THE REFERENCE BUILDING PROCESS
Special respect to sustainable certification and the mandatory BIM requirements management

H. A. Tan, J. Gantner, T. Kirmayr, Dr. T. Liebich, S. Homolka, P. Noisten

Fraunhofer Institute for Building Physics, Valley
AEC3 Deutschland GmbH, München

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AGENDA

- Challenges today
- The Reference Building Process Map (RBPM)
- Sustainability certification and BIM
- Integration with the BIM Requirement Management (ReqCap)
- Summary and Outlook

CURRENT CHALLENGES

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...t 21 project

...erator Deutsche Bahn (DB) will ...he controversial Stuttgart 21 station ...proving an additional €2bn.

...21 project, which involves the ...f a new underground main station, ...l to cost €2.6bn when it was floated ...osts climbed to €4.5bn in 2009 and ...d €6.5bn.

...e completed by 2022, three years ...nally planned, the project would ...art's main terminus station with an ...rough-station that will be integrated

...s it also a criminal case? Photo: DPA

...concert house 'possibly

...MT+02:00 ...IT+02:00

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...lamburg could open a criminal investigation ...ezzlement and fraud in the long-running ... €800-million concert house.

The Sydney Morning Herald

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Berlin's new airport's problems an 'embarrassment' for Germany

March 14, 2013

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The terminal building at the construction site of the new 'Willy Brandt' Berlin Brandenburg International (BER) airport. The new airport has been plagued with problems, undermining Germany's reputation for engineering skill. *Photo: Bloomberg*

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Current Challenges

- More and more complexity for the buildings
  - Demanding design
  - Resource and energy efficiency
  - Social aspects
  - Etc.
- „One-of-a-kind“ projects
- Use of high-tech products
- Highly specialized experts
- Increase in the number of people involved

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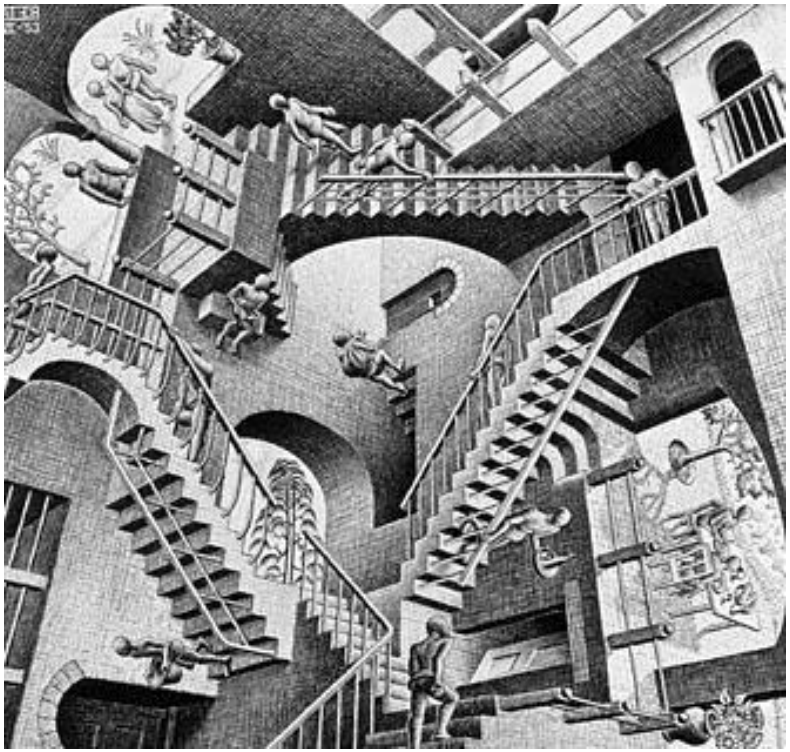
Current Challenges

- Hard to assess the current state of planning
- Inefficiencies due to multiple capturing of data
- Collusion of tasks
- Loss of information during different stages



Current Challenges

- Need for optimization of building processes and better communication
- Need for a holistic project planning **AND** management tool

„We need a line of action“ *

*Peter Meijnen, Porsche Consulting
BIMiD 3. Fachsymposium, Stuttgart, 23.04.2015

THE REFERENCE BUILDING PROCESS MAP (RBPM)

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What is the question?

Who
delivers
when,
what,
to whom,
and in
which quality ? *

* Thomas Liebich, AEC3
BIMiD 2. Fachsymposium, Braunschweig, 16.10.2014

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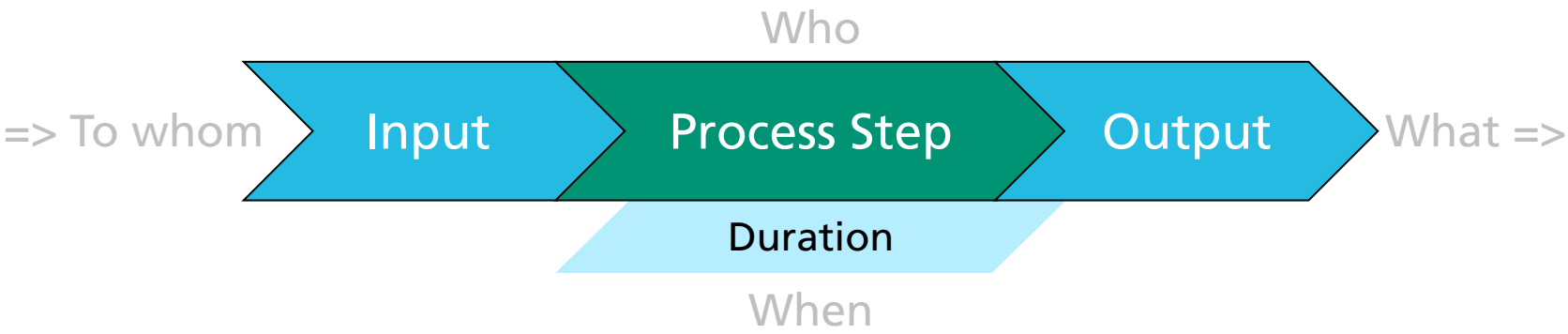
A Process Map

