data Management.
  - VDC combines vertical and horizontal constructions
- A BIM server is a capability for central management of data and processes that strongly enhances work processes in the construction and facility data

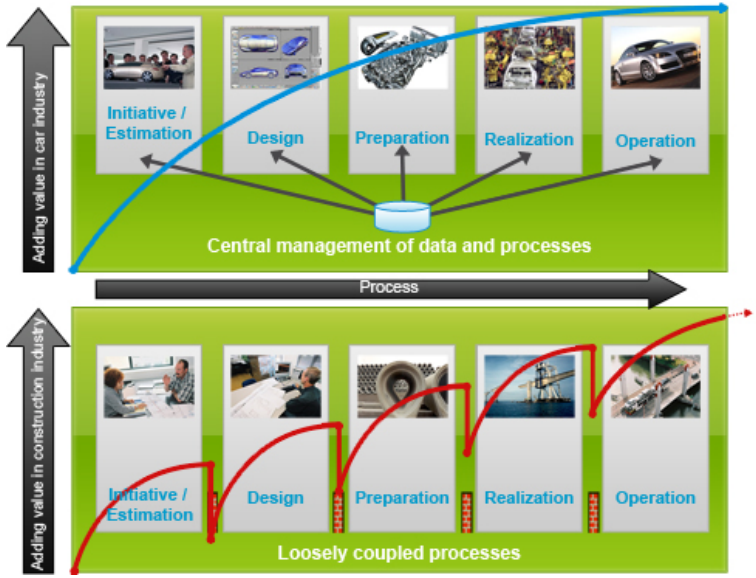


Figure 1: Central management of data and processe

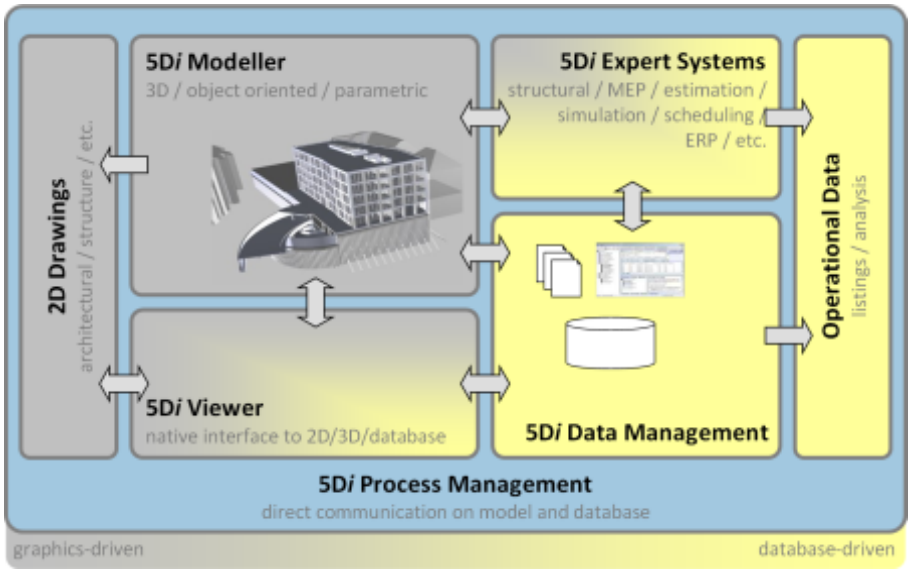


Figure 2 Integration using a BIM/VDC Server

(courtesy of ENCORD & 5d-initiative.com)

Flexible Server Architecture

Jotne

1

FM
Health Departement (Norway)

Future Servers

Servers being established

Plug-in of new server is role-based and transparent, e.g. the user will not know which server he is working on.

