

Future Nordic Concrete Architecture

Better digital collaboration through buildingSMART

Eilif Hjelseth



2011
2009



Eilif Hjelseth

- Researcher / Ph.D. student at UMB, Norway
 - Utilization of knowledge systems in the AEC industry
 - writing about the I in the BIM
 - ecological philosophy: Reuse of information
- Other part time works:
 - buildingSMART, educational coordinator
 - Standards Norway, secretary ISO/TC59/SC13
- *UMB => Universitetet Med Buildingsmart*
 - UMB educate Masters in Architecture and Construction

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When:

Material cost	➤ was high	➤ was low	➤ is low
Labor cost	➤ was low	➤ was high	➤ is high
Industrialisation	➤ was low	➤ was high	➤ is high
Communication	➤ was directly	➤ was separated	➤ is directly

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What can be made of concrete



Ammerud living area in Oslo

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What can be made of concrete



- Antonio Gaudi

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Some complex forms and detailing with precast concrete.



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Made without BIM and CNC



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Made with BIM and CNC




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BIM => A way of thinking

- for developing a process who results in better buildings
 - The construction process is intensive on information
- Information is a factor equal to materials – you can't build much without a lot of it.....
- Exchange of information must be based on common use of open standards as IFC file format (schema)
- This is enabling interoperability in the design and production process



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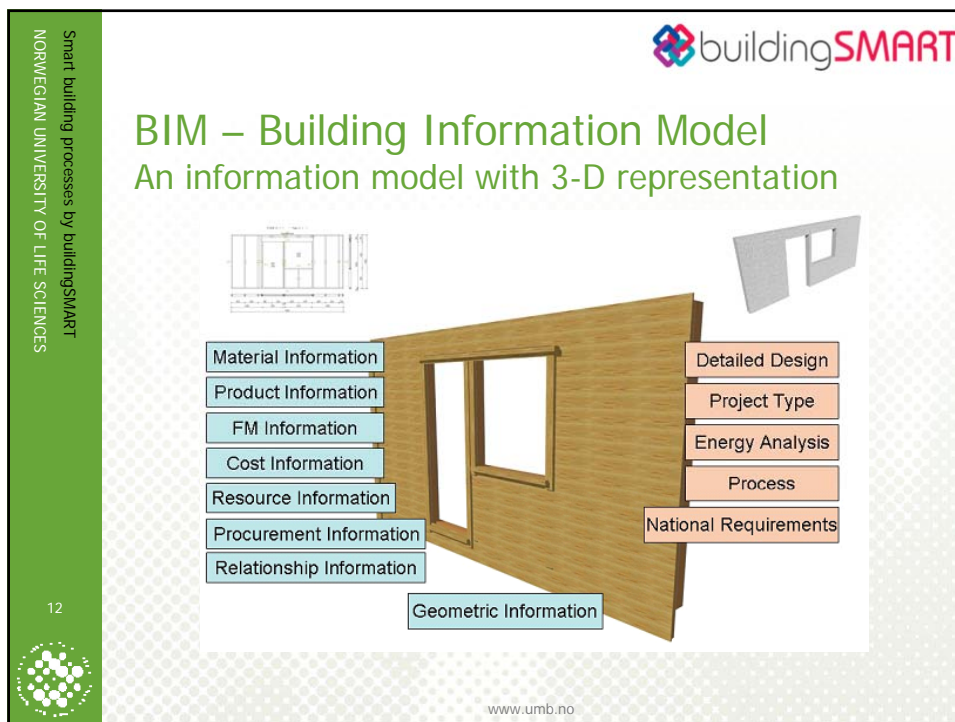
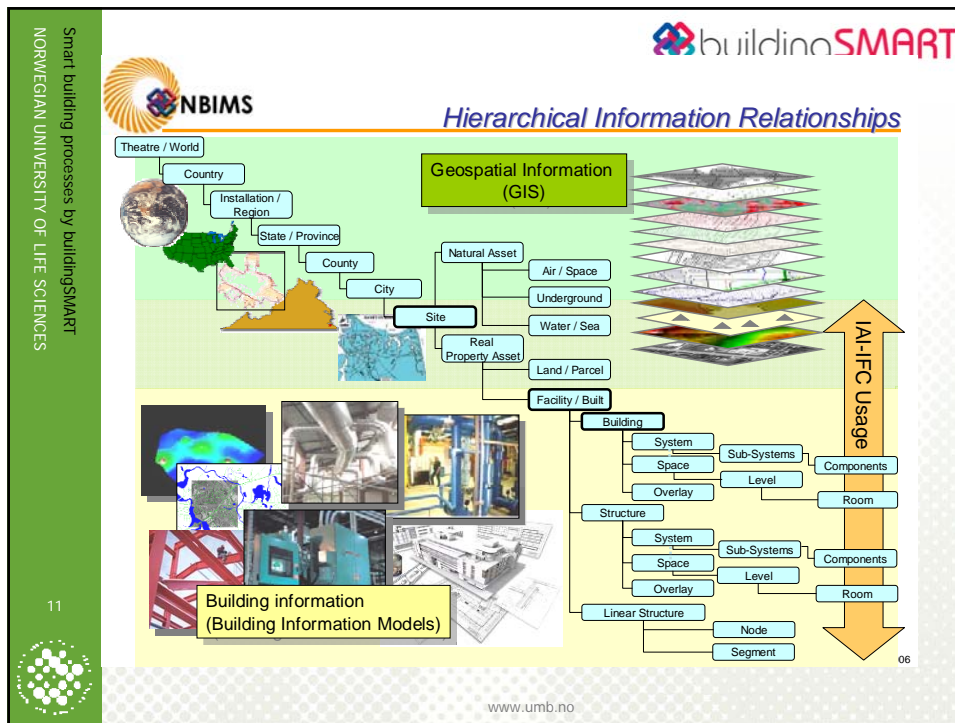
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Dan Piraro
9-1-09
BIZARRO.COM

