First Steps of implementing BIM in Landscape Architecture

Alexander Peters
Hochschule Geisenheim University,
Geisenheim / Germany

Example of a screenshot of a 3D-BIM-Model (courtesy of scape Landschaftsarchitekten GmbH, Düsseldorf]

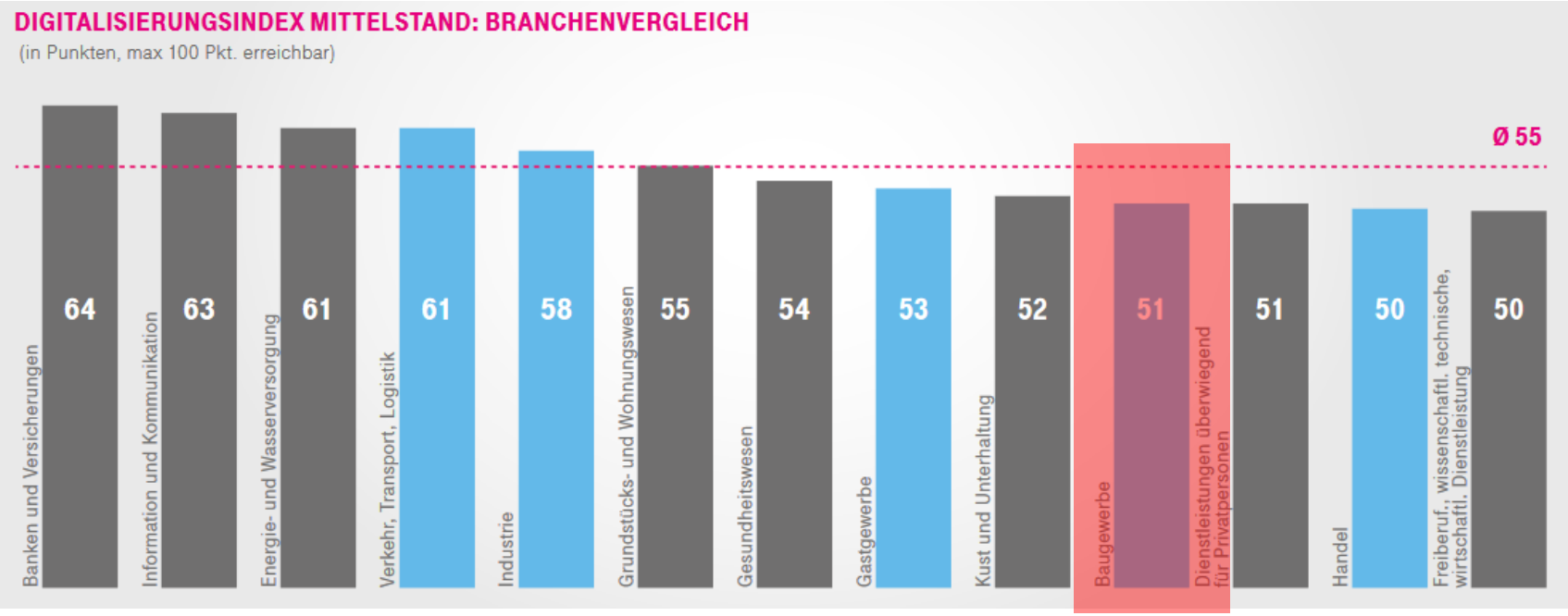
Do you recognize this?

Tim Reckmann, https://www.flickr.com/photos/foto_db/15817154324

- Nevertheless you can communicate with each other.

- To do this, you all use **digital services** and **digital information**.