FM
Region North

FM
Region Middle

FM
Region West

FM
Region South & East

BIM Server(s) to aggregate FM information from many hospitals

2

FM
St. Olav Hospital

FM
AHUS

FM
Nytt Østfoldsykehus

FM
Psykiatrien i Vestfold

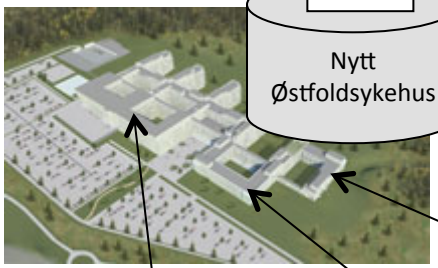
FM
Vestfold

BIM Server(s) for FM and Operations of Hospitals

3

PRJ
St. Olav Hospital

PRJ
Knowledge Centre



PRJ
Nytt Østfoldsykehus

PRJ
Building #1

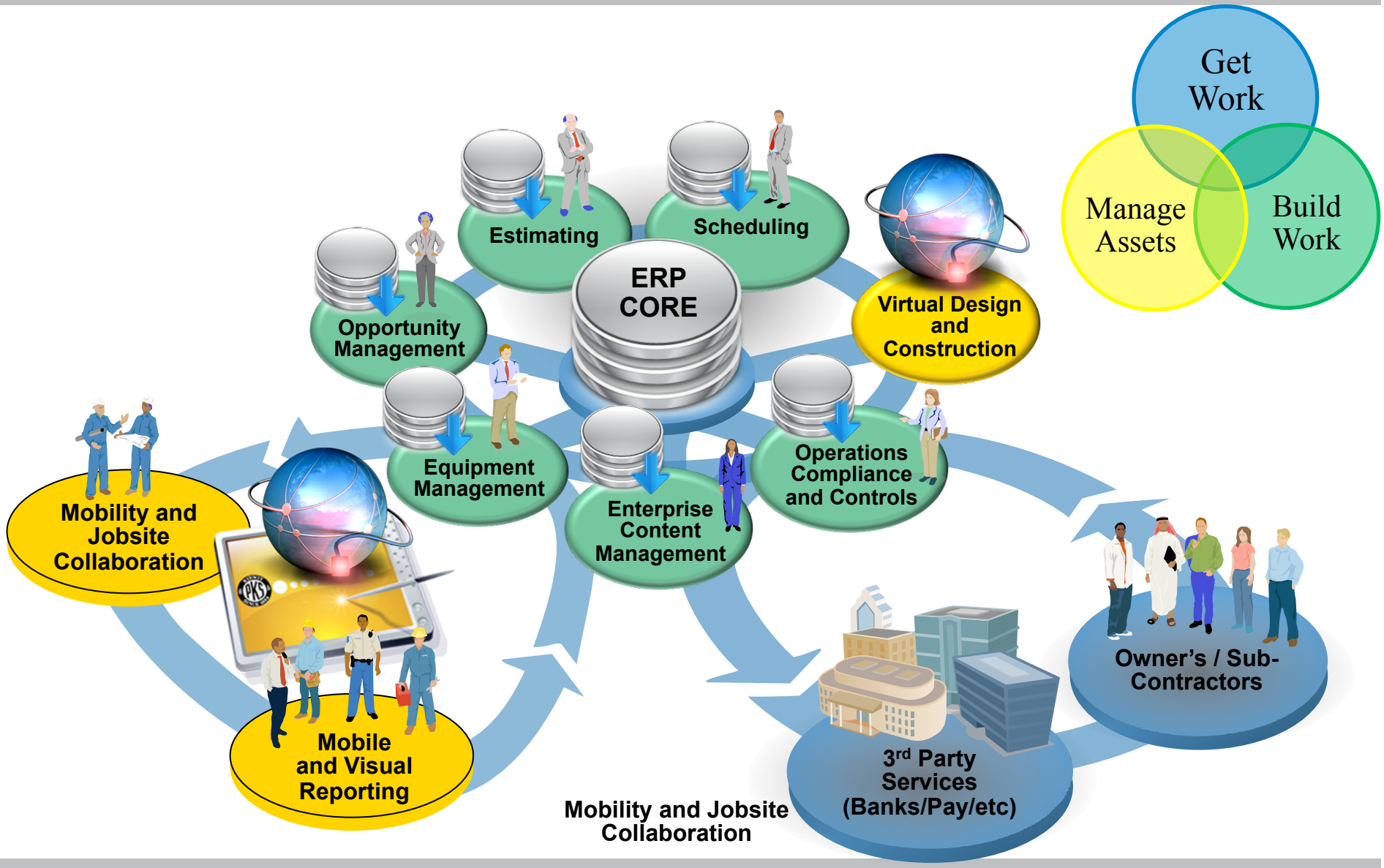
PRJ
Building #2

PRJ
Building #3

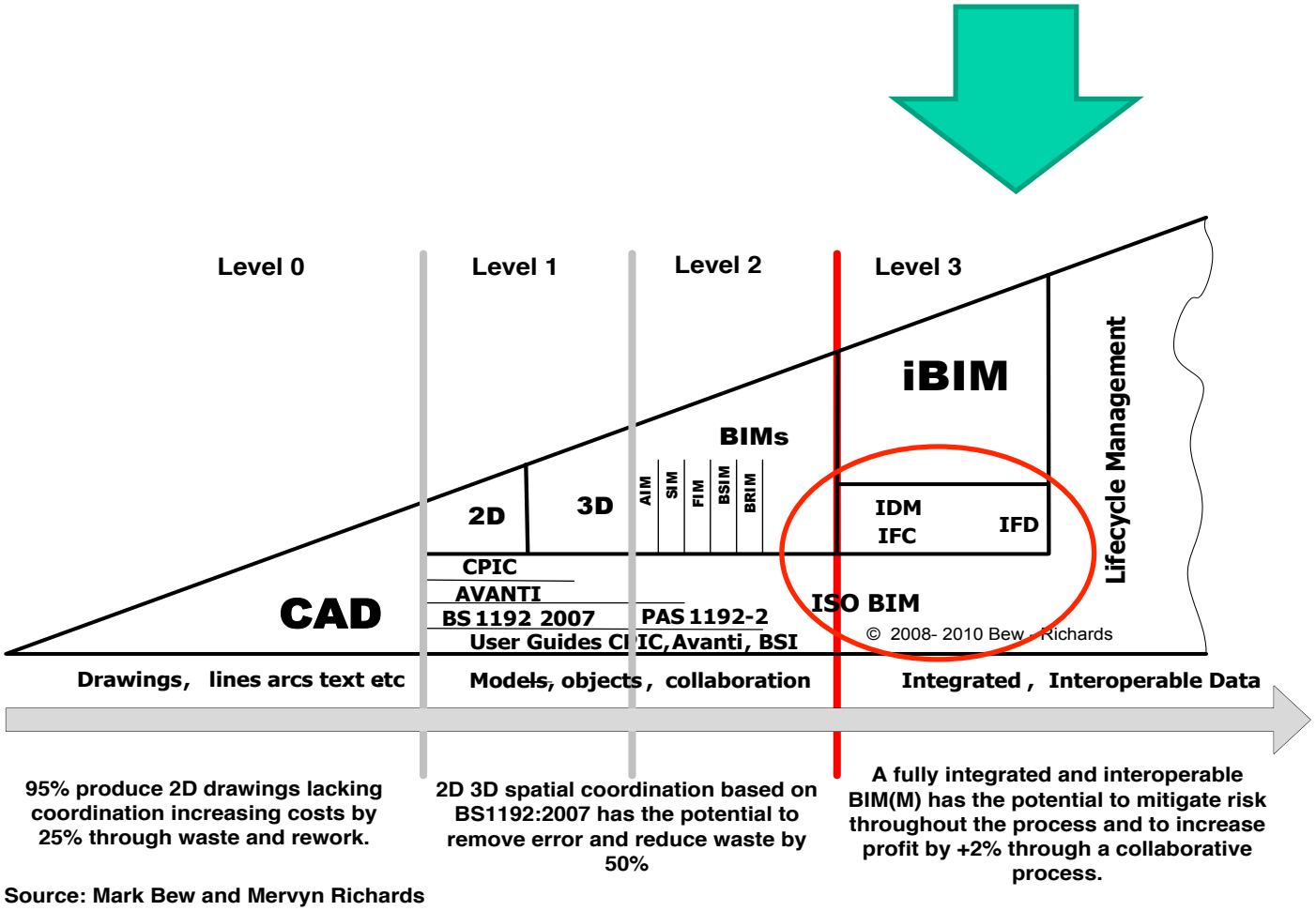
BIM Project Server(s) that aggregates VDC information from other BIM Project. Servers(building , discipline, contract, etc.)