THE IMPORTANCE OF CARTOON CHARACTERS
DISCUSSING FORMAT IN ADVANCE



Building Information Modelling ...

- ... is the creation and use of coordinated, consistent, computable information about a building project in design, in construction and in building operation and management.

coordinated
consistent
computable
information

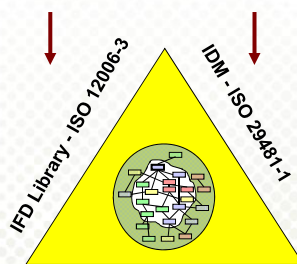
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Use of open standards

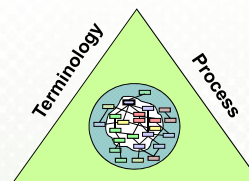
Developed by ISO /TC 59/ SC 13
(Norwegian secretariat)



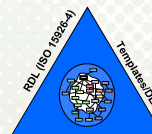
IFC 2x - ISO 16739

Developed by ISO /TC 184/ SC 4
(USA secretariat)

in close collaboration with
buildingSMART
Model Support Group



Data storage – file format



ISO 15926-2

Oil and gas

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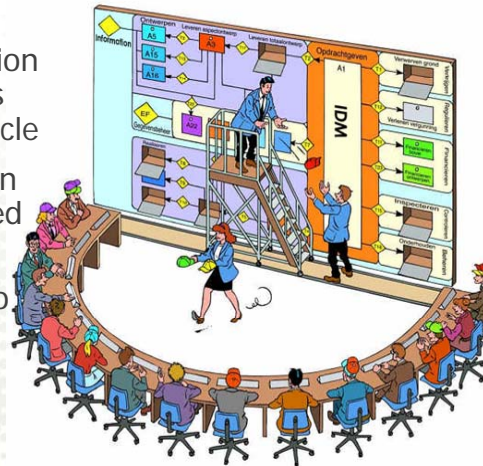
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IDM – Information Delivery Manual

Requirement & Goal

- Standardize on information needed for specific tasks within the building lifecycle
- Development based upon open data standards used by all
- Provides requirements to software companies