In terms of digitization, the **construction industry** was ranked in fourth-last place in Germany's industry comparison in 2018.



https://www.digitalisierungsindex.de/wp-content/uploads/2018/11/Telekom_Digitalisierungsindex_2018_GESAMTBERICHT.pdf

Content of Presentation

Content of presentation

First Steps of implementing **Building Information Modeling** (BIM) **in Landscape Architecture**

- Introduction to BIM
- Problem Statement and Objectives
- Materials and Methods
- Discussion
- Conclusion and Outlook

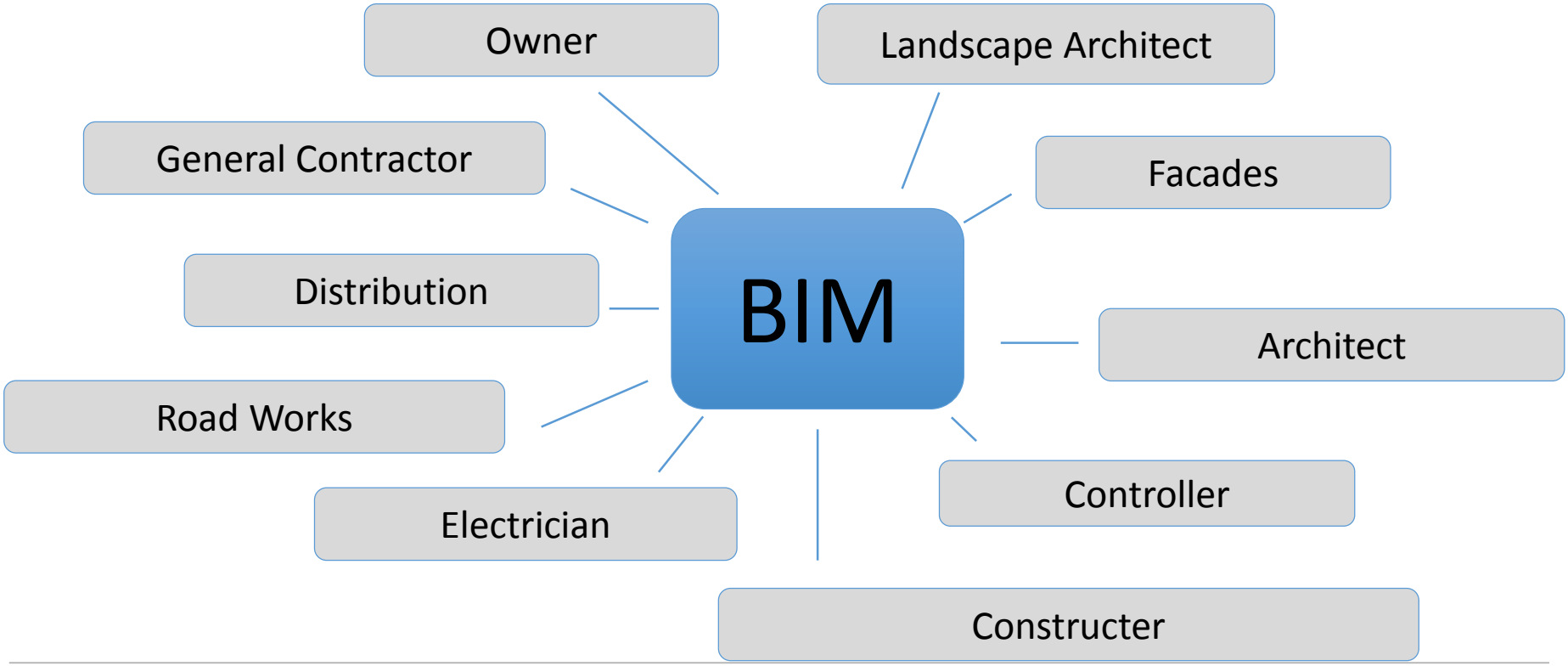
Introducing BIM

Introducing BIM

- Method of **modeling a building throughout its whole lifecycle**
- digitally **providing information** on behalf of
  - Planning
  - Construction
  - Maintenance
  - Deconstruction