4

ERP for Construction

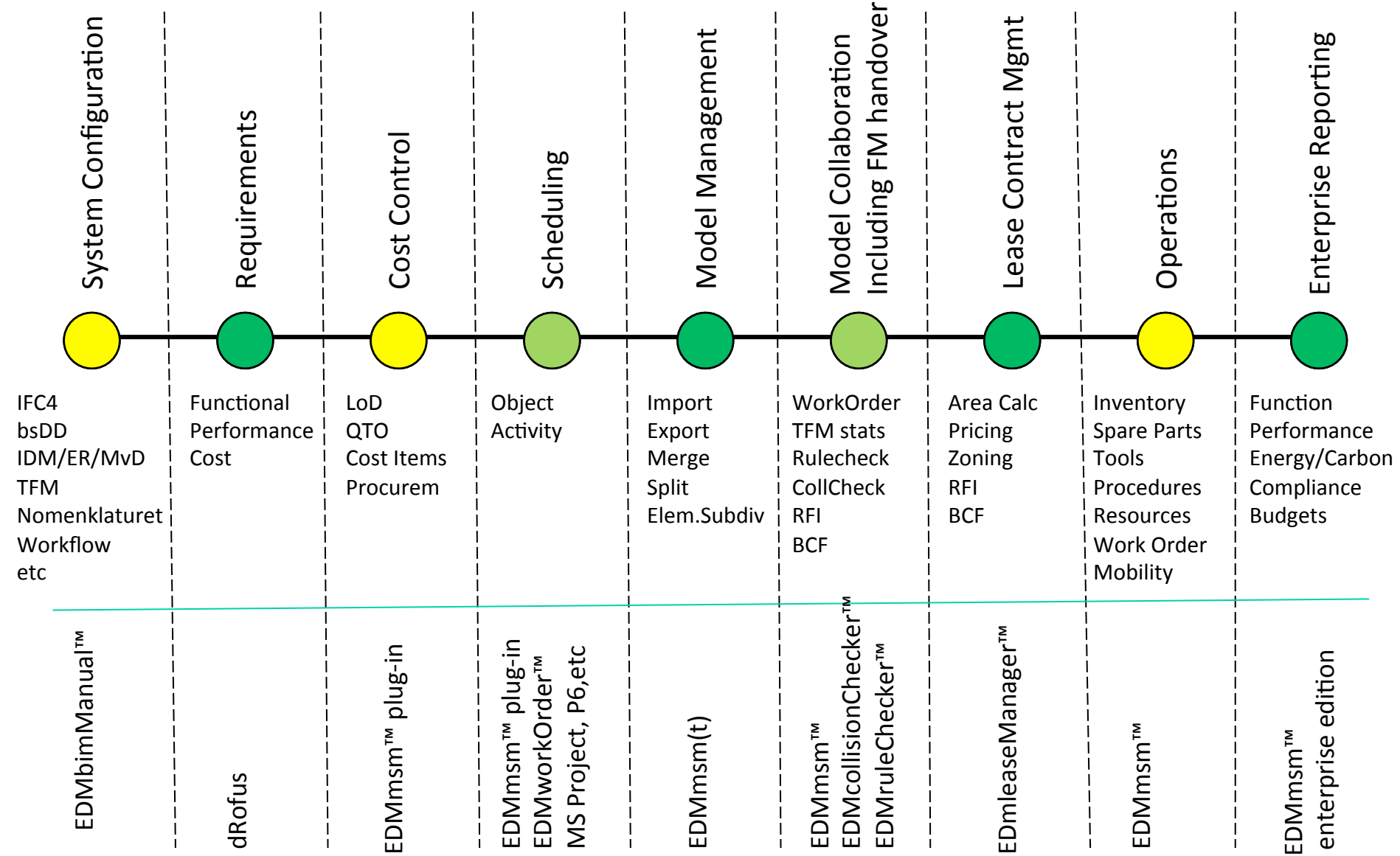


Jotne delivers EXPRESS Data Manager™

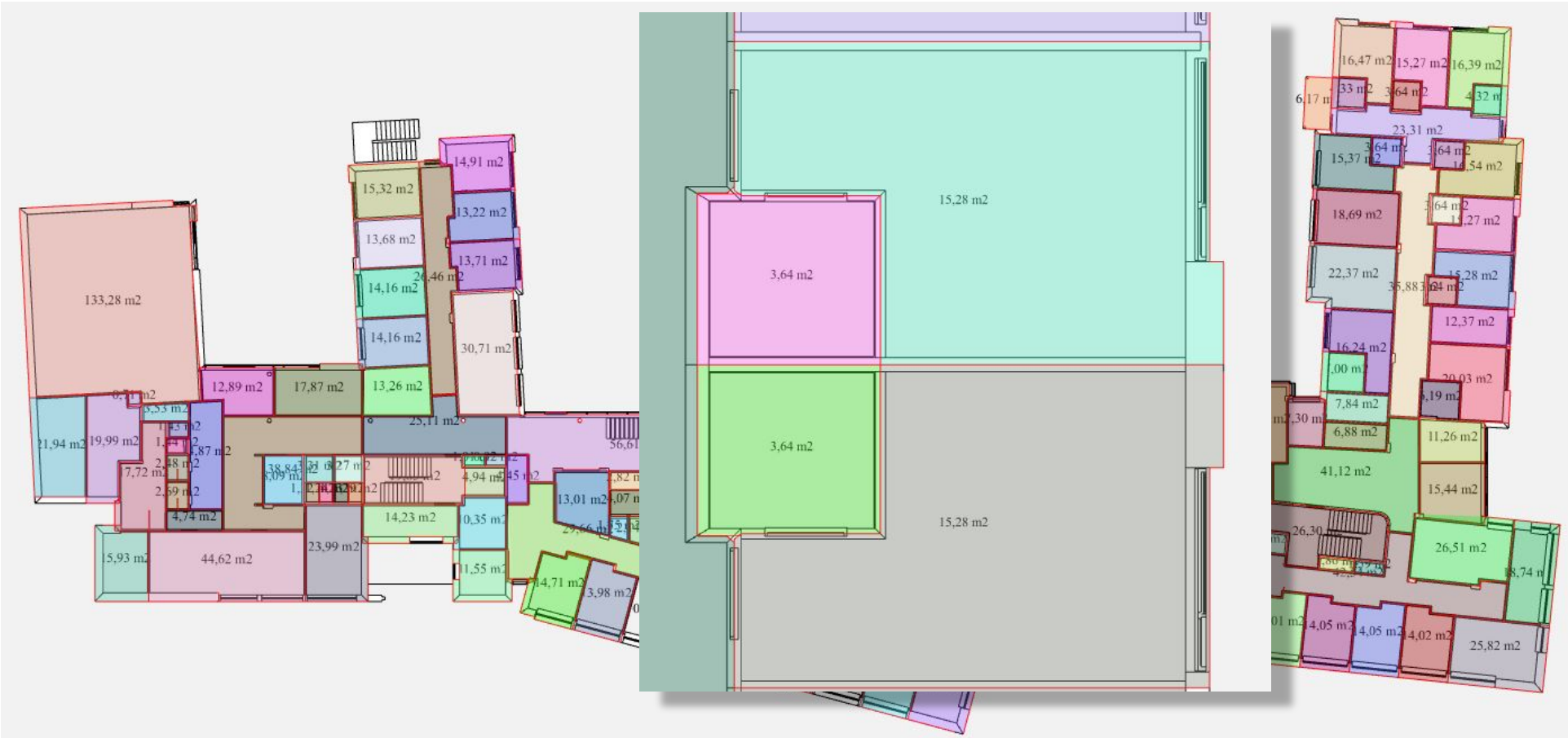


Source: Mark Bew and Mervyn Richards

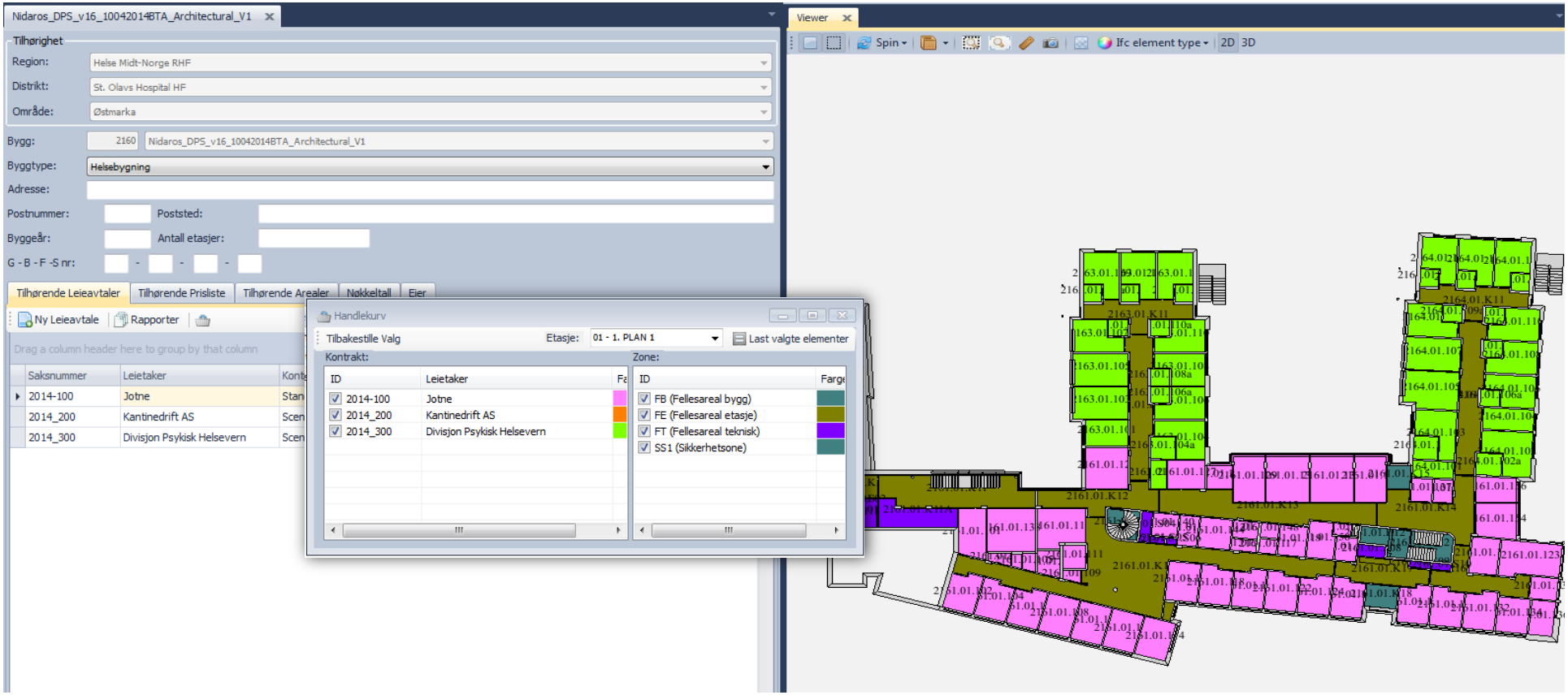
From design to operation, a roadmap



Zoning, AreaCalculation, Presentation



Åpningsbilde for valgt bygning
Alle avtaler vises i viewer, med deres aktuelle farger



Printer friendly and Template-driven

Leieavtale
St.Olav Eiendom

Avtale nummer: 2014-100

Parter

Utleier :	St. Olav Eiendom
Ansvarssted :	
Leietager :	Jotne
Ansvarssted :	12345

Leieobjekt (jfr. kontraktens punkt 2)

Adresse :	0607 oslo
Leieobjektet skal brukes til :	Helsebygning

Leieobjekt:

	Areal (BTA)			
Lokasjon :	Eget areal	Fellesareal	Sum	Kommentar
2160 Nidaros_DPS_v16_10042014BTA_Architectural_V1	601,62	919,85	1521,47	

Leiesum (jfr. kontraktens punkt 3)

Kostnader:	Pris pr m2	Eget areal	Fellesareal	Sum
Grunnleie:	1550,00	932 503,25	1425 772,75	2 358 276
Felleskostnad	200,00	120 323,00	183 970,68	304 294
Total leiesum				2 662 570

Brukerkostnad:	Pris pr m2	Eget areal	Fellesareal	Sum
Energi:	540	601,62		324 872
Fakturagrunnlag totalt				2 987 442

Leieforholdets varighet (jfr. kontraktens punkt 5)

Leieforholdet løper fra	2014.5.8	til	2014.10.31
Første regulering		utgangsindeks	

Sted / Dato

Utleiers sign. | Leietagers sign.

Leietagers kontaktperson: Pål Huse

Utleiers kontaktperson/saksbehandler: Pål Huse

Fakturagrunnlag ra

for periden fra og me **4.10.31**

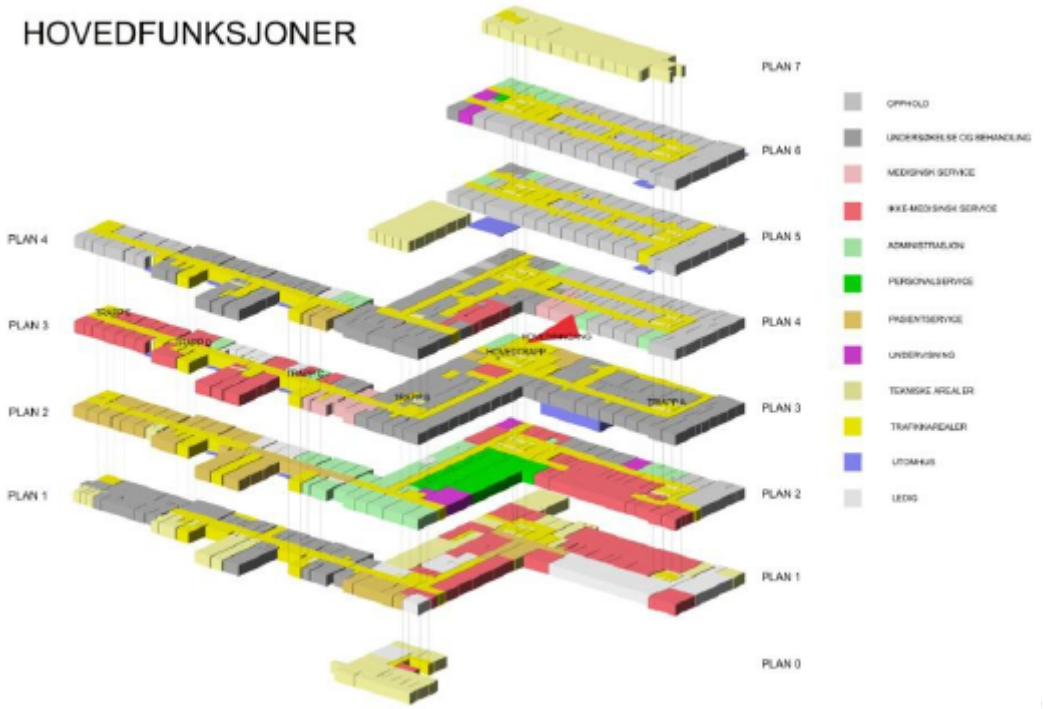
Leietagernummer: 100

Avtale: 201 **s_DPS_v16_10042014BTA_Arch ral V1**

Leieobjekt	Lok.	Leirett (m2)					Felleskost for fellesareal (kr/m2)	Sum felleskost for FA (kr)	Årsleie (sum LR + sum FA (kr)	Sum felles kostnad (kr)	Sum (kr)
2161.01.101 - Student	Helse Midt	15,47					200	2365,32	30320,50	3912,32	34 233
2161.01.102 - Kontor	Helse Midt	13,68					200	4183,27	53624,35	6919,27	60 544
2161.01.103 - WC	Helse Midt	2,74					200	837,88	10740,55	1385,88	12 126
2161.01.104 - Kontor	Helse Midt	13,84					200	4232,20	54251,54	7000,20	61 252
2161.01.105 - WC	Helse Midt	4,35					200	1330,21	17051,60	2200,21	19 252
2161.01.106 - Kontor	Helse Midt	13,84					200	4232,20	54251,54	7000,20	61 252
2161.01.107 - Stellerom	Helse Midt	6,85					200	2094,69	26851,38	3464,69	30 316

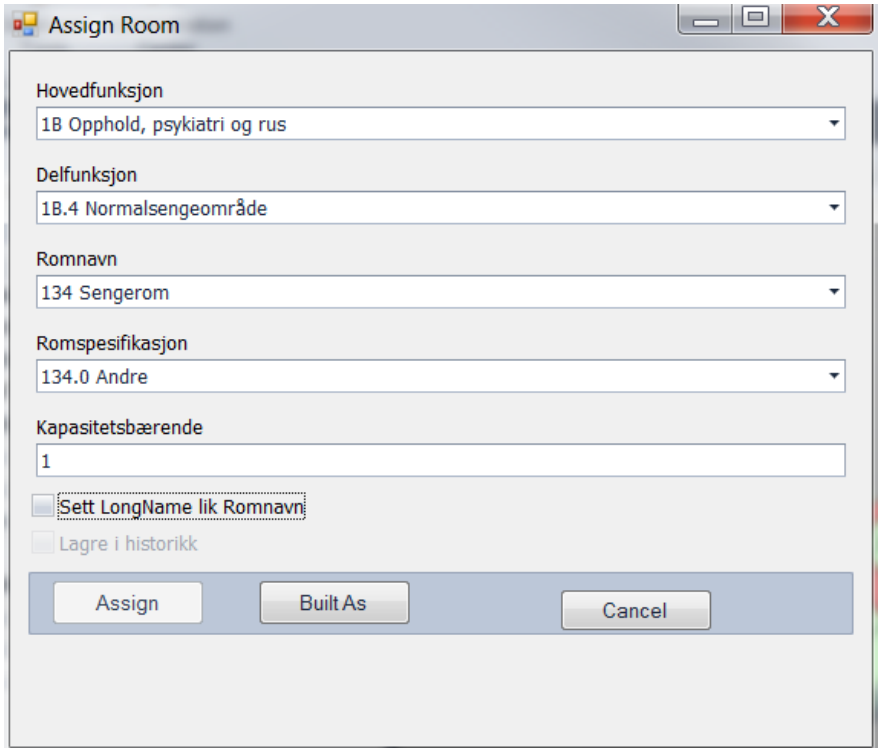
”Nomenklaturet”