- **Process flow**: Direct sequence of events
- A process step is defined by:



- Effectivity of a process :
  - Time duration
  - To produce the result
  - In a defined quality

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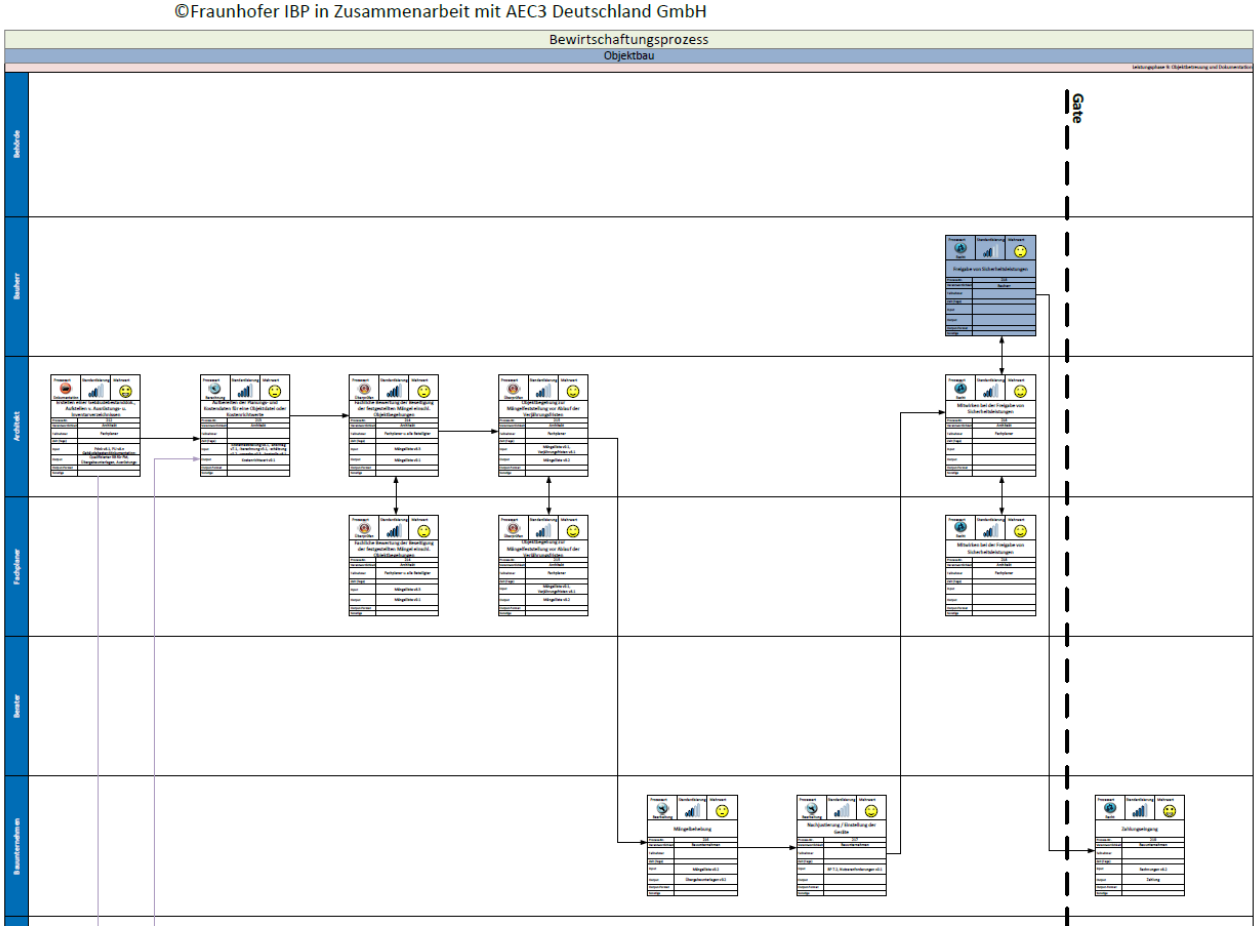
The Building Process Map