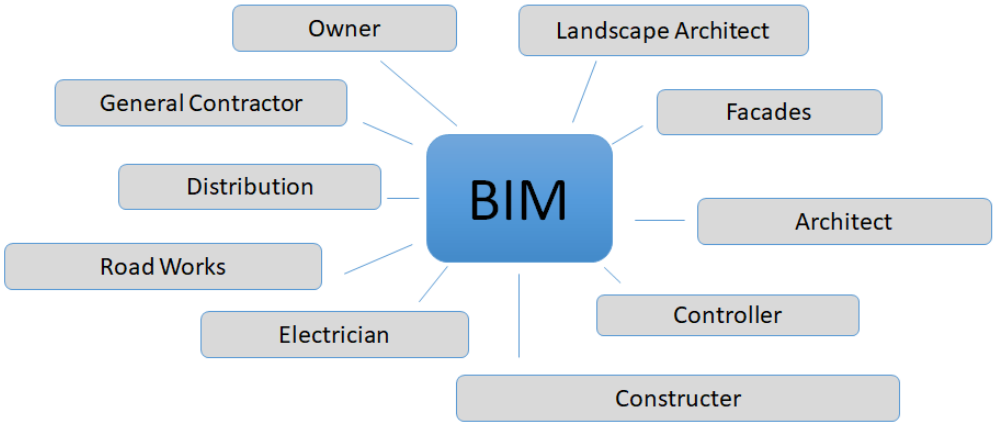
Introducing BIM

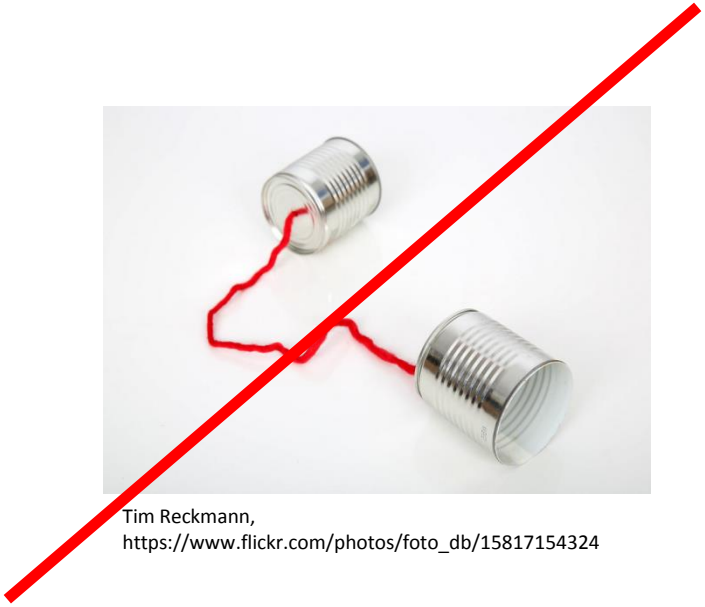
- Building / site construction involves many partipicants



Introducing BIM

- They have to **share and exchange information - digitally**





Tim Reckmann,
https://www.flickr.com/photos/foto_db/15817154324

Problem statement / Objectives

Problem Statement

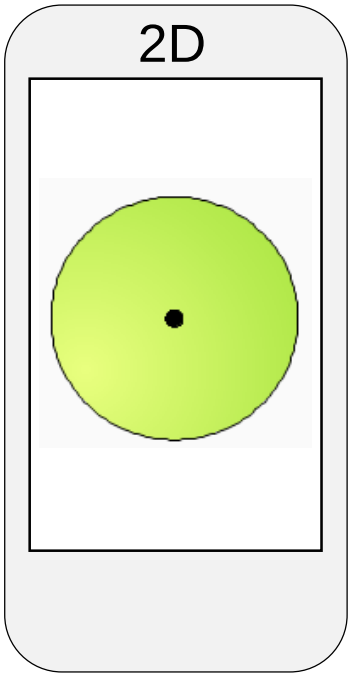
- Use of various software
- Use of different file formats