Classification system for health care buildings in Norway. Rooms are classified according to their functions, distinguishing between capacity bearing and other functions.
«Nomenklaturet» (by The Norwegian Directorate of Health) is implemented in EDM BIM manual



”Nomenklaturet”

- Select one or several rooms for which a classification is to be assigned in one go.
- Rooms are classified via a GUI dialog, which reads legal combinations from the BIM manual definitions of Nomenklaturet.
- Classification is written to space object as a separate property set (with classification codes and textual values).
- History of assigned classifications is maintained.
- Assign a «Built-As» classification



”Nomenklaturet”

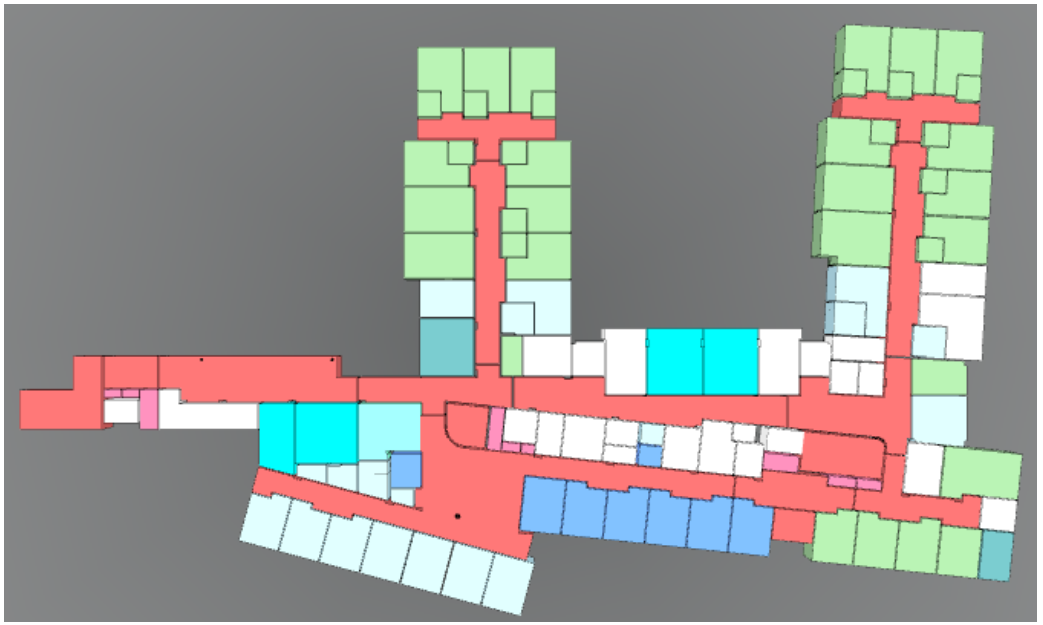
Create reports e.g. grouped by ”Main- and sub-function”, space areas summed per sub-function.

Hovedfunksjon | Delfunksjon

Nummer	Navn	Etg	BTA_space	Romnavn	Romspesifikasjon	Kapasit...
			SUM=197,42 m²			
Administrasjon						
			SUM=114,52 m²			
Opphold, psykiatri og rus						
Dagområde						
2161.01.107	Stellerom	01	6,85 m²	Ammerom	Andre	
2161.01.109	WC	01	2,26 m²	WC	Personal	
2161.01.154	Møte	01	17,47 m²	Møte	Andre	1
2163.01.101	Samtale	01	13,13 m²	Samtale	Andre	
2164.01.103a	HC bad	01	6,47 m²	Bad	M/ badekar	
2163.01.104	HC-rom	01	17,03 m²	Trening	Andre	
2164.01.103	HC-rom	01	16,80 m²	Trening	Andre	
2161.01.106	Kontor	01	13,84 m²	Kontor	Antall plasser	1
2161.01.110	Kontor	01	14,59 m²	Kontor	Antall plasser	1
2161.01.104	Kontor	01	13,84 m²	Kontor	Antall plasser	1
2161.01.108	Kontor	01	14,59 m²	Kontor	Antall plasser	1
2161.01.112	Kontor	01	14,59 m²	Kontor	Antall plasser	1
2161.01.102	Kontor	01	13,68 m²	Kontor	Antall plasser	1
2161.01.103	WC	01	2,74 m²	WC	Personal	
2163.01.104a	HC bad	01	6,46 m²	Bad	M/ badekar	
2161.01.105	WC	01	4,35 m²	WC	Personal	
2161.01.148	WC	01	2,98 m²	WC	Andre	
2161.01.114	Kontor	01	14,54 m²	Kontor	Antall plasser	1
2164.01.102a	HC-bad	01	6,58 m²	Bad	M/ badekar	
			SUM=202,79 m²			
Normalsengeområde						
2161.01.134	Kontor lege	01	13,03 m²	Kontor	Andre	1
2161.01.128	Kontor avd.	01	13,84 m²	Kontor	Andre	1
2161.01.130	Kontor ass. avd.	01	13,85 m²	Kontor	Andre	1

View spaces with color coding according to their classifications.

Here the various ”sub-functions” are colored according to the corresponding colors in the report



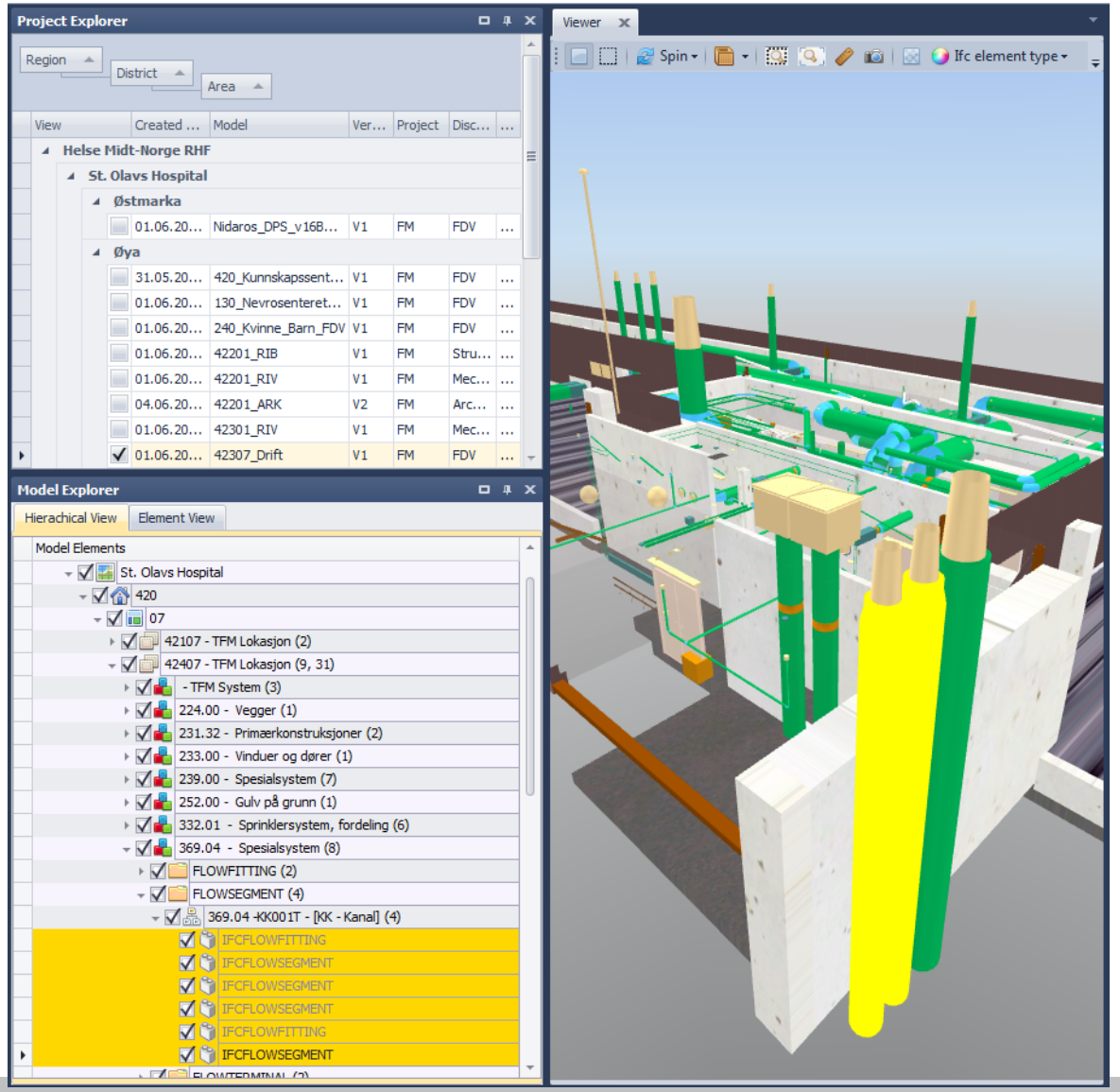
TFM

Navigate in model
based on TFM codes

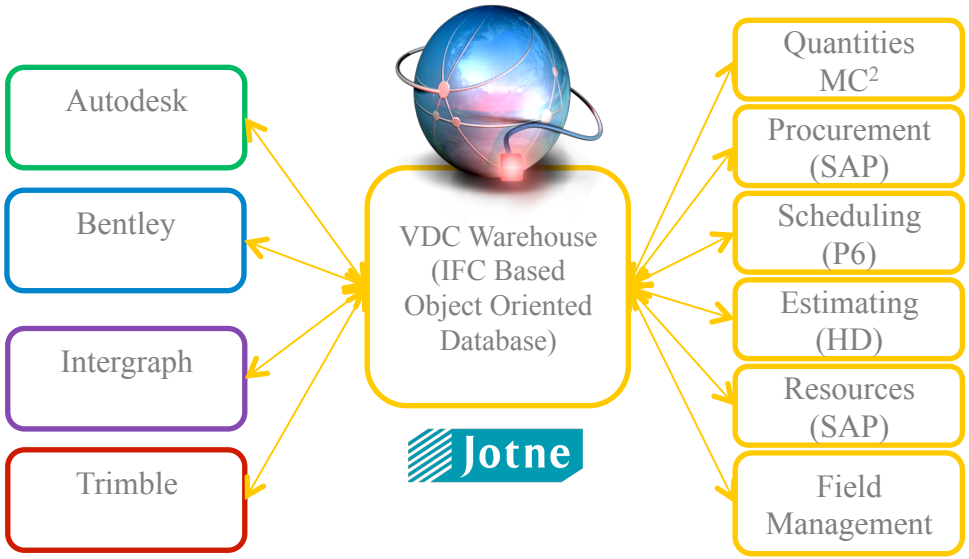
Wing →

System →

Type object →



Cost of lack of Interoperability



NIST documented in 2004 that US Capital facility alone have an annual cost of $15.8B from lack of interoperability. This cost is basically paid by owners and operators, and that do not have a system for managing their asset data coming from their multi $B projects.

