

We broke the BIM!

BIM – Einsatzmöglichkeiten anhand praktischer Anwendungsfälle

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WaBoLu, Berlin, 07Mai18*

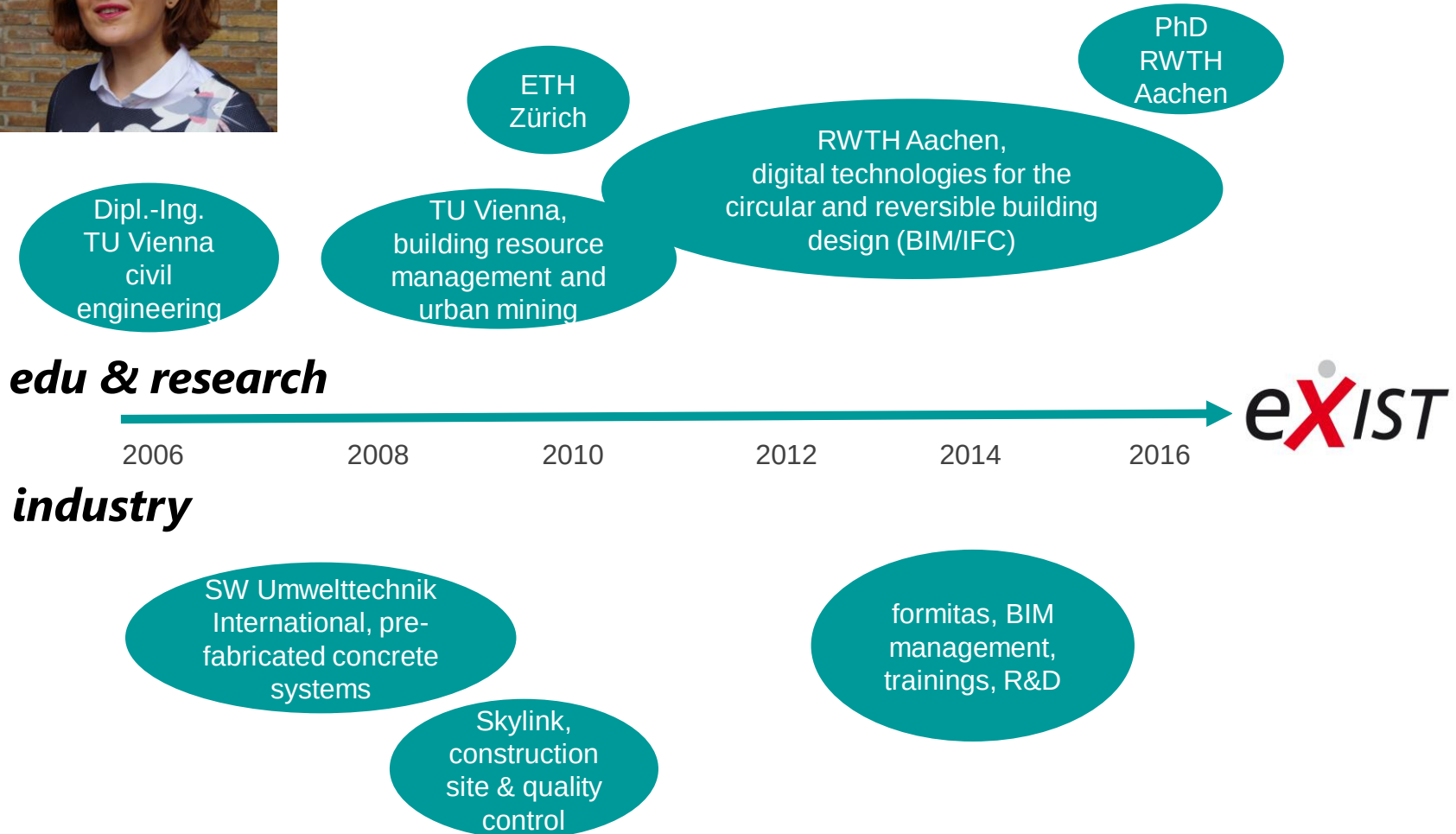


Inhalt

- A road to BIM
- BIM Basics
 - Die Evolution von CAD
 - Was ist BIM?
- Experimentelle Forschung – Anwendungsbeispiele
 - Intelligente Echtzeit Raumklima-Optimierung
 - Automatisierte Simulation und Optimierung von Materialsicherheit und Kreislauffähigkeit



A road to BIM





BIM

BIM Basics



“Essentially, all models are wrong, but some are useful.”

