

Information systematic, BIM lab and pilot implementations

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A Definition of Model Information Content for Strategic BIM Implementation

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On strategy:

"The most successful people in life are generally those with the best information".
(Benjamin Disraeli)*



*Benjamin Disraeli, 1st Earl of Beaconsfield, (21 December 1804 – 19 April 1881) was British Prime Minister 1874 - 1880



Background to Study & Problem Area

- Definitions of digital information deliverables for specific BIM-Uses still remain something of puzzle in practice today. **Too much guess-work** still exists and as such deliveries **could be better organised** and potentially standardised.
- This study attempts to develop the concept of *Leveransspecifikationer* suggested within **Bygghandlingar 90** but not substantiated.
- These guidelines recommend the use of **delivery specifications** to accompany exchanges in digital information at **all stages of the design, construct and operate process**. However there is a lack of practical examples on how to develop information delivery specifications for **defining and recording BIM-Info content** in connection to, or supporting a, project-based strategic BIM Implementation Plan.



Goals

This study's aim consists of two goals:

- The first is to explore and enable a method of **defining the content of model information deliverables** through a review of 2 key primary specific BIM uses: **3d Design Coordination** and **Early Energy Appraisal** through an analysis of practical applications.
- Secondly to **design an associated process** that ensures **integration of information deliveries** into a **project plan** thereby securing greater certainty and efficiency of information exchanges.



Research Questions

The central questions for these goals are:

- How could **BIM-Info delivery content be articulated** in a commonly understood manner on a project basis?
- Could a **standard matrix be established** that could be used for various BIM-Uses at various project stages that would **help align information delivery expectations**?



Sub-Questions

To answer these research questions five sub questions are answered:

- **What BIM-Info is need** at **what time** to enable efficient BIM Discipline Authoring toward e.g., swift 3d Design Coordination at design development stage?
- **What BIM-Info is *not* needed?** – Clarity is needed on what BIM-Info is not relevant at particular stages.
- What **level of detail** is needed to carry out BIM-Uses at various stages?
- Is there a **logical information order**?
- What is the **logical information order of authoring** BIM-Info for early Energy Analysis when it comes to generating BIM objects?



Data Collection and Case Description

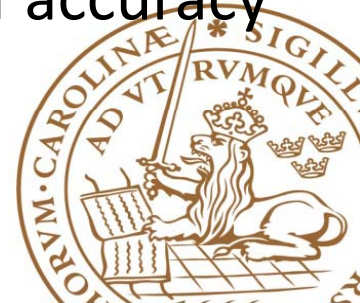
This study involved empirical data collection from a (real world) residential case study project together with data collected from a controlled experimental model:

- **Case #1: Koggens Gränd - Malmö's first owner-occupier flats.**
- **Case #2: KonsultHus - An Experimental Coordination Model.**



Some Key Issues

- Lack of a common understanding of what each BIM-Use entails, not least in terms of BIM-Info deliverables.
- Time commitment in the early stages present difficulties and frustration, suggesting a resistance to change or flawed time planning.
- Difficulties exist for team members to arrive at the same place at the same time with regards BIM-Info quality and completeness.
- Quality Control and validation of delivered BIM-Info is often left to the receiver to sort out - leading to down time for file clean-ups, deletion of duplicate objects etc.
- Lack of trust in data integrity emerged. The completeness and accuracy of 3D models remain a major concern for the design team.



BIM-Info Deliveries (The Great Waste)