NIST GCR 04-867

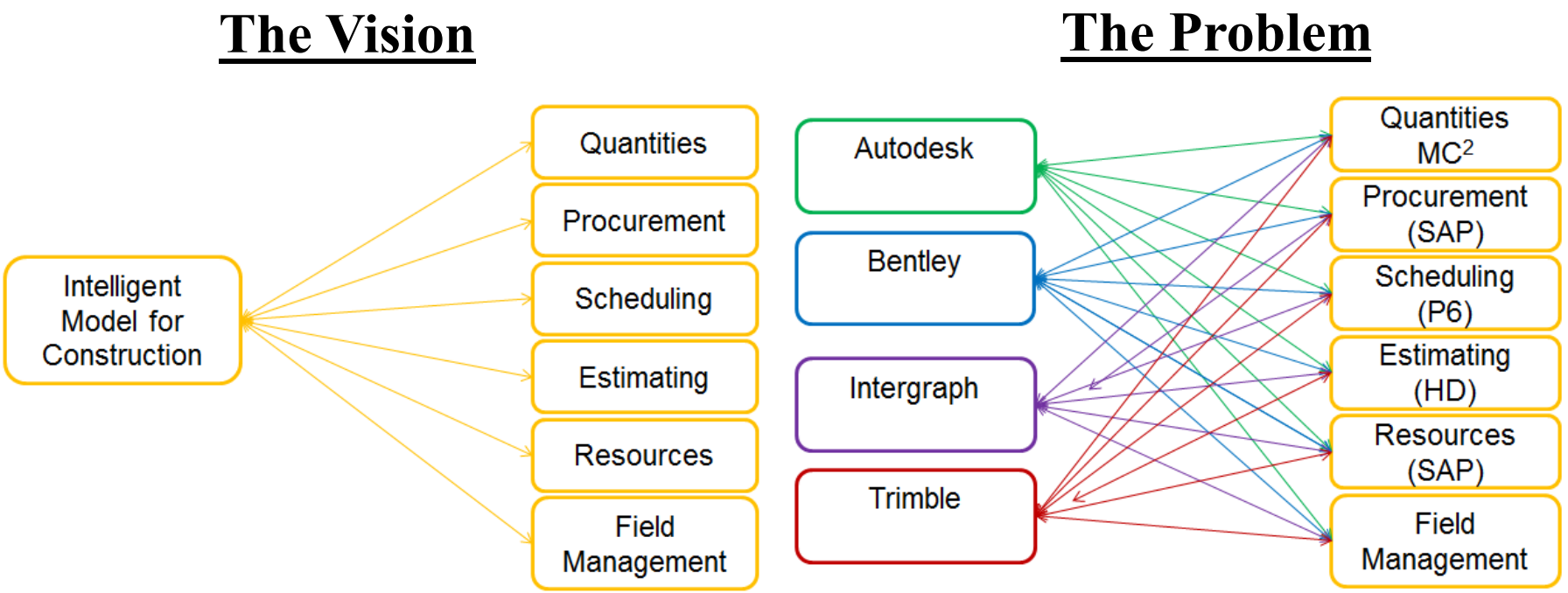
NIST U.S. Department of Commerce Technology Administration National Institute of Standards and Technology

Advanced Technology Program Information Technology and Electronics Office Gaithersburg, Maryland 20899

Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry

Michael P. Gallaher, Alan C. O'Connor, John L. Dettbarn, Jr., and Linda T. Gilday

Vision


The Vision
Intelligent Model for Construction
Quantities
Procurement
Scheduling
Estimating
Resources
Field Management
The Problem
Autodesk
Bentley
Intergraph
Trimble
Quantities MC²
Procurement (SAP)
Scheduling (P6)
Estimating (HD)
Resources (SAP)
Field Management

BIM or VDC Strategy ?

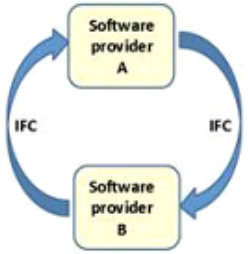
Why establish an openBIM strategy?

- Give clear direction to the organization.
- Ensure proper focus from top-level management - throughout the organization.
- Focus on "business objectives" rather than technicalities.
- Give clear signals to the building industry, in relation to where South-Eastern Norway Regional Health Authority is moving.

openBIM Strategy: Requirements to the models and storage formats

- All information in projects to be stored on open international formats (IFC – latest available version)
- Provide full isometrics, in order use the model directly in the industrialization process.
- The following text shall be included in our new BIM-contracts:

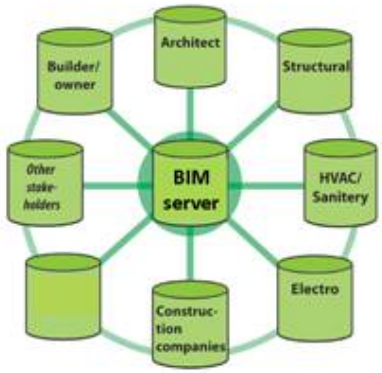
  From 01.01.2014 *the complete information produced by architects, consultants, contractors, etc., in their software applications, should be exported to openBIM (IFC). All information shall be stored on the latest publicly available version of the openBIM IFC format. Similarly, software applications should be able to import all the data stored in openBIM (IFC).*



Complete Round-trip

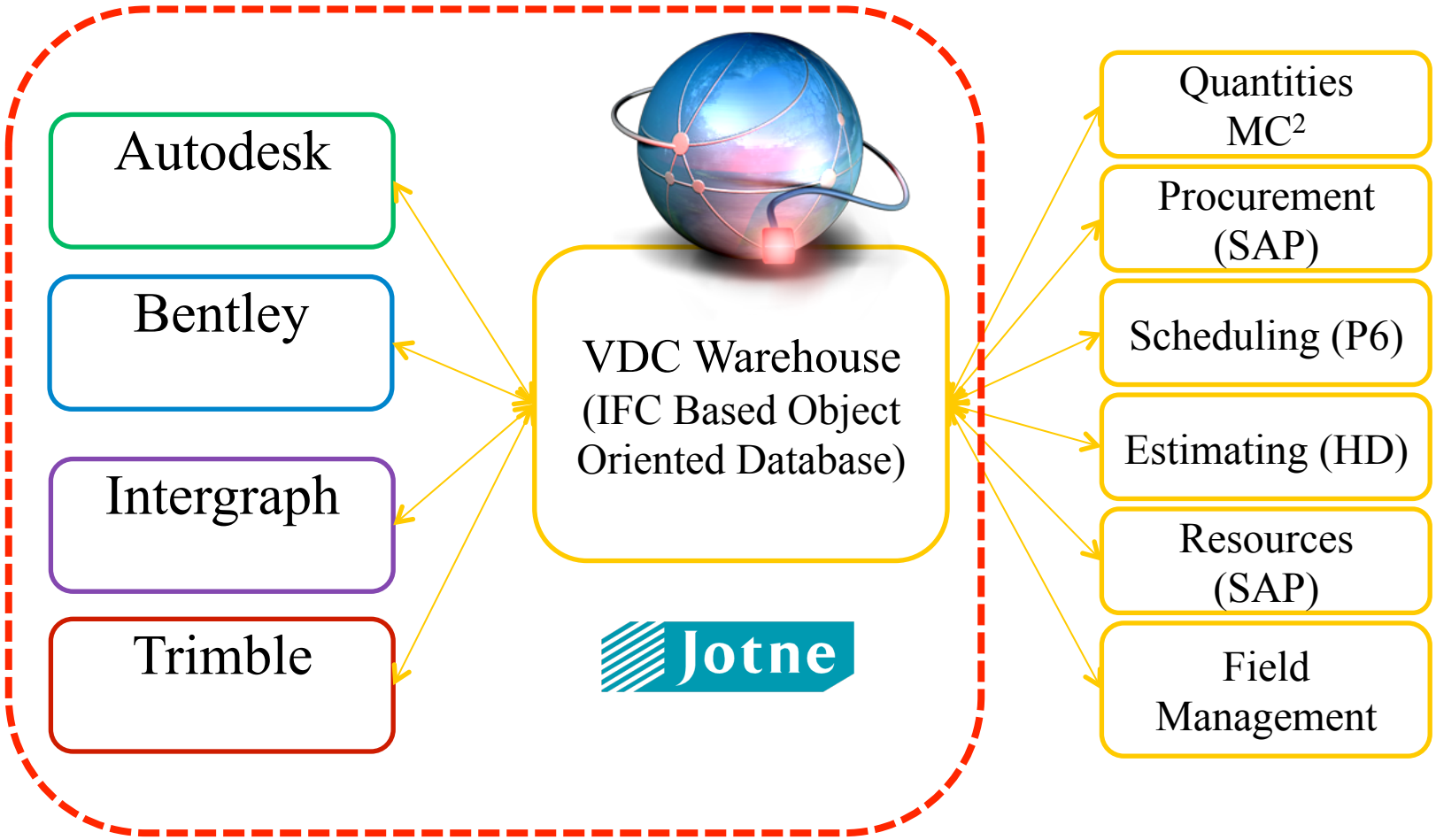
openBIM Strategy: Implementation of BIM-server