George Box

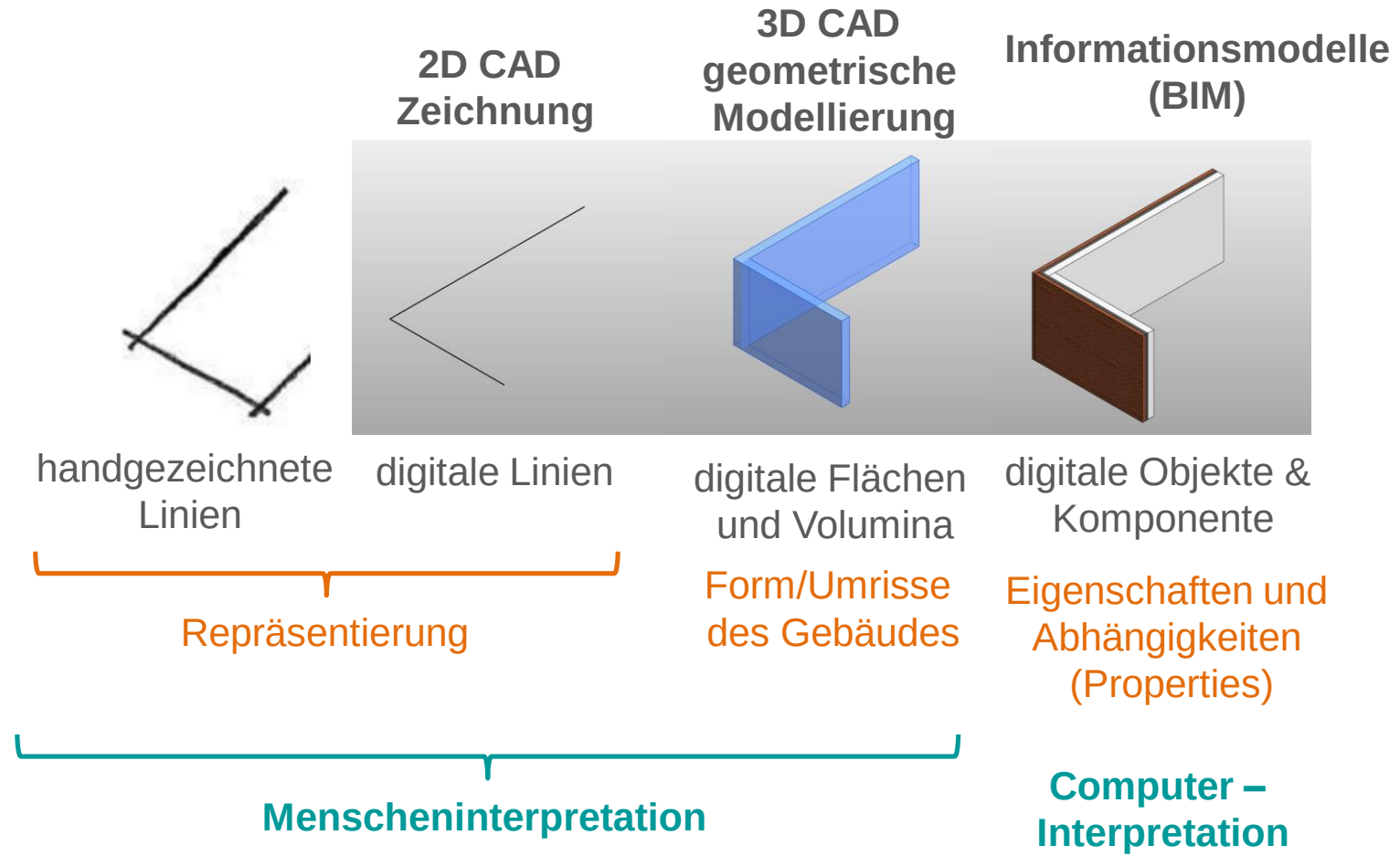


Was ist BIM?