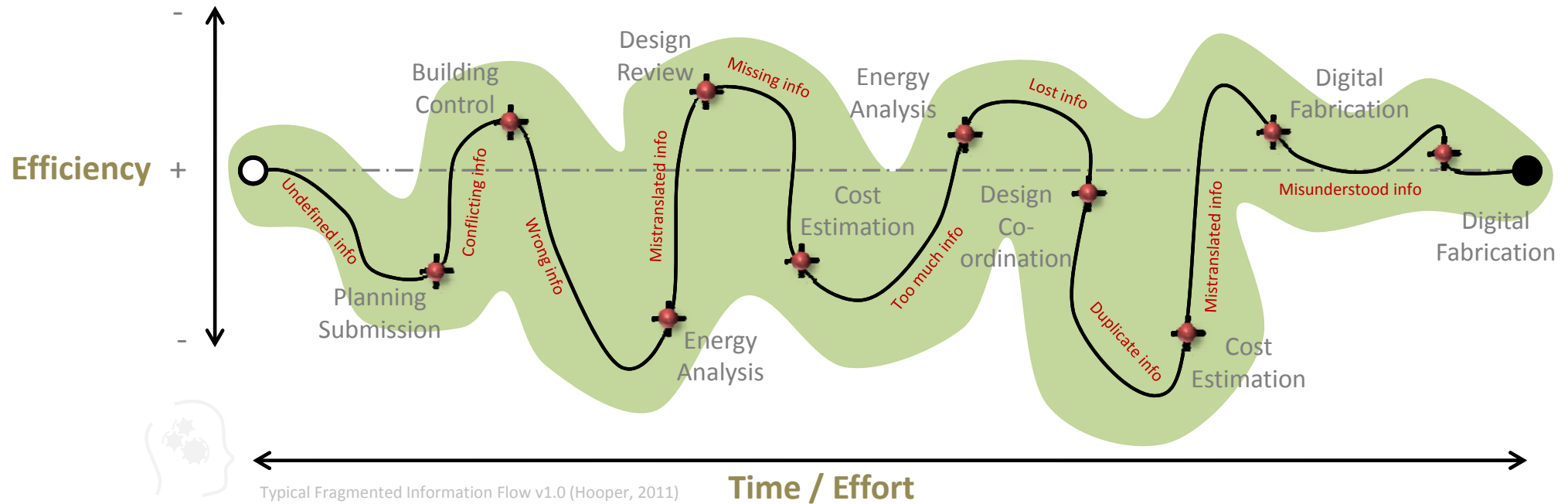
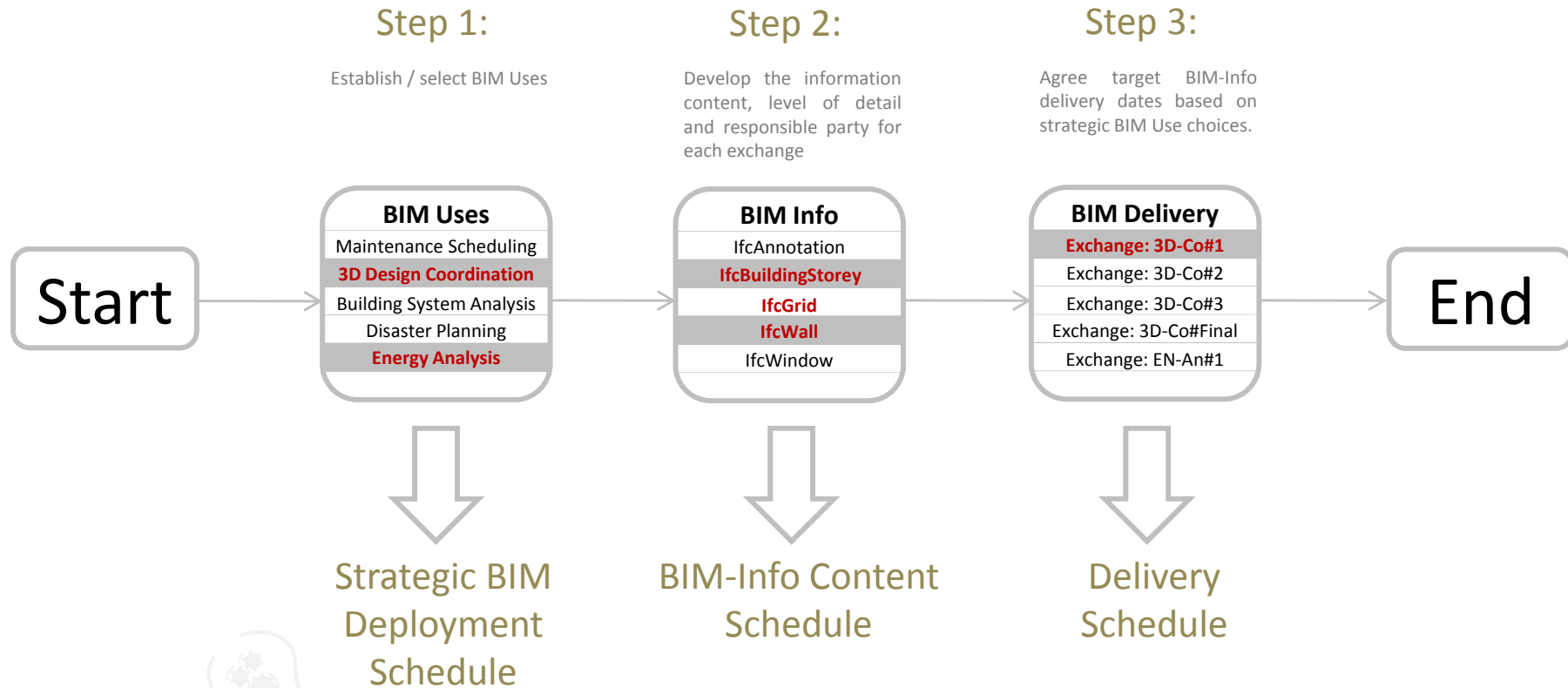