- BIM-server for both building projects and Facility Management

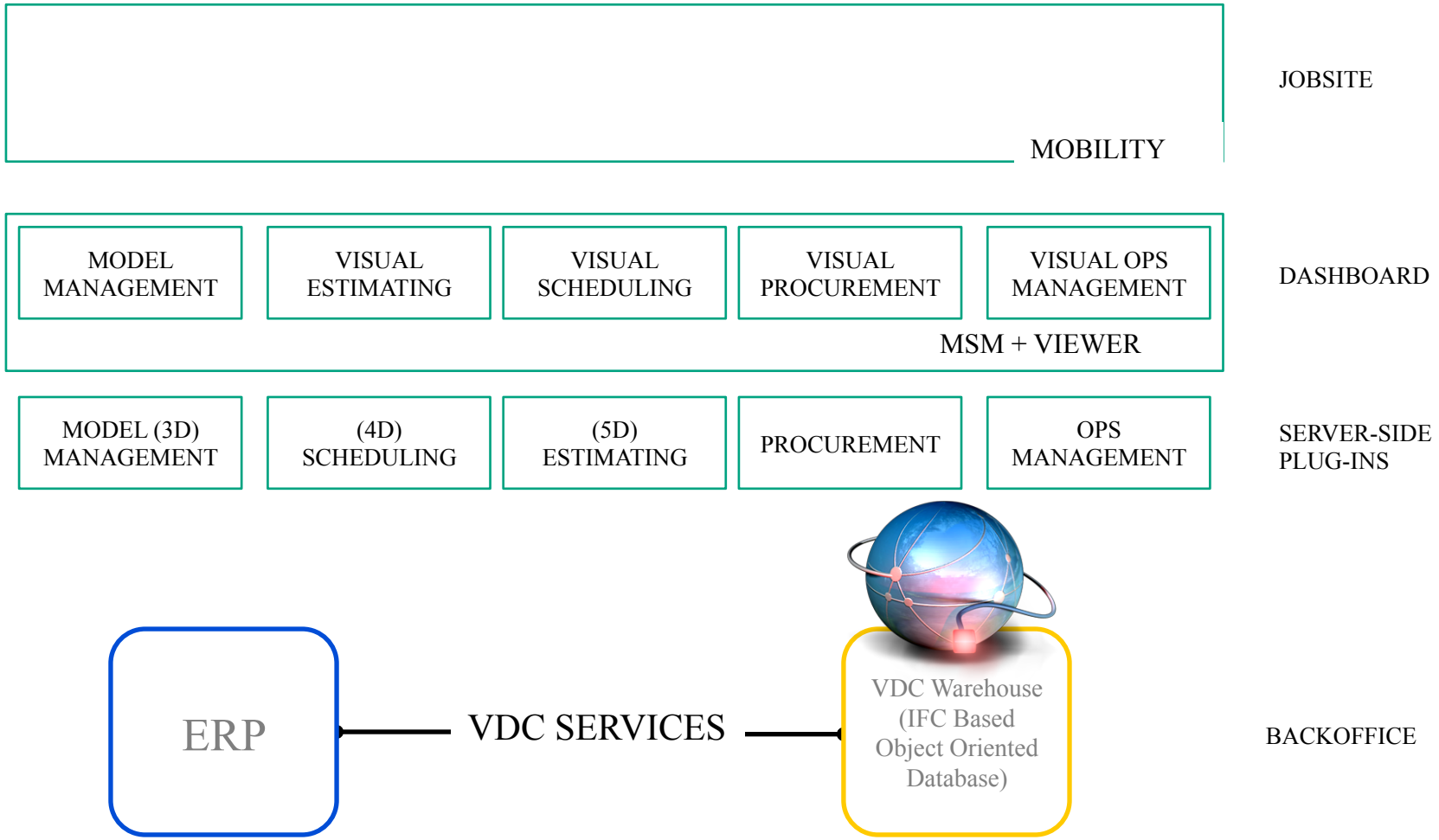


HELSE SØR-ØST

The Solution



VDC Warehouse Overview



Pillars of data interoperability

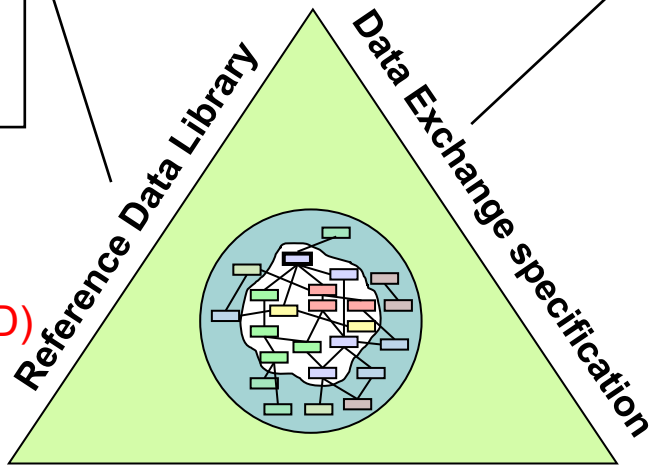
Defines domain concepts and their inherent constraints

ISO 15926-4

ISO 12006-3 IFD (bsDD)

OASIS PLCS RD

...



Defines the scope of an exchange for a given process

ISO 15926-7

ISO 29481 IDM

OASIS PLCS DEX

...

ISO 15926-2

ISO 16739 (IFC)

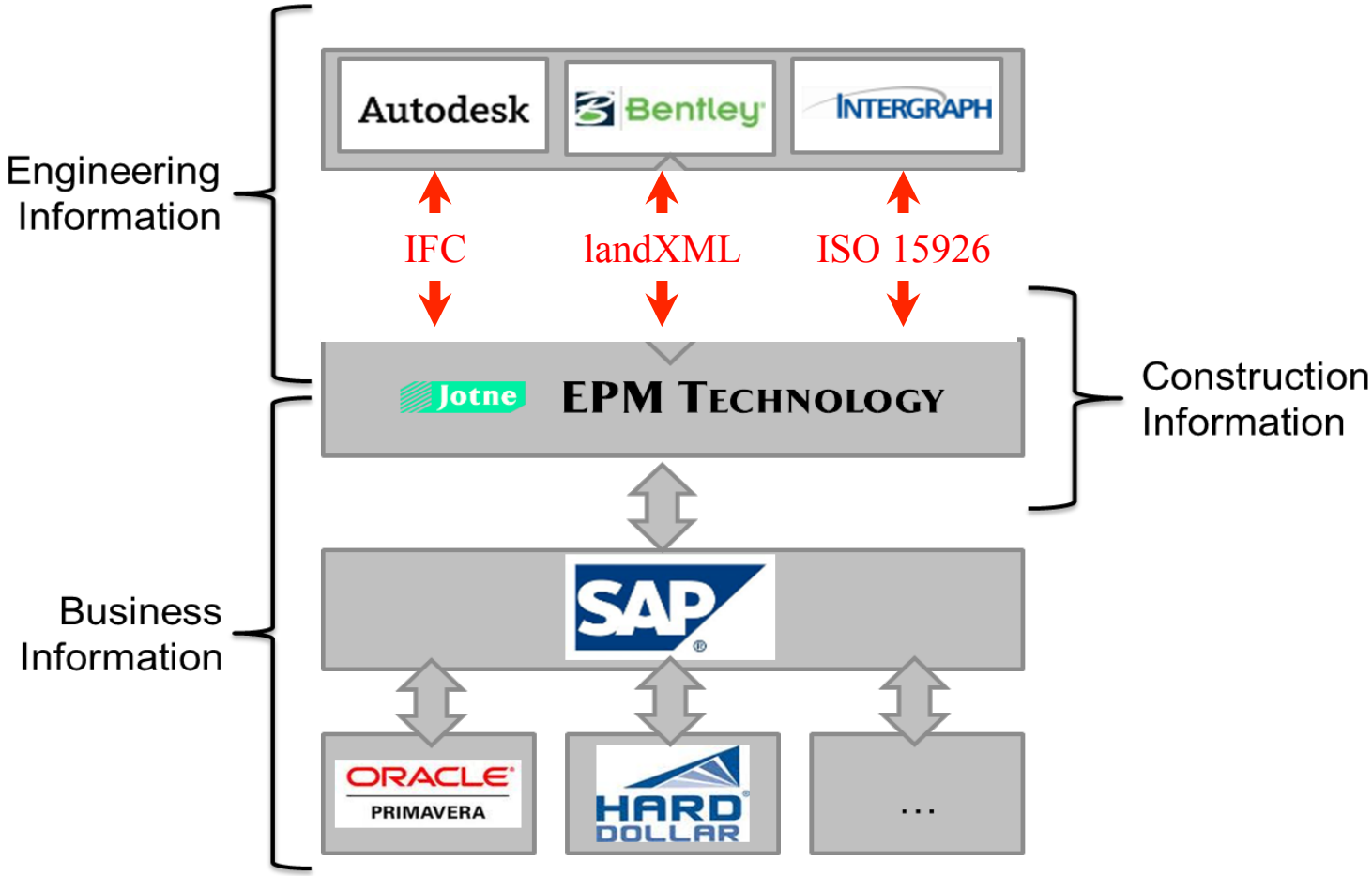
ISO 10303-239 (PLCS)

ISO 19100 (GML)

...