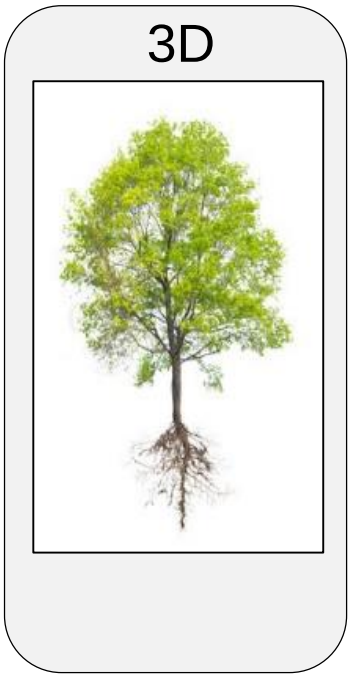
- Open BIM requires non proprietary file formats, like ifc

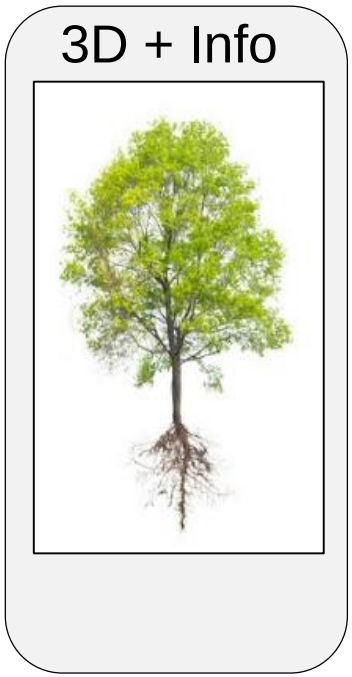
Problem Statement

Focusing on information: 2 levels

- Geometrical level
- Semantical level







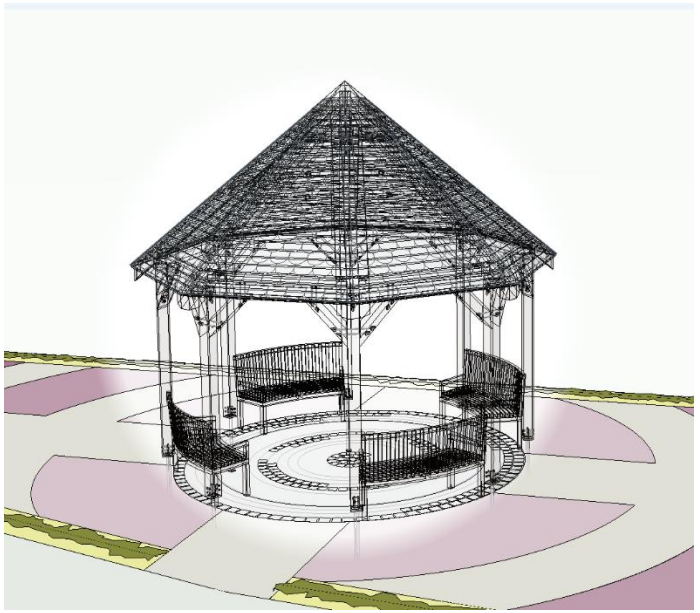
Article master data
- botanical name
- German name

Sizing
- height
- crown
- trunk girth
- root stem

Properties
- form of education
- winter hardiness zone
- soil characteristics
- autumn coloring
- …