»Building Information Modeling bezeichnet eine **kooperative Arbeitsmethodik**, mit der auf der Grundlage **digitaler Modelle** eines Bauwerks die für seinen **Lebenszyklus relevanten Informationen** und **Daten** konsistent **erfasst, verwaltet** und in einer transparenten **Kommunikation zwischen den Beteiligten ausgetauscht** oder für die weitere **Bearbeitung übergeben** werden.« [1]

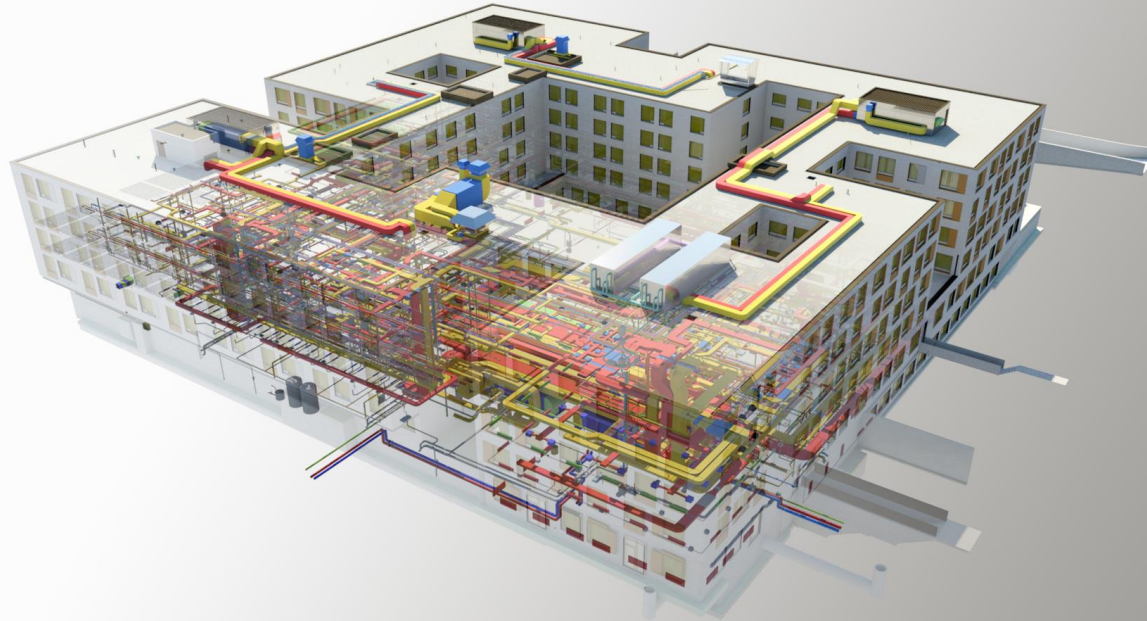


Die Evolution von CAD





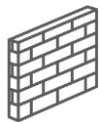
Was ist BIM?