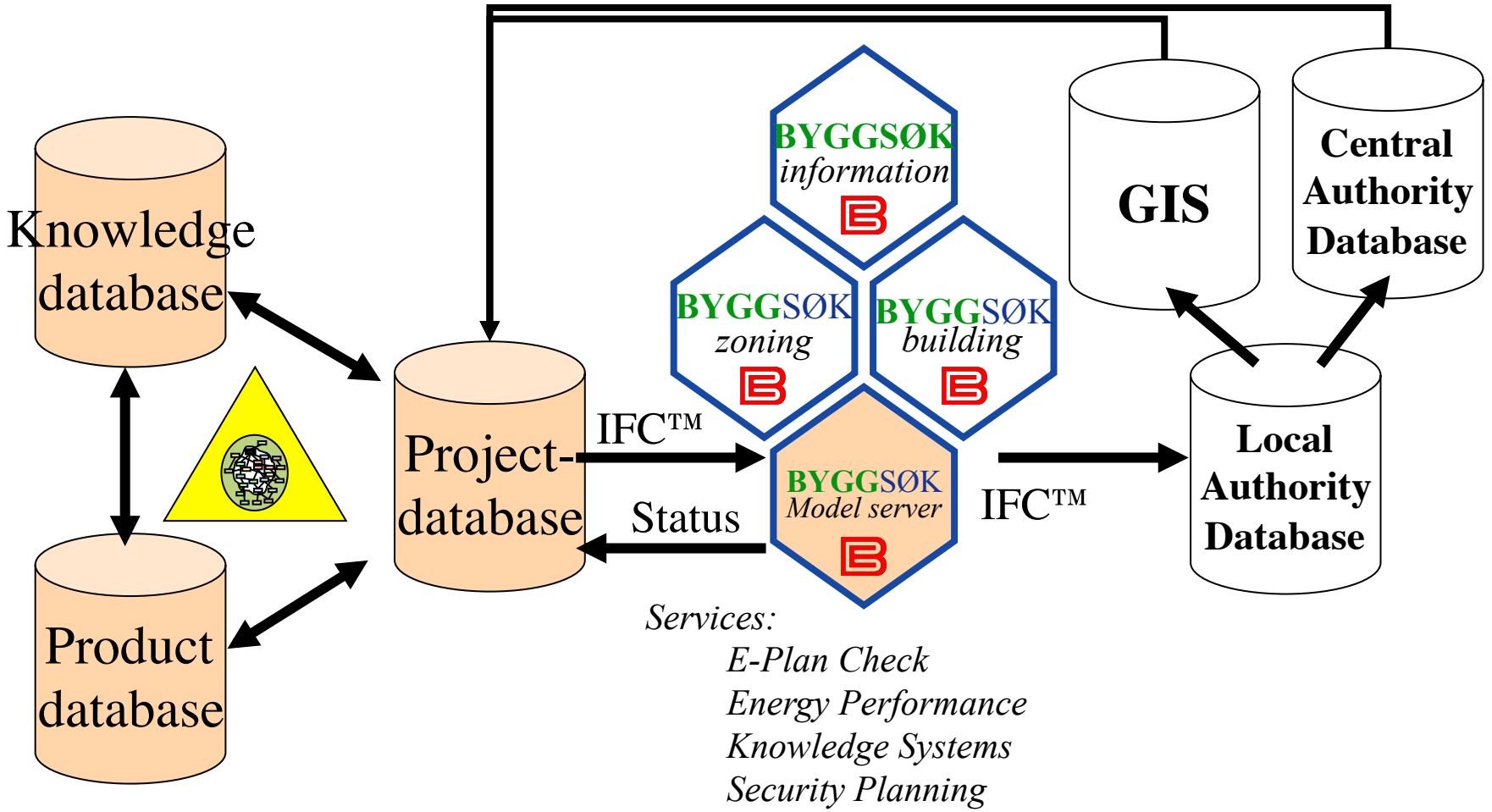
The basis for defining valid data structures that can be exchanged/ shared

Virtual Design and Construction (VDC)



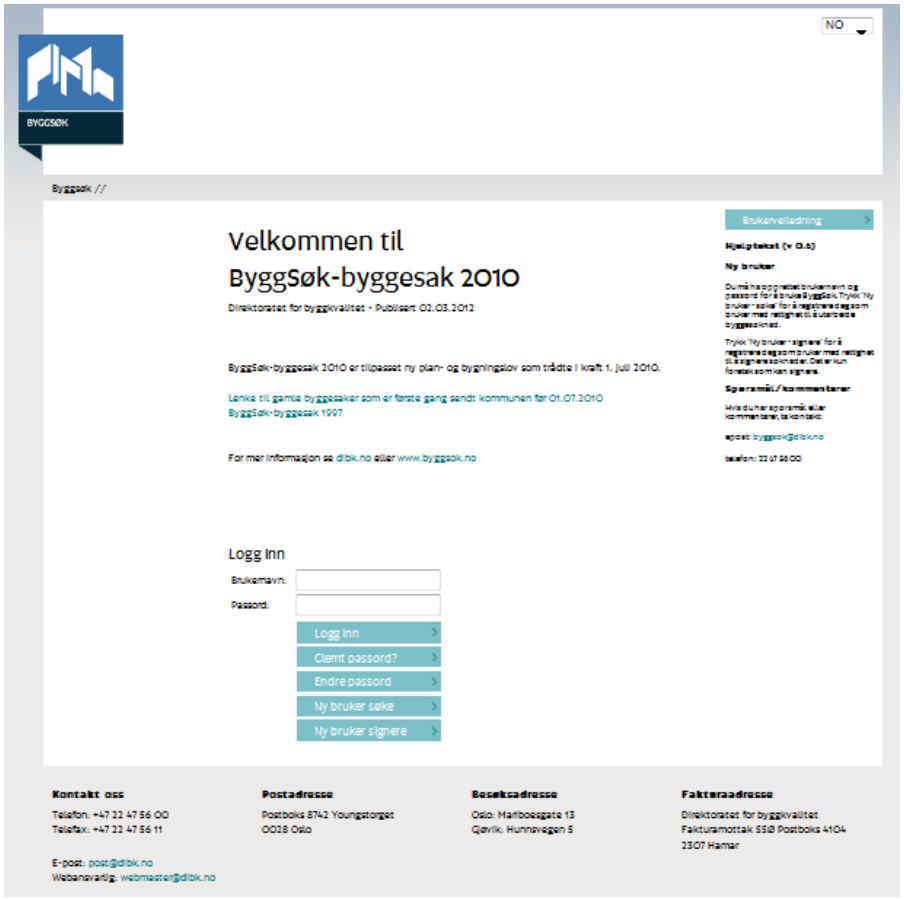
Product Data Portals

Government solutions in Singapore, Norway, US & Australia



Central and Local Government databases updated by the applicant

BYGGSØK



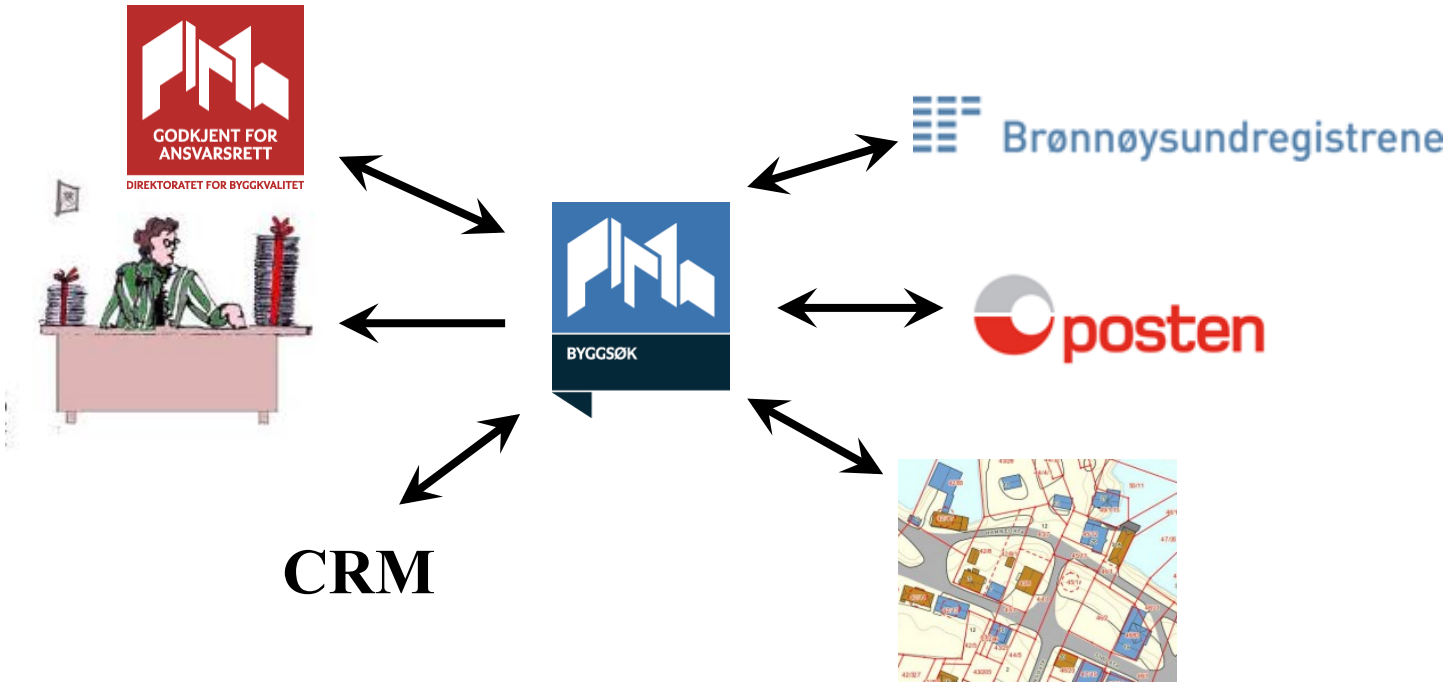
Todays ByggSøk byggesak:

- Portal for preparing and sending applications for building permits
- Submission to local authorities (XML, forms with user-attachments)
- Uses ByggSøks own XML formats

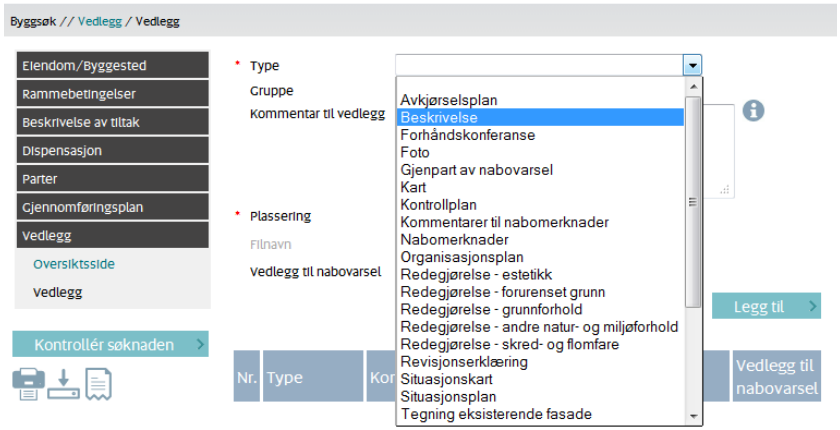
ByggSøk is <u>not</u> based on open international standards

BYGGSØK Integrations

- DiBK Central Approvals (roles and responsibilities in projects)
- Brønnøysund Register Centre (business enterprises registers)
- Posten (postal services)
- Municipality map systems / geo integration
- Municipality case processing/archiving systems
- CRM system



BYGGSØK future (3D Byggsøk)?