Source: Fraunhofer IBP

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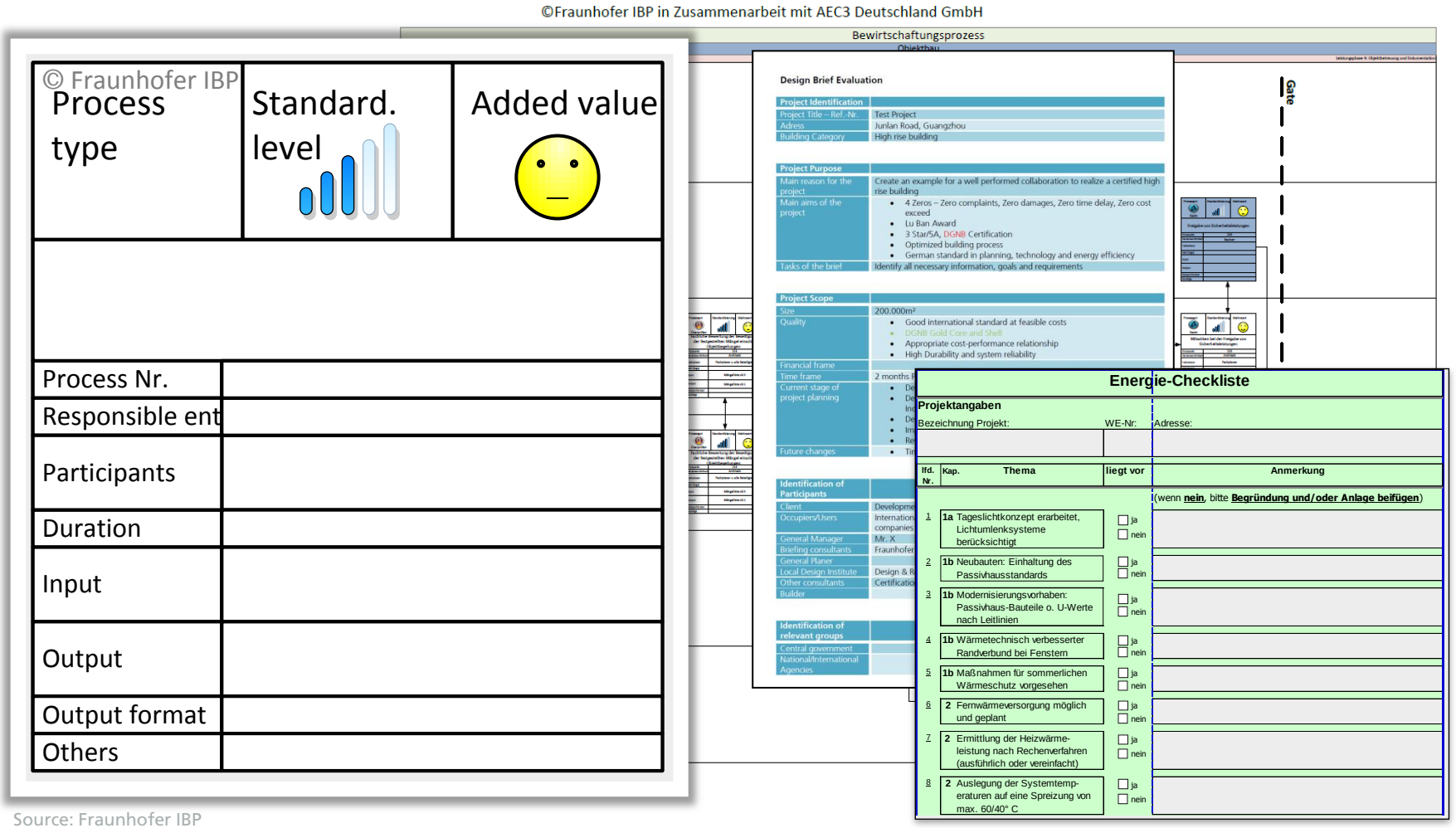
The Building Process Map



Source: Fraunhofer IBP

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The Reference Building Process Map (RBPM)

- Based on: HOAI, Norms, Guidelines

Grundleistungen	Besondere Leistungen
LPH 1 Grundlagenermittlung	
a) Klären der Aufgabenstellung auf Grundlage der Vorgaben oder der Bedarfsplanung des Auftraggebers b) Ortsbesichtigung c) Beraten zum gesamten Leistungs- und Untersuchungsbedarf d) Formulieren der Entscheidungshilfen für die Auswahl anderer an der Planung fachlich Beteiligter e) Zusammenfassen, Erläutern und Dokumentieren der Ergebnisse	- Bedarfsplanung - Bedarfsermittlung - Aufstellen eines Funktionsprogramms - Aufstellen eines Raumprogramms - Standortanalyse - Mitwirken bei Grundstücks- und Objektauswahl, -beschaffung und -übertragung - Beschaffen von Unterlagen, die für das Vorhaben erheblich sind

- General flow for a design and construction project
  - Logical sequence flow based on the state of the art
  - From the first idea (Phase 0)
  - To the operation phase (LPh 9 / HOAI)

HOAI – Fassung 2013

- LPH 1 - Grundlagen-ermittlung
- LPH 2 - Vorplanung
- LPH 3 – Entwurfs-planung
- LPH 4 – Genehmigungs-planung
- LPH 5 – Ausführungs-planung
- LPH 6 – Vorbereitung der Vergabe
- LPH 7 – Mitwirkung bei der Vergabe
- LPH 8 – Objekt-überwachung und Dokumentation
- LPH 9 – Objekt-betreuung

Source: HOAI 2013

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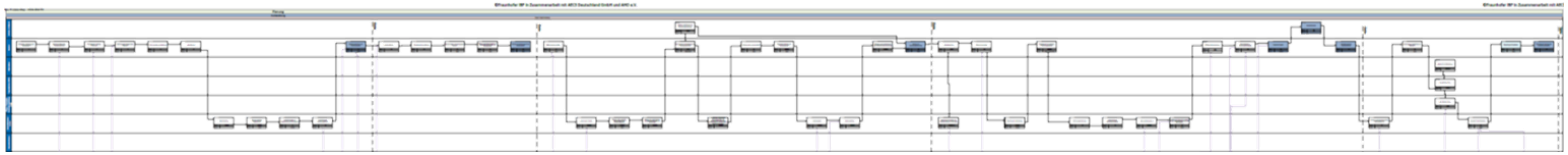
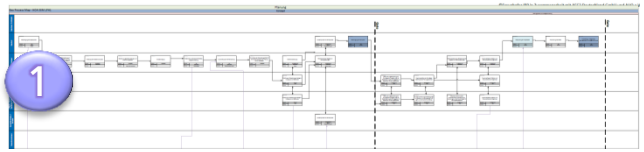
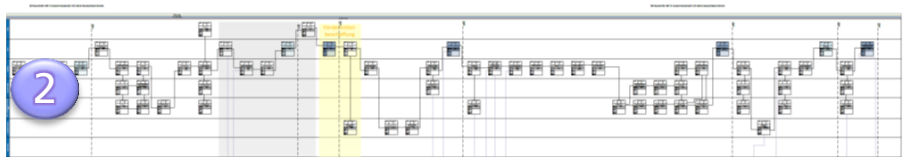
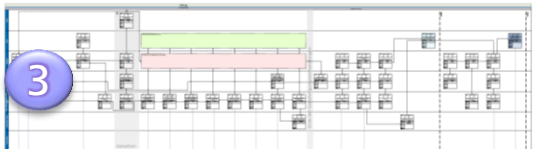
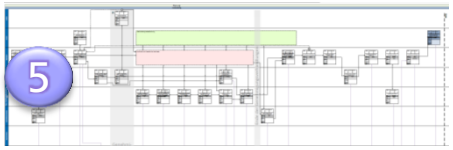
The Reference Building Process Map (RBPM)