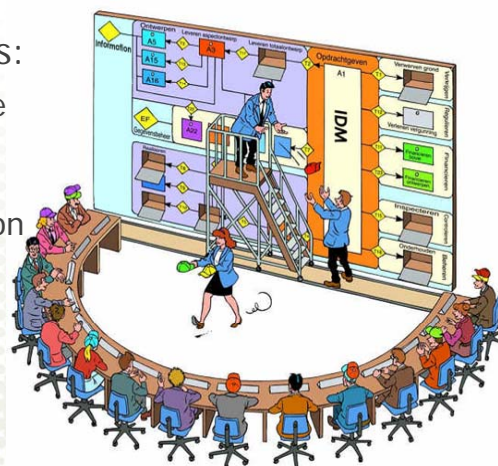
Courtesy: Henk Shaap, VISI

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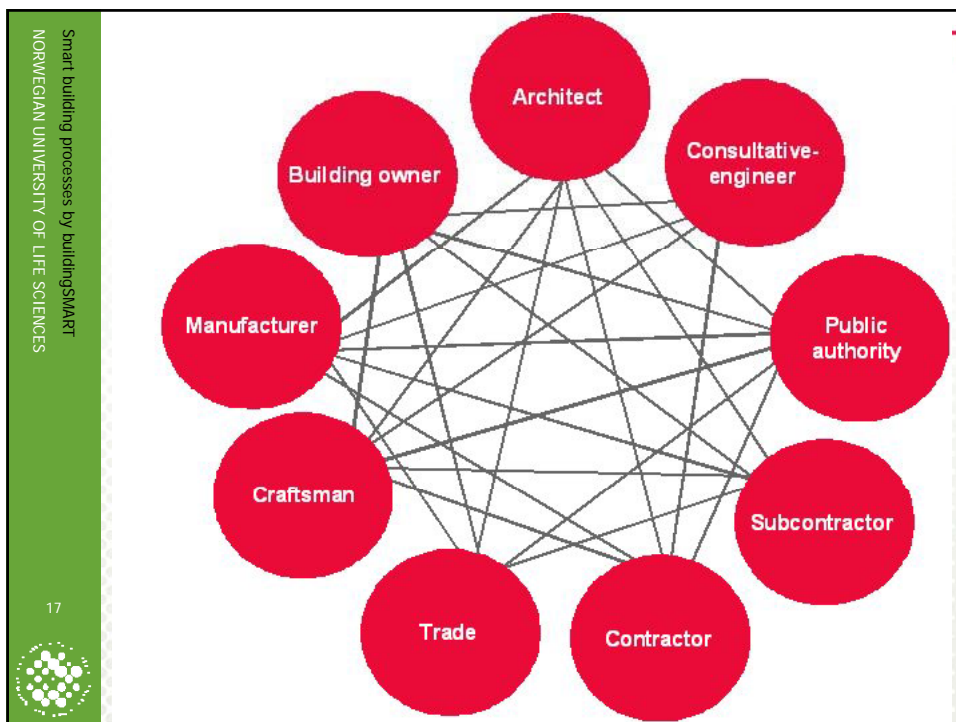
IDM – Information Delivery Manual

- To improve the construction process:
 - Information must be available when it is needed
 - Quality of information needs to be appropriate




Courtesy: Henk Shaap, VISI

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New Methods of Architecture and Building


Three conditions exist that are likely to lead to significant restructuring of the construction industry. These are:

1. - the recognition that traditional contracting practices are inefficient and costly to the client,
2. - the growing availability of information-rich 3D parametric modeling, and
3. - the strong interest in integrating the issues of design and fabrication.


• Eastman, C.M. (2004) Invited Keynote Presentation, New Methods of Architecture and Building, Fabrication, ACADIA 2004 Conference, Toronto, CA

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From file to factory

- Continuous innovation and change in designs require more and faster development of numerical control programs, molds, tools and dies required to manufacture the product.
- Rapid technology change is increasing the complexity of the tools and processes used in manufacturing,
- and **new methodologies** are breaking down the walls between **design and manufacturing operations**.

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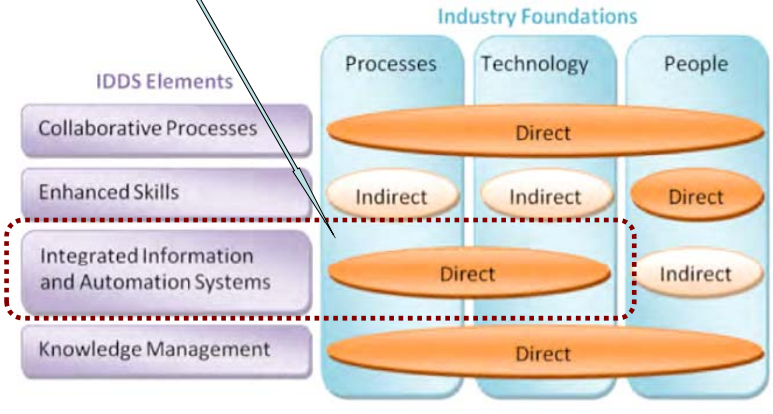
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IDDs - Integrated Design Delivery Solutions