Problem Statement

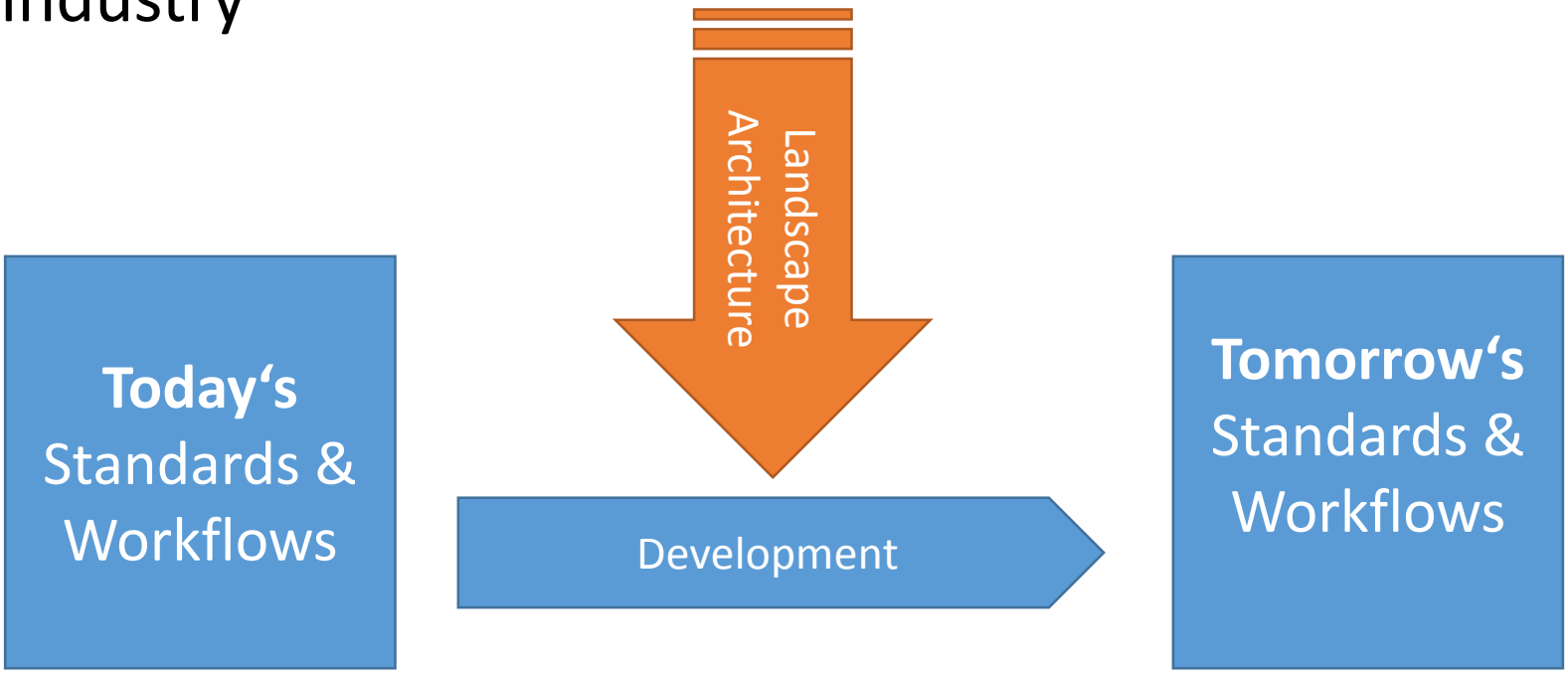
Geometrical level of BIM-Model **does not serve the purpose of presentation**



Screenshot of a 3D-garden-pavilion (courtesy of G. Bechstein, Hochschule Geisenheim University]

Problem Statement

- Current standards and workflows represent the demands of architecture and infrastructure industry



Problem Statement

- Information has to structured in a standardized way
- IFC is a possible instrument, but…
- the currently used entities and attributes are insufficient
  - IFC Site
  - IFC Slab
  - IFC Stair
  - IFC Wall

https://wpgs.de/wp-content/uploads/2019/02/explorativ-explorative-studien-explorative-forschung.jpg

Objectives

- **Major challenge**: efficient usage
  - We have to adapt standards and workflows to the needs of landscape architecture

→ Multiple-case case study

https://wpgs.de/wp-content/uploads/2019/02/explorativ-explorative-studien-explorative-forschung.jpg

Objectives

- Can **international experience** and achievements **be transferred to** the needs and characteristics of **Germany**?
- Which **objects** have to be available for **landscape architecture?**

https://wpgs.de/wp-content/uploads/2019/02/explorativ-explorative-studien-explorative-forschung.jpg