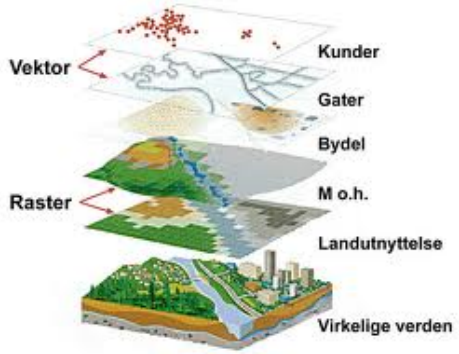


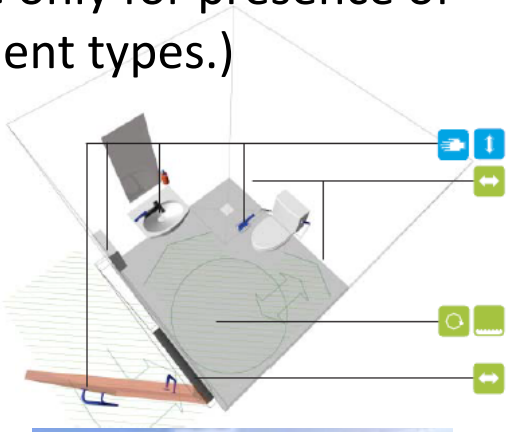
Today:

Static attachments in applications are uploaded, without any checking of their contents.

(Checking is done only for presence of required attachment types.)

There is an urgent need for more integrations and more intelligent solutions :



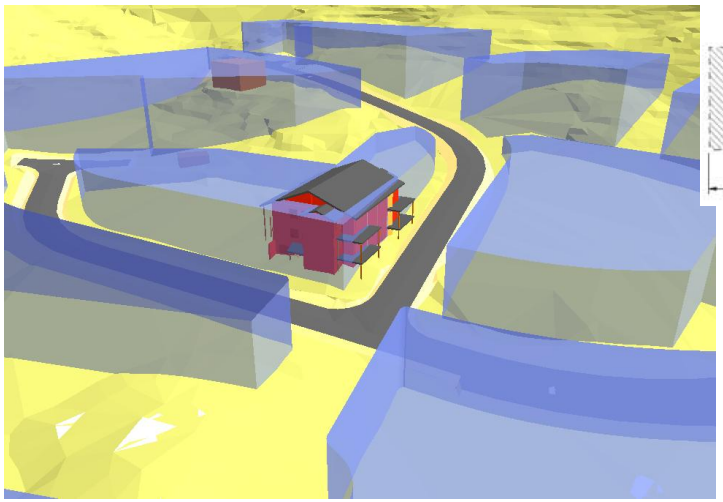


Some prototyping of Future BYGGSØK

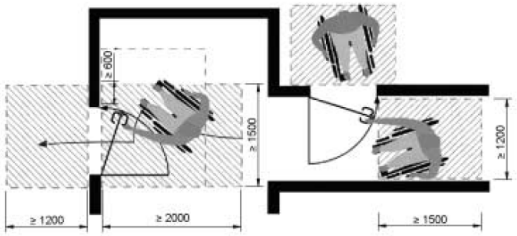
Use of open standards in a ModelServer to perform automatic rule checking <u>prior</u> to submittals to local authorities, demonstrating:

- Building code and Zoning requirements are accepted
- Better quality of Applications before submission and the approval process starts.
- Better availability to intelligent data between industry and Government.
  (Industry uses models, why should Government only get PDF documents?)

Check against Zoning

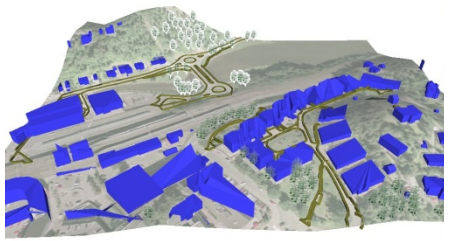


Check of Universal Design



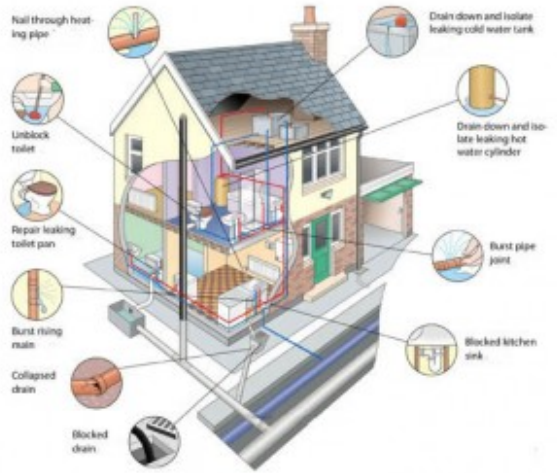
Check of Energy Classification

Visualisation, GML + IFC



Ultimate Solution

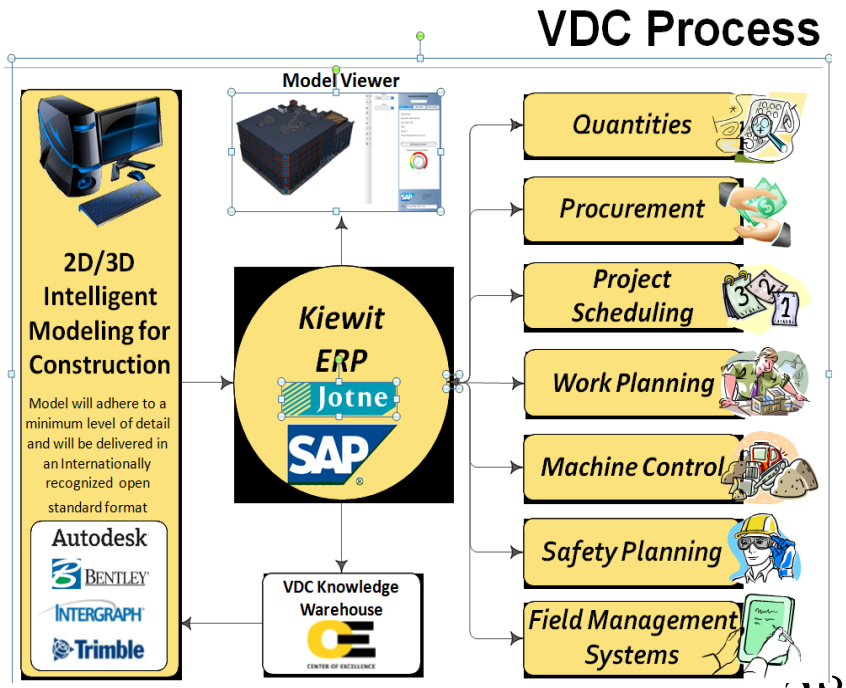
- Interoperability BETWEEN interoperability standards
- Interoperability USED in portals
- Interoperability FINANCED LONGTERM by jurisdictions
  Example: Norwegian Altinn (all-in) owned and financed by the finance department



Jotne Key References

Kiewit Corporation

- Kiewit Overview
  Established in 1884; Privately held; Forbes#249 company; ENR#3 company;16 000 employees; Revenue of $9bn from heavy infrastucture, building, process plants and mining industry. ICT support is done by Kiewit Technology Group and Kiewit Continuous Improvements and, managed by Jake Macholtz and VP Kirk Samuelson that also is member of the board in Jotne BIM Solutions, Inc.
- Kiewit planned VDC integration with their SAP ERP system in 2011 and they early selected Jotne as their prime technology partner because of the technology's core functionality and support for open standards.
- Jotne has delivered a VDC Warehouse, VDC Rules Wizard and Validation and VDC Viewer. Jotne has built a Construction Utilization system for Kiewit that is integrated with backoffice systems for ERP, Scheduling, Planning, etc.
- Software Product value is $2.5 million, whereas $2 million has been invoiced. Services is approximately $2/year and is scheduled at least until 2015.
- Jotne and Kiewit has established a strategic partnership for developing a new software solution for the construction market. Today all IP is owned by Jotne, but Kiewit Technology Group will develop and sell their own IP in the global construction market with a 35% revenue share for Jotne.



Jotne Key References

Lockheed Martin Aero

- History:
  - Long lasting relationship 10+ years
  - Technical Assistance Agreement (TAA)
  - Joint Strike Fighter International Information Interoperability Initiative (JSF4I)
    - Trade Study for Exchanging Information
    - Pilot/Demonstrator of Data Exchange Approach
  - SimDM project (2009-2012)
    - *EDMopenSimDM* ™
    - ISO 10303-209 converter development toolkit
    - NASTRAN/Abaqus to ISO 10303-209 converters
- Current:
  - User of *EDMdeveloper* ™ licenses
  - Final Assembly and Checkout (FACO) Italy MSA
  - LMC P3/Aegis proposal
  - LM Aero F-35 ALIS proposal
  - *EDMopenSimDM*™ sales activity