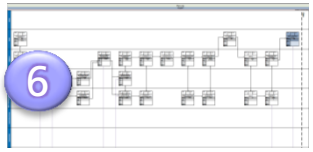












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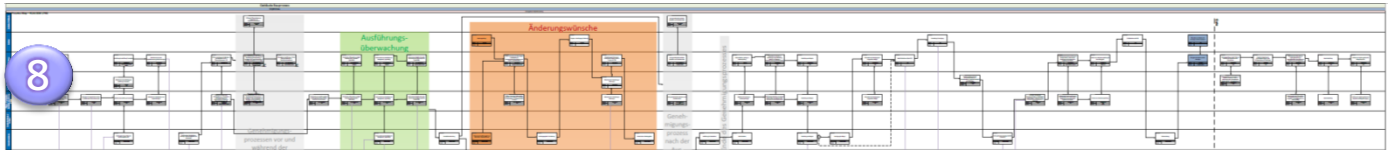

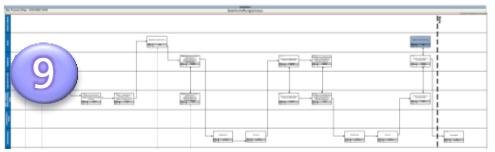

Source: Fraunhofer IBP

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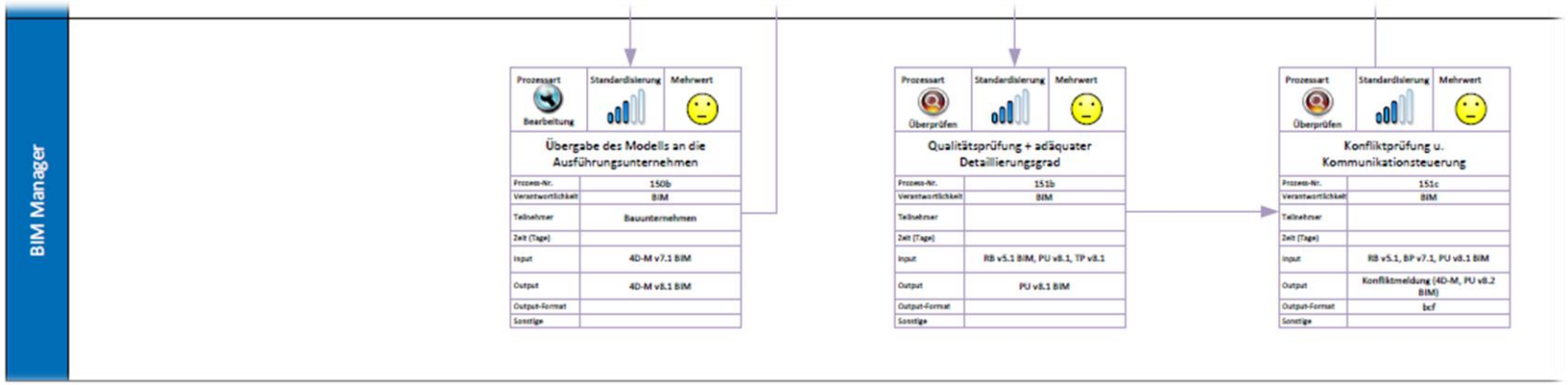
The BIM Reference Building Process Map (HOAI+BIM)

- What is different using BIM?
  - New process steps
  - Output formats
- BIM-Manager?
  - Roles and responsibilities



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CERTIFICATION SCHEMES AND BIM AS A POSSIBLE SOLUTION

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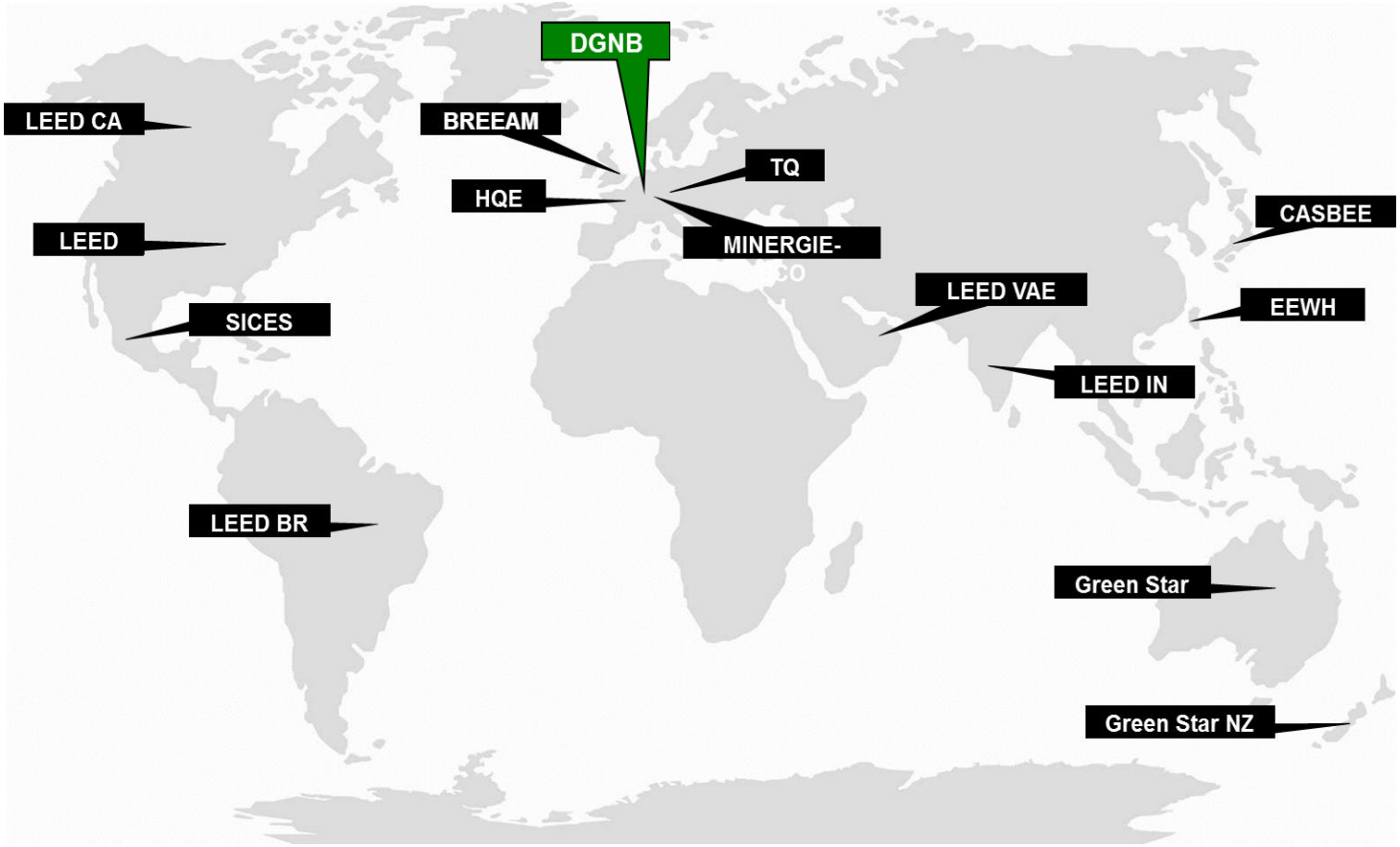