Methods

Methods – International Experience Norway

Norwegian BIM for landscape initiative

- "Informasjonsmodell for landskapsobjekter"(Statens kartverk 2016)

Hardt terrengelement / *Paved surface*

Posted on 17. mars 2015 | by admin | Publisert i — Ingen Kommentarer

LAST NED SKJEMA
DOWNLOAD SPREADSHEET

Fasene i tabellen forholder seg til Statsbyggs prosjektmodell

HardtTerrengelement - Harde flater i forbindelse med veier og plasser defineres som harde terrengelementer. ***Paved surface*** *- Hard surfaces, as applied in roads and plazas, are defined as paved surfaces (the definitions* ***hardscape*** *or* ***hard landscaping*** *are commonly used in this context. However, those terms may include objects such as steps, curbs and retaining walls, i.e. not exclusively surfaces).*

Methods – International Experience Norway

- Factor “time“ is taken into account:
- six project phases represent project progress
- Each piece of information is assigned to a time component

OBJECT SPREADSHEET						
Tree						
	Programfase (LOD 000) progamming	Skisseprosjekt (LOD 100) sketch proposal	Forprosjekt (LOD 200) preliminary project	Detaljprosjekt (LOD 300) detail project	Byggefase (LOD 400) construction	FDVU (LOD 500) operations and maintenance
	0	1	2	3	4	5
Parameter name						
Type Tree		x	x	x	x	x
Height				x	x	
Spread				x	x	
Girth				x	x	
Clear stem height				x	x	
Root protection and condition				x	x	
Form specified				x	x	
planting distance			x	x	x	x
planting system			x	x	x	x
Origin		x	x	x	x	x
Stakeout data					x	
Ultimate height		x	x	x		x

Extract of the object spreadsheet “Tree” [Wik et al, 2018]

Methods – International Experience UK

- **Landscape Institute's** BIM Working Group established **product data templates** (PDT)
- PDT empower manufacturers and suppliers to supply consistent and comparable product information
- Relevant information on individual products in standardized form and thus across systems

Methods – International Experience UK

Product data templates (pdt) for the landscape sector

Landscape Institute
Inspiring great places

Flora
Product Data Template

Template Category	**Flora**			
Template Version	v6.1			
Category Description	Plant species grown for the purpose of planting out in a landscape.			
Classification System				
Classification	Value			
Suitability for Use				
Template Custodian	Landscape Institute			
Information Category	**Parameter Name**	**Value**	**Units**	**Notes**
Manufacturer Data				
Specifications	Supplier		Text	
Specifications	Supplier Website		URL	
Specifications	Product Range		Text	
Specifications	Product Model Number		Text	Or Code
Specifications	CE Approval		Text	Number, Yes, No
Specifications	Product Literature Webpage		URL	
Specifications	Product Features		Text	Free text to describe product
Naming Data				
Specifications	Product Code		Text	
Specifications	Botanical Name		Text	
Specifications	Alternative Botanical Name		Text	Or Names
Specifications	Common Name		Text	Or Names
Specifications	Category or Class		List	Or Type. Select from list
Specifications	Sub-Category or Sub-Class		List	Select from list or type to define new value

Extract of the pdt spreadsheet "Flora" [Landscape Institute 2016b]

Methods – Expert Interviews and Use Case Study

- Conducting **expert interviews** with representatives of the various stakeholder groups (builders, planners, software companies, manufacturers, contractors and facility managers)
- Analysis of completed and partially **accompanied projects**
- The **necessary adjustments for usability; German standards** must be taken into account
- Elaboration of exemplary Information Delivery Manuals (IDM), e.g. “IDM Plants”

Discussion

Discussion

- UK pdt and Norwegian object list focus on national requirements
- Both emphasize the generation of standardized specifications for implementing BIM in landscape architecture
- Both require an international standardization process