Figure 2: Information Flow - Traditional



BIM-Info Delivery Protocol (IDP)



BIM-Info Delivery Plan v1.0 (Hooper, 2011)



BIM-Uses



BIM-Info Deliveries (Strategic Authoring & Exchange)

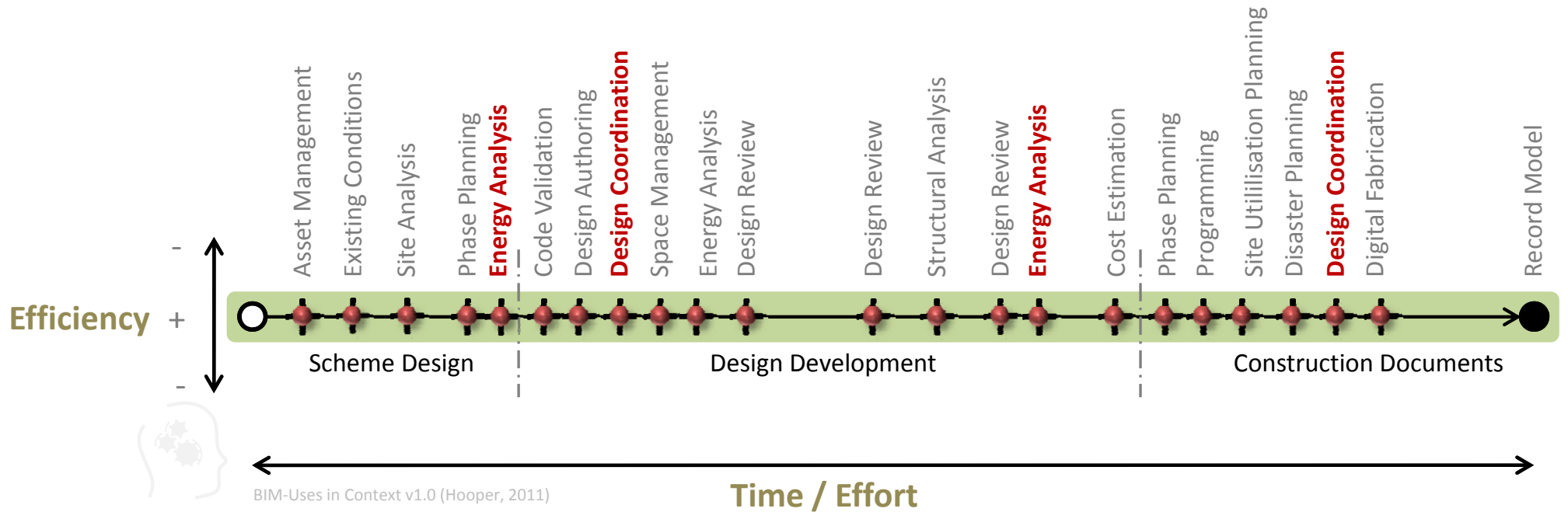


Figure 6: BIM-Uses in context



BIM-Info: Level of Detail

Identifying BIM Objects & Properties for Strategic BIM Uses:

The AIA amongst others has defined the concept of Levels of Detail (LOD) described through a sliding scale of LOD 100 – 500. In essence, the levels can be summaries as follows:

- ✦ LOD 100: Conceptual
- ✦ LOD 200: Approximate geometry
- ✦ LOD 300: Precise geometry
- ✦ LOD 400: Fabrication
- ✦ LOD 500: As-built

This system is gaining recognition around the world.