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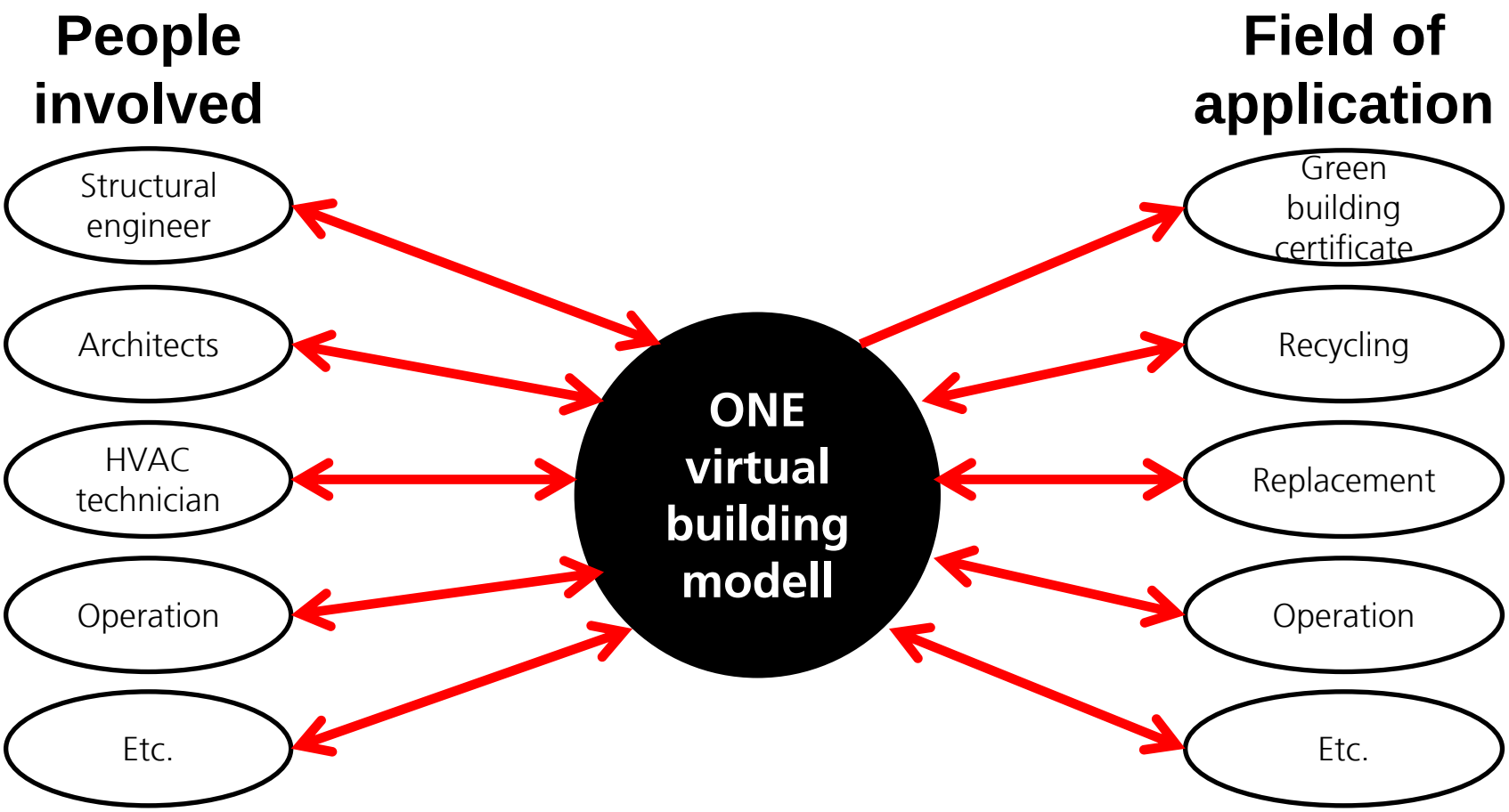

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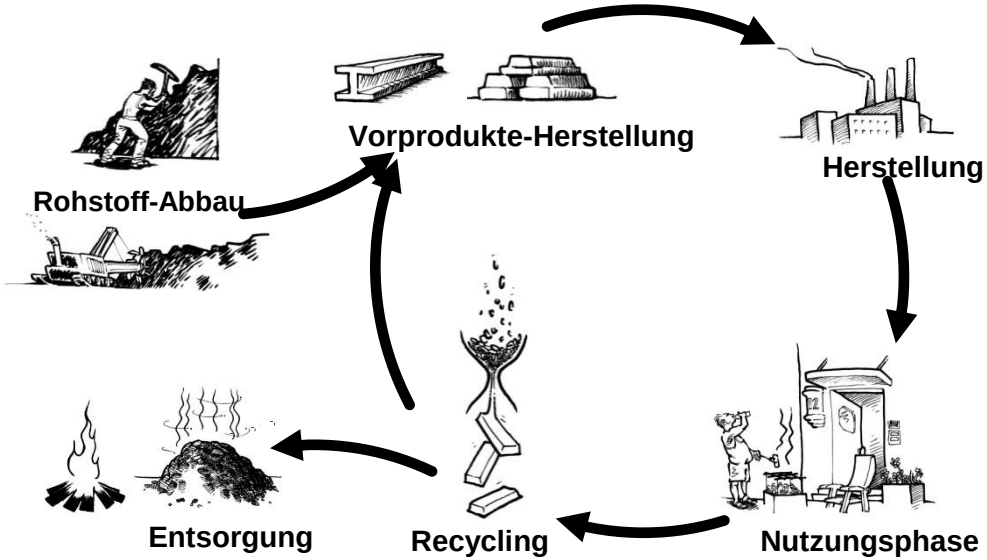