Quelle: Autodesk ®



Informationsmodell



Semantische
Objekte



interdisziplinär



parametrisch



Lebenszyklus-
betrachtung

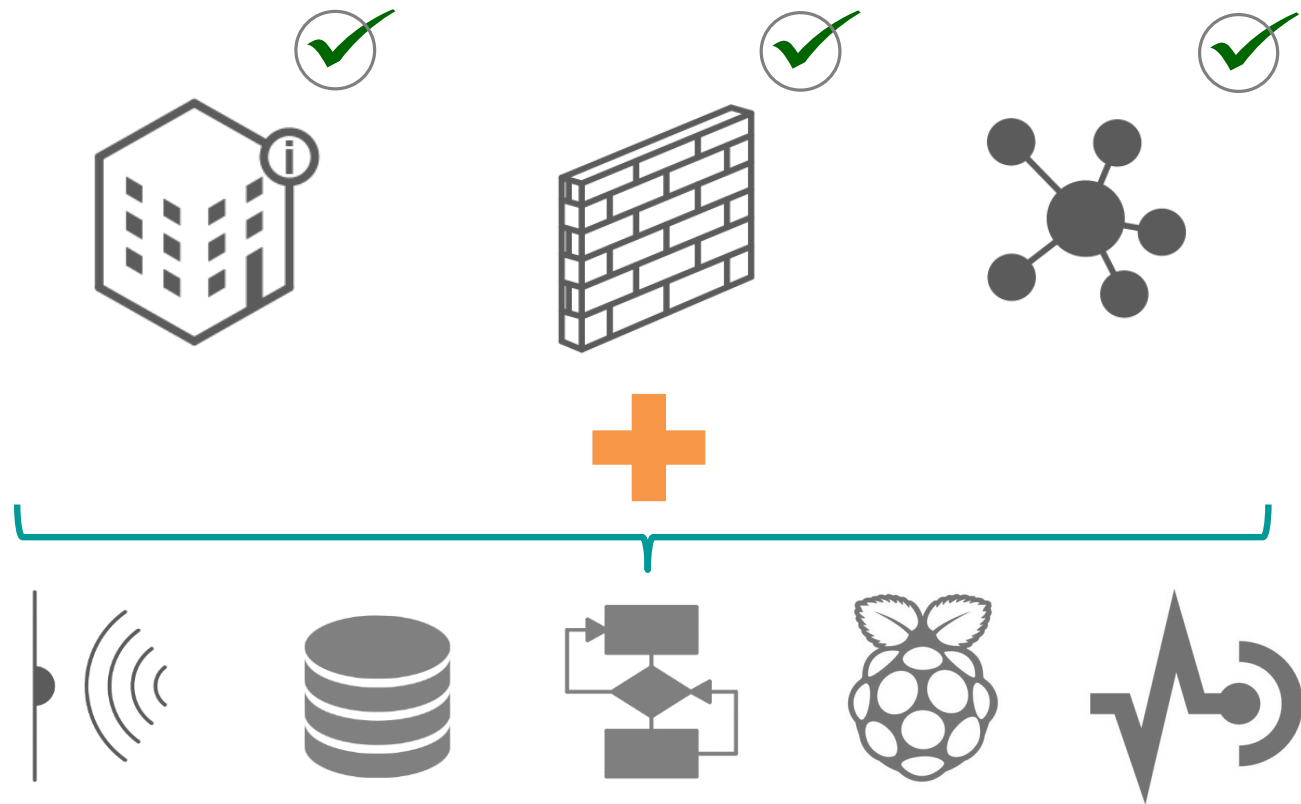


Intelligente Echtzeit-Steuerung des Innenklimas

BIM + Big Data + AI

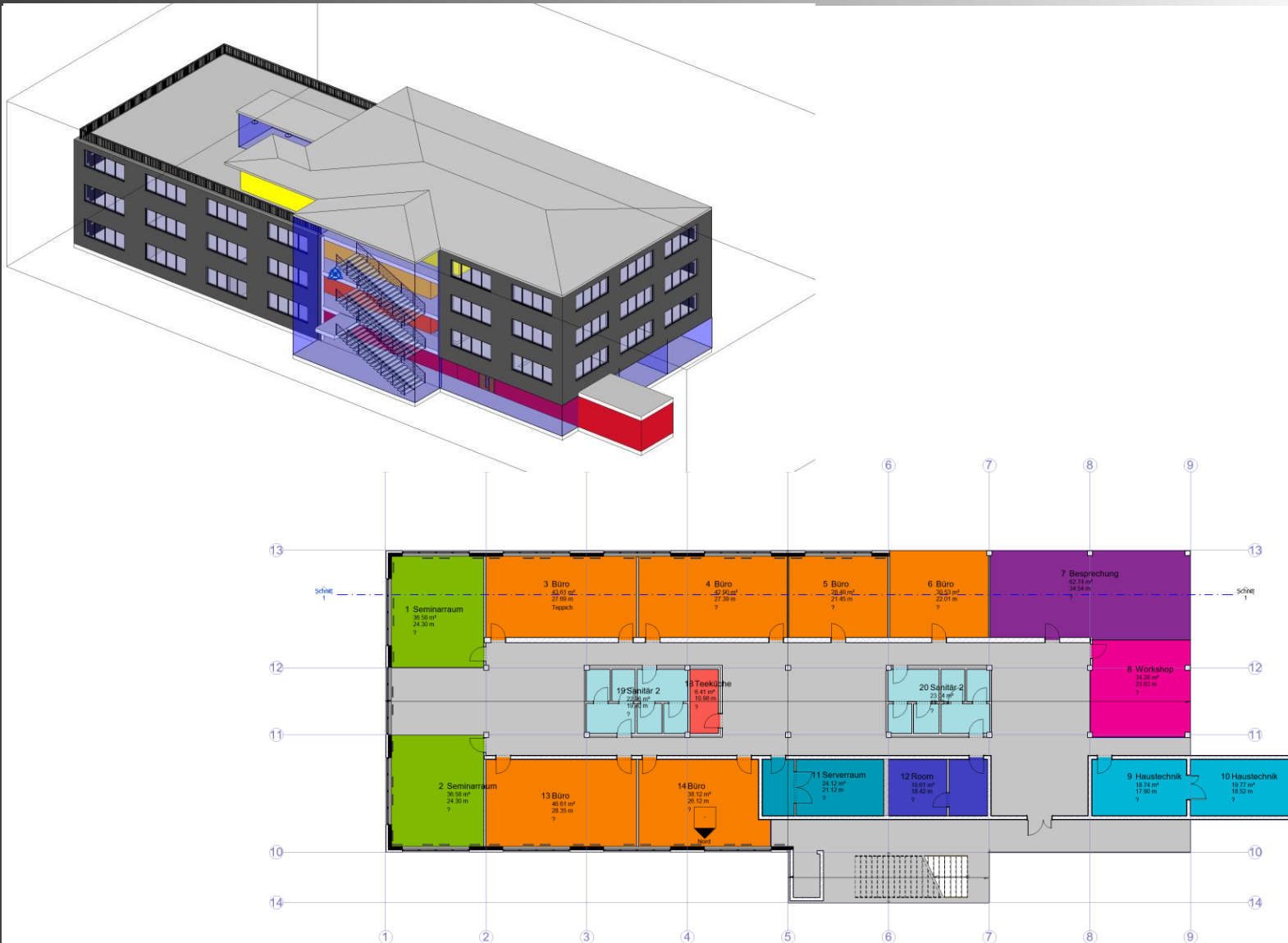


BIM + Smart Building Systeme + AI