Discussion

- Spreadsheets/pdts meet current requirements of the software developers, suppliers and architects
- Standardized information in the pdts can be readapted regarding new requirements (e.g. IFC 5.0, …)

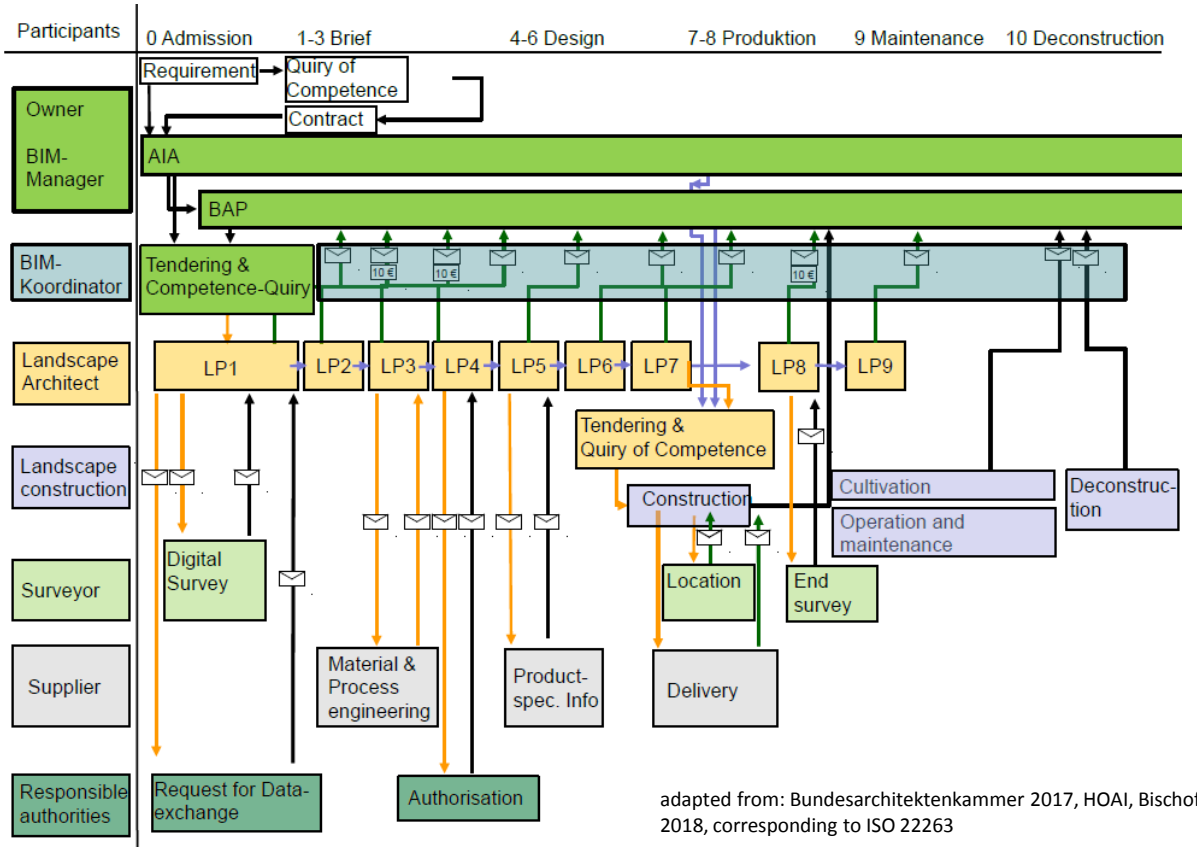
Conclusion and outlook

Conclusion and Outlook

- To identify the processes and participants, an interim result is the simplified visualization of the process mapping.
- Detailed elaborations of necessary IDM (e.g. IDM plants) will be developed in accordance with international and national standards.