BIM-Info: Additional BIM Objects & Properties

Project Information

- ✦ Project Issue Date
- ✦ Project Status
- ✦ Info Status
- ✦ Client Name
- ✦ Project Address
- ✦ Project Name
- ✦ Project Number

Project Units

- ✦ Length
- ✦ Area
- ✦ Volume
- ✦ Angle
- ✦ Slope
- ✦ Currency

Annotation

- ✦ Location
- ✦ Coordinates
- ✦ Position
- ✦ Grids
- ✦ Levels
- ✦ Rooms
- ✦ Areas
- ✦ Zones (Fire)

Other

- ✦ Voids
- ✦ Holes



BIM-Info Delivery Specifications (IDS)


BIM Information Delivery Specifications - 3D Design Coordination										
 BIM Information Delivery Specifications - 3D Design Coordination v1.0 (Hooper, 2011)			BIM Use: 3D Design Coordination Stage: Scheme Design Info Exchange: 3D-Co#1 Date: 1 Jan 2011				BIM Use: 3D Design Coordination Stage: Scheme Design Info Exchange: 3D-Co#2 Date: 1 Feb 2011			
BIM-Info	Responsible	Notes	Level of Detail	Info Author	Info Reciever	Format	Level of Detail	Info Author	Info Reciever	Format
Annotation										
Location	Arch		X - Confirmed	Arch	Struct & MEP	*.rvt				
Coordinates	Arch		X - Confirmed	Arch	Struct & MEP	*.rvt				
Position	Arch		X - Confirmed	Arch	Struct & MEP	*.rvt				
Grids	Arch		X - LOD 200	Arch	Struct & MEP	*.rvt	X - LOD 200	Struct	Arch & MEP	*.rvt
Levels	Arch		X - LOD 200	Arch	Struct & MEP	*.rvt	X - LOD 200	Struct	Arch & MEP	*.rvt
Rooms	Arch		X - LOD 200	Arch	Struct & MEP	*.rvt				
Areas	Arch		X - LOD 200	Arch	Struct & MEP	*.rvt				
Zones	Arch		X - LOD 200	Arch	Struct & MEP	*.rvt				
SUBSTRUTURE										
Foundations										
Standard Strip Foundations	Struct		X - LOD 200	Arch	Struct & MEP	*.rvt	X - LOD 200	Struct	Arch & MEP	*.rvt
Special Foundations										
Slab Foundations										
Pile Foundations	Struct		X - LOD 200	Arch	Struct & MEP	*.rvt	X - LOD 200	Struct	Arch & MEP	*.rvt

Figure 7: Extract from BIM-Info Delivery Specifications (IDS)