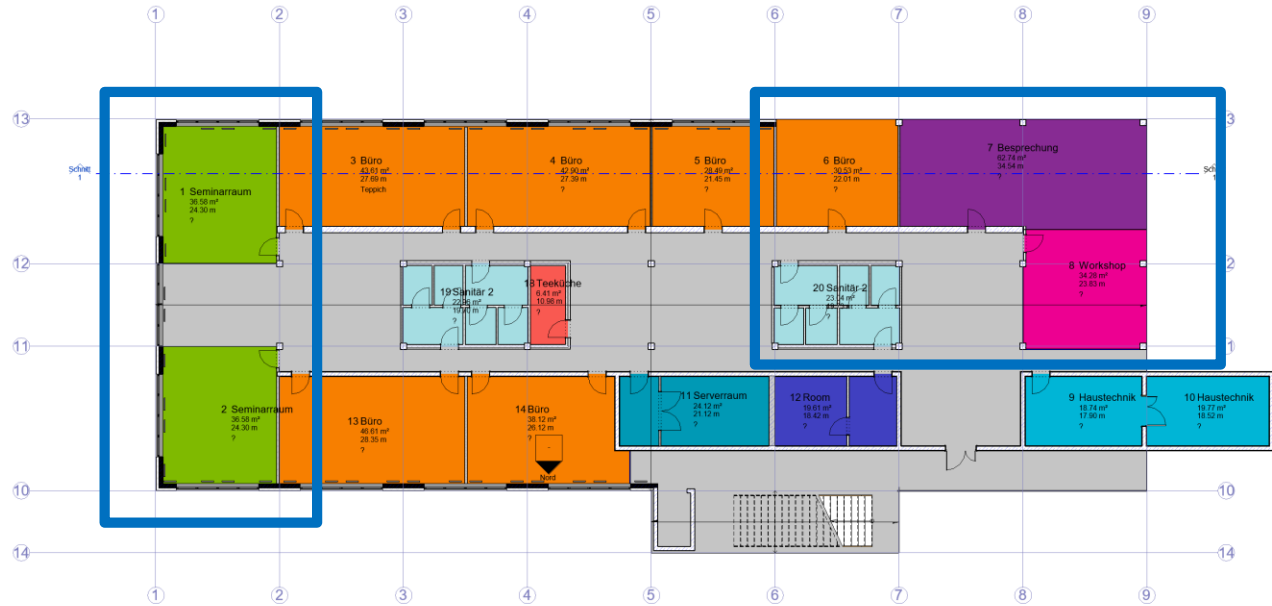


Grundlage - das BIM Gebäudedatenmodell





Datenprofile



Raum- Kalender



„Nutzer-Profil“



Wetterdaten



Sensore, Datensammlung und Datenauswertung

Toxische Gase



Geräuschssensoren



Öffnungssensoren

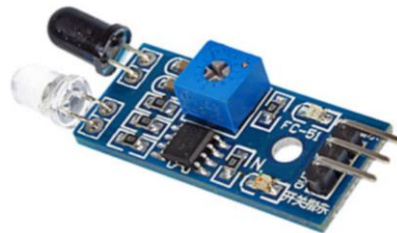


Temperatur-/