Conclusion and Outlook

Draft “Process Representation”



adapted from: Bundesarchitektenkammer 2017, HOAI, Bischof et al. 2018, corresponding to ISO 22263

Conclusion and Outlook

- Open BIM demands open standards like the Industry Foundation Classes (IFC)
- National needs vs. international standards
- A common denominator as to which components and objects are indispensable is to be determined

Conclusion and Outlook

- Based on the work in Norway and the UK, a German standard “PDT Plant” has been drawn up.
- Further national drafts for PDT are being developed: “PDT Stair”, “PDT Retaining Wall” and “PDT Hard Surface” - results will be presented in autumn 2019.

References

References

- Bischof, Moritz; Bougain, Aude; Gantner, Johannes; Hausknecht, Kerstin; Heins, Christian; Kirmayr, Thomas et al. (2018): BIMiD-Leitfaden. So kann der Einstieg in BIM gelingen. 2. Auflage. Hg. v. Fraunhofer IBP, zuletzt geprüft am 25.11.2018.
- Borrmann, André (2015): Building Information Modeling. In: Detail 2015 (6), S. 602–607, zuletzt geprüft am 26.01.2017.
- VDI Richtlinie 2552, Oktober 2018: Building Information Modeling, zuletzt geprüft am 26.01.2019.
- Bundesarchitektenkammer (Hg.) (2017): BIM für Architekten. Leistungsbild Vertrag Vergütung. Online verfügbar unter http://www.aknw.de/fileadmin/user_upload/Publikationen-Broschueren/BIM-BAK-Broschuere-WEB.pdf, zuletzt geprüft am 24.05.2018.
- Deutsche Telekom AG (Hg.) (2017): Digitalisierungsindex Mittelstand. Der digitale status quo des deutschen Mittelstands, zuletzt geprüft am 13.06.2018.
- Norm DIN EN ISO 29481-1, Januar 2018: DIN EN ISO 29481-1:2018-01, zuletzt geprüft am 26.01.2019.
- Kreißig, Johannes (2016): BIM, Nachhaltigkeit und Zertifizierung | DGNB Blog. Hg. v. Deutsche Gesellschaft für Nachhaltiges Bauen - DGNB e.V. Stuttgart. Online verfügbar unter http://blog.dgnb.de/bim-nachhaltigkeit-zertifizierung/, zuletzt geprüft am 07.05.2018.
- Landscape Institute (2016a): BIM for Landscape. Abingdon, Ann Arbor, Michigan: Taylor and Francis; ProQuest.
- Landscape Institute (2016b): PDT store Landscape Institute. Landscape Institute. Online verfügbar unter https://www.landscapeinstitute.org/technical-resource/pdt-store/, zuletzt geprüft am 20.01.2019.
- Statens kartverk (Hg.) (2016): SOSI generell objektkatalog Landskapsarkitektur. Versjon 5.0. Online verfügbar unter https://www.kartverket.no/globalassets/standard/sosi-standarden-del-1-og-2/sosi-standarden/sosi-standarden-5.0/sosi_landskapsarkitektur_5.0.pdf, zuletzt geprüft am 12.06.2018.
- Thon, Andreas; Peters, Alexander (2018): BIM in der Landschaftsarchitektur. In: Neue Landschaft (9), S. 28–32.
- HOAI (10.07.2013): Verordnung über die Honorare für Architekten- und Ingenieurleistungen (Honorarordnung für Architekten und Ingenieure - HOAI). In: BGBl. I S. 2276, zuletzt geprüft am 25.11.2018.
- Wik, Knut Hallgeir; Sekse, Marius; Enebo, Bjørn Amund; Thorvaldsen, Jostein (2018): BIM for Landscape: A Norwegian Standardization Project. In: Erich Buhmann (Hg.): JoDLA 3-2018. Journal of Digital Landscape Architecture. 1. Neuerscheinung. Berlin: VDE VERLAG, S. 241–248. Online verfügbar unter https://gispoint.de/fileadmin/user_upload/paper_gis_open/DLA_2018/537642026.pdf, zuletzt geprüft am 19.11.18.

Thank you for your attention

Any questions?