Our primary focus



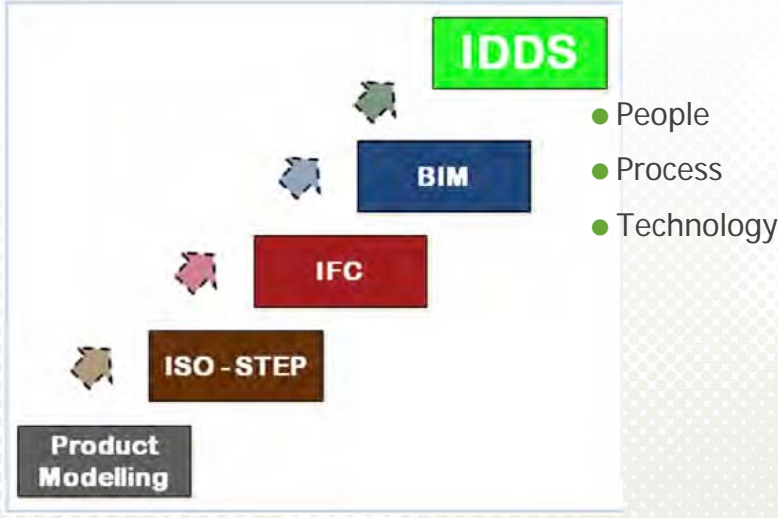
IDDs Elements	Industry Foundations		
	Processes	Technology	People
Collaborative Processes	Direct	Direct	Direct
Enhanced Skills	Indirect	Indirect	Direct
Integrated Information and Automation Systems	Direct	Direct	Indirect
Knowledge Management	Direct	Direct	Direct

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Integrated Design & Delivery Solutions



- People
- Process
- Technology

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File export from architect to CNC machinery



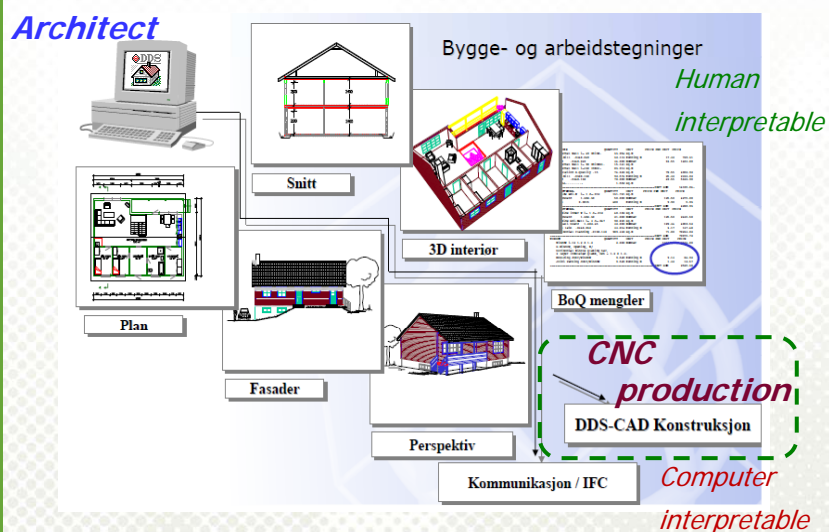
- File to factory is possible – but not a straight forward process.....
- Today some scripting and / or use of middleware is often needed for different machinery
 - Large number of formats: IGES / STEP (IFC) / DXF / DWG/ SolidWorks / Rhino /CAD 3DM / 3DS / SAT/ ACIS, +++
- Increased focus can motivate for standardization for file exchange format
 - Easier software updates, only one export format
- Reference model (from architect) in IFC format
- Production model (for CNC) converted from IFC to IGES with G-code.

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Deliveries in the design process



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CNC machinery for large scale production



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- A good start – *good process* - is half way to the results
 - Why not think about the at the start
- Good tool is half way to the results
 - Why not make a good start with good tools?
- *Can buildingSMART as tool be a good start?*

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Questions?

Thank you for your attention!

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Industrial production "File to Factory"

- This series of pictures is from Lindbäcks Building Factory in Sweden.
- The assembly line use CNC machinery controlled by software from DDS in Norway




LINDBÄCKS



DATA DESIGN SYSTEM

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Assembly line - Wall elements



Stud assembly – nailing station





Indoor boards, nailing machine



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Elements of windows placed into a wall frame