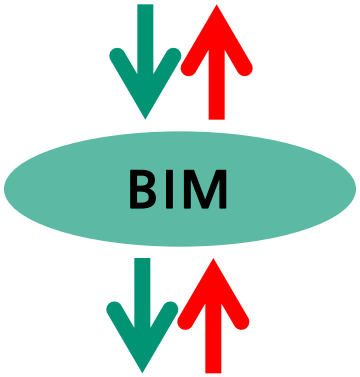

Green building certification schemes

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Advantages of a combined BIM - building certification approach

- BIM as centralized communication platform
- Ease of the documentation effort for green building certification schemes
- Effects on the overall sustainability rating can be instantly illustrated
- Information from green building certification process can be included into the virtual building modell and used in other life cycle stages (e.g. for facility management)

INTEGRATION WITH BIM REQUIREMENT MANAGEMENT (AEC3 REQCAP SYSTEM)

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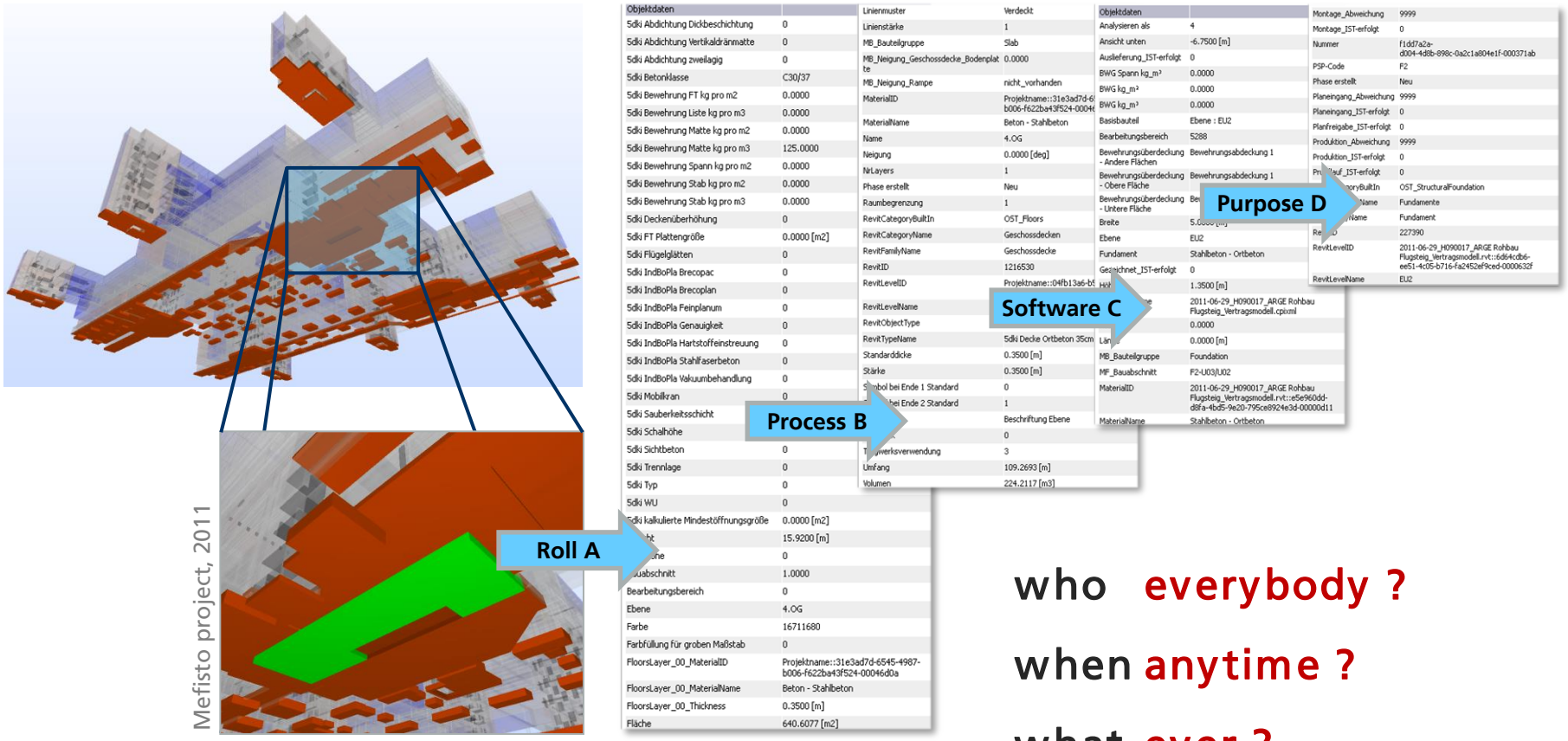
Remember the question ?!



who everybody ?

when anytime ?

what ever ?

whichrequirement ?