Feuchtigkeitssensoren



Heligkeitssensoren



Luftsensoren (CO2)



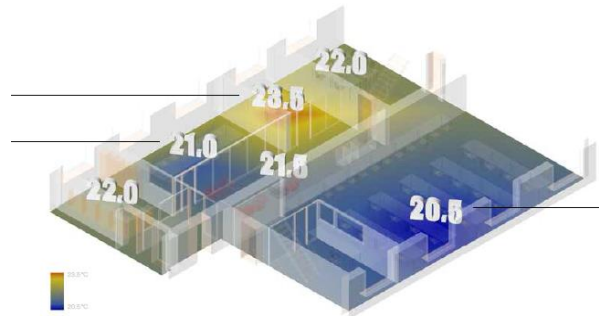
Feinstaub



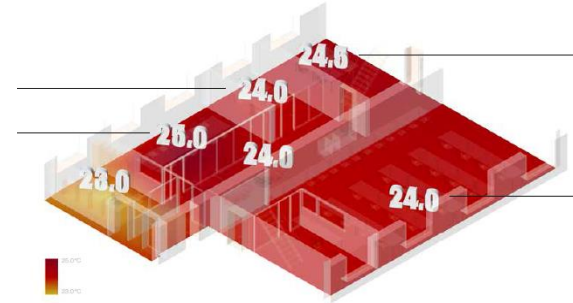
Steuersystem



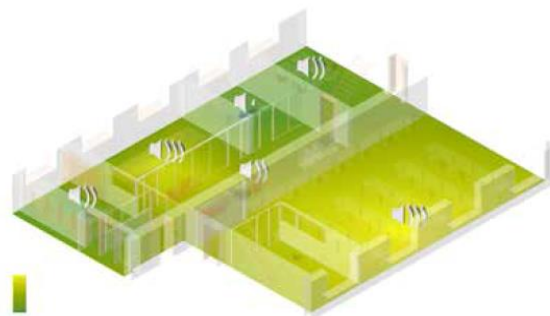
Beobachtung + Datensammlung+ Datenauswertung



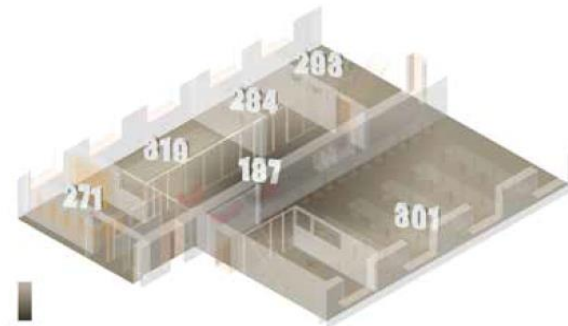
Licht



Temperatur