BIM-Info: Content Quality Control Measures

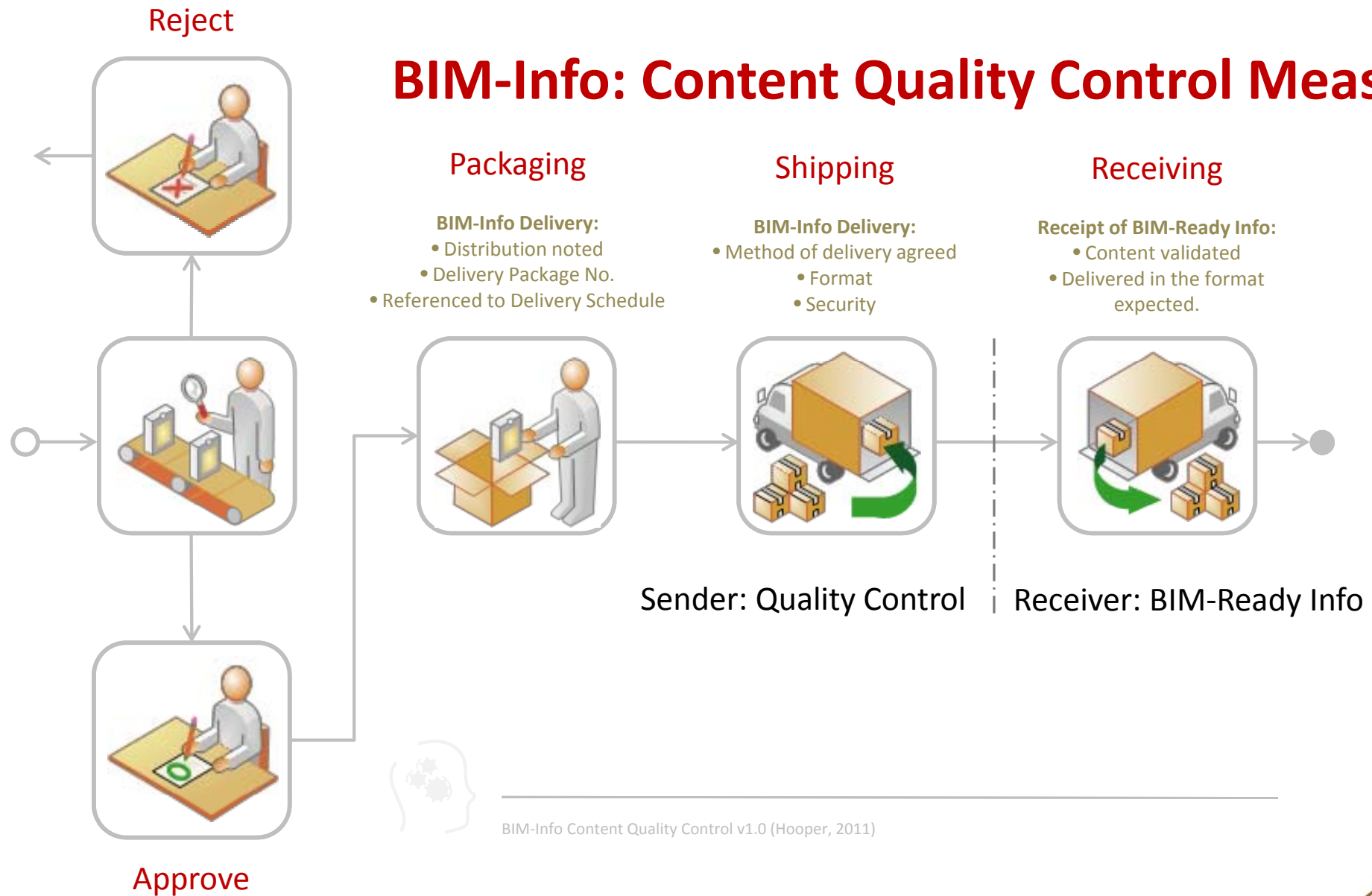


Figure 9: BIM-Info Content Quality Control Measures



Results & Conclusions

- The key deliverable: the BIM-Info Delivery Protocol (IDP).
- BIM-Info control through use of straight-forward and easy to use tools.
- A working method of aligning consultant BIM-Info delivery expectations.
- Represents a development of the concept behind BH90's *Leveransspecifikationer*.
- Method of recording and articulating information flow and priorities.
- A tool to understanding each other's information needs.
- Scope to reduce the risk for misunderstanding.
- Aims to enhance the quality of the product and safeguard the success of project.



Results & Conclusions

- Facilitates a clear and commonly understood picture of the BIM-Info Deliveries.
- Offers a clear and tangible solution to help consultant disciplines manage BIM-Info.
- Enables teams to add maximum value to the project.
- The timing and content of BIM authorship is critical. By articulating planned BIM-Uses, the necessary BIM-Info needed to carry out these Uses together with target BIM-Delivery dates; project teams can more readily focus on the strategic task in hand and help each other to deliver the intended result in an efficient manner.
- Takes the guesswork out of digital exchange.



Further Research

- Automation: It may prove possible to generate **machine-readable** model information content definitions through the **XML schema** making it possible to **standardize such contents** and deliver project information through **automated processes**.

Information										
Construction Information	Arch		✘ - LOD 200	Arch	Struct & MEP	*.rvt				
Engineering Information	Arch		✘ - LOD 200	Arch	Struct & MEP	*.rvt				
Record Information	Arch		✘ - LOD 200	Arch	Struct & MEP	*.rvt				
			Link to Model: Holmes Office - Architecture.rvt				Link to Model: Holmes Office - Structure.rvt			
			Extract Info Content From Project Server				Extract Info Content From Project Server			

Figure 10: BIM-Info Content Extraction



Thank you!

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