Source: AEC3 Deutschland GmbH

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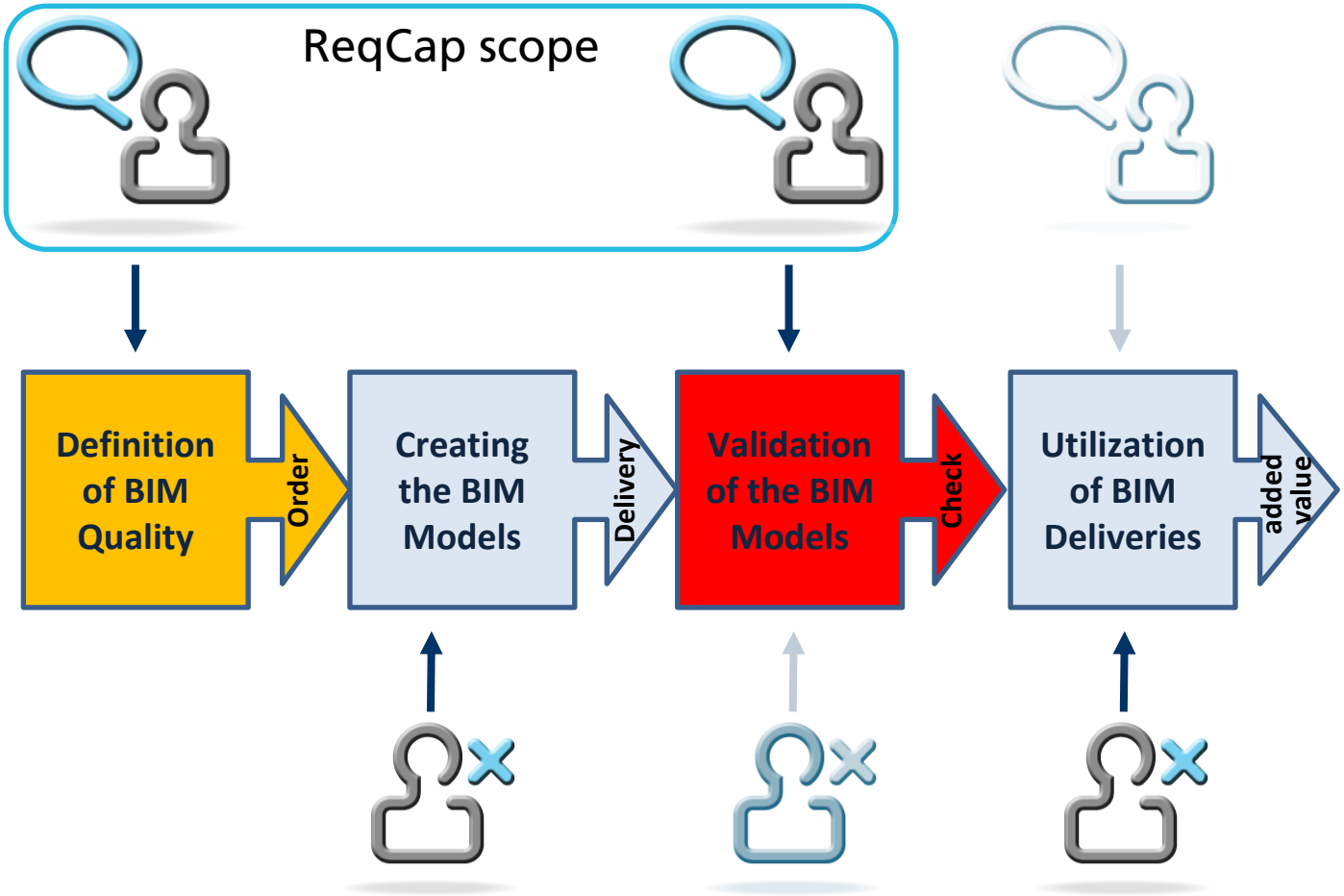
Definition of BIM Quality



Source: AEC3 Deutschland GmbH

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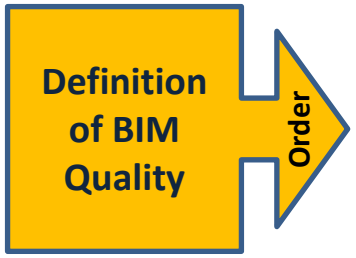
Definition of BIM Quality



REQCAP Guides Requirements Filter Settings Components Signed in as user@testserver.de

bSN-Guide (Prototype 1)

Show Mass Update Form | Clear Filter

IFC binding | Role | Task | Model element | Property | Requirement

Concept Definition	Datastructure: IFC4	Owner	S04-P01	S05-P01	S06.1-P01	S07-P01	S08-P01	S09-P01
265 : Nedløp	IfcPipeSegment.###.###	R3-01 : RIV - Rør	OPT	OPT	MANDATORY	MANDATORY	MANDATORY	MANDATORY
Pipe segment type common	Pset_PipeSegmentTypeComm	?	?	?	?	?	?	?
Qto_ pipe segment base quantities	Qto_PipeSegmentBaseQuantiti	?	?	?	?	?	?	?
265 : Takrenne	IfcPipeSegment.IfcPipeSegmer	R3-01 : RIV - Rør	OPT	OPT	MANDATORY	MANDATORY	MANDATORY	MANDATORY
Pipe segment type common	Pset_PipeSegmentTypeComm	?	?	?	?	?	?	?
Qto_ pipe segment base quantities	Qto_PipeSegmentBaseQuantiti	?	?	?	?	?	?	?
2	IfcChimney.###.###	R2-03 : RIBrann	?	?	?	?	?	?
2	IfcChimney.###.###	R2-03 : RIBrann	?	?	?	?	?	?
302 fleksible rør	IfcPipeSegment.IfcPipeSegmer	R3-01 : RIV - Rør	OPT	OPT	MANDATORY	MANDATORY	MANDATORY	MANDATORY
Pipe segment type common	Pset_PipeSegmentTypeComm	?	?	?	?	?	?	?
Inner diameter	InnerDiameter	?	?	?	?	?	?	?
Nominal diameter	NominalDiameter	?	?	?	?	?	?	?
Outer diameter	OuterDiameter	?	?	?	?	?	?	?
Pressure range	PressureRange	?	?	?	?	?	?	?
Reference	Reference	?	?	?	?	?	?	?
Status	Status	?	?	?	?	?	?	?
Temperature range	TemperatureRange	?	?	?	?	?	?	?
Working pressure	WorkingPressure	?	?	?	?	?	?	?
Qto_ pipe segment base quantities	Qto_PipeSegmentBaseQuantiti	?	?	?	?	?	?	?
302 : Forbindelsesledd	IfcPipeFitting.IfcPipeFittingTyp	R3-01 : RIV - Rør	OPT	OPT	MANDATORY	MANDATORY	MANDATORY	MANDATORY
Pipe fitting type common	Pset_PipeFittingTypeCommon	?	?	?	?	?	?	?

Source: AEC3 Deutschland GmbH

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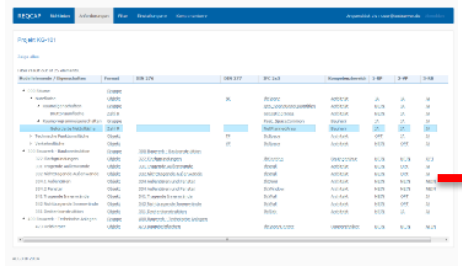
Validating the BIM Quality

- Automatic generation of checking rules from the Level of Development

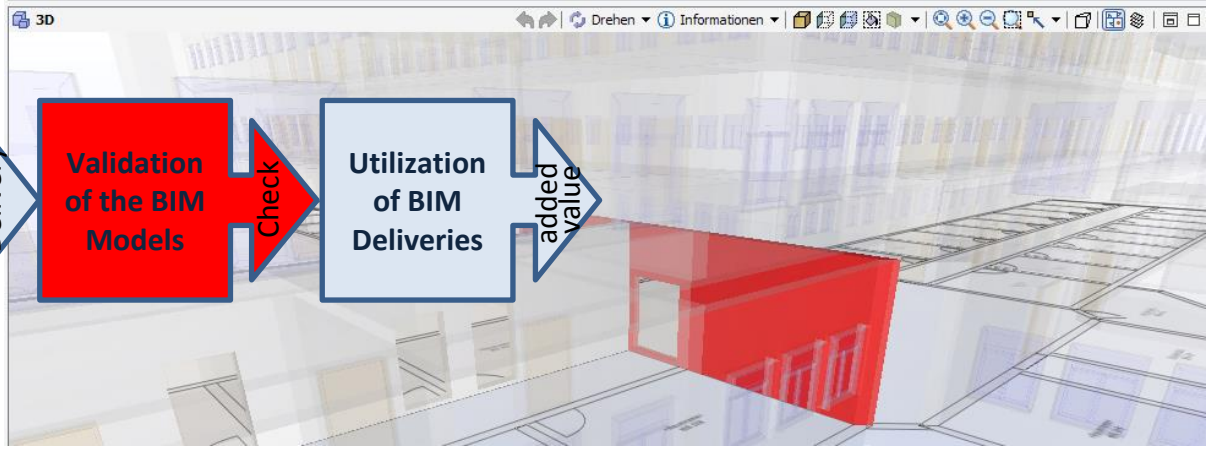


Überprüfte Komponenten

Status	Komponente	Eigenschaft	Operator	Wert
Einschließen	Wand			

Eigenschaftensätze

Komponente	Eigenschaftensatz	Eigenschaft	Wert ist vorhanden	Wertbedingungen	Visualisierung
Wand	Pset_WallCommon	ThermalTransmittance	Muss vorhanden sein	X ≥ 0,1 und X ≤ 1	



Source: AEC3 Deutschland GmbH

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SUMMARY AND OUTLOOK

Outcomes

- ***Who* delivers *when*, *what* to *whom*, and in which *Quality*?**
  - "I have delivered my dataset!"
  - Essential as guidance for the design and building phases

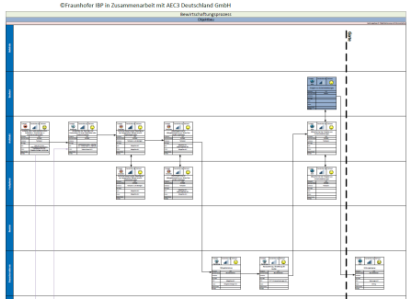
- Use of the RBPM:
  - Transparency
  - Clearly defined roles
  - Assume one's own responsibilities

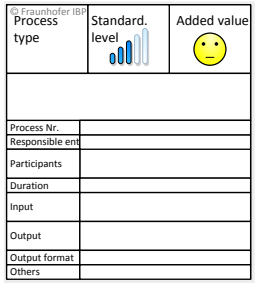
➡ More efficient communication and collaboration

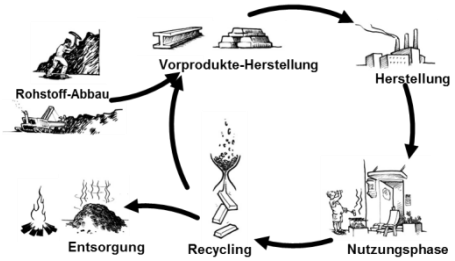
Outlook

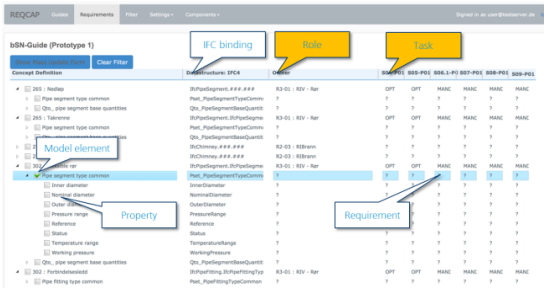
- Combination of BIM & sustainable certification
  - Proof of concept needed (suitable tools and processes)
- Lean Construction
  - Continuous improvement using the **Reverse Process Design (RPD)**
- Provide a continuous status as decision-support
  - For all phases incl. tendering, operation, dismantelment
  - For better services: sustainability rating consultancy, Facility Management, collaboration with equipment producers

QUESTIONS?









Contact:

aude.tan@ibp.fraunhofer.de
johannes.gantner@ibp.fraunhofer.de
thomas.liebich@aec3.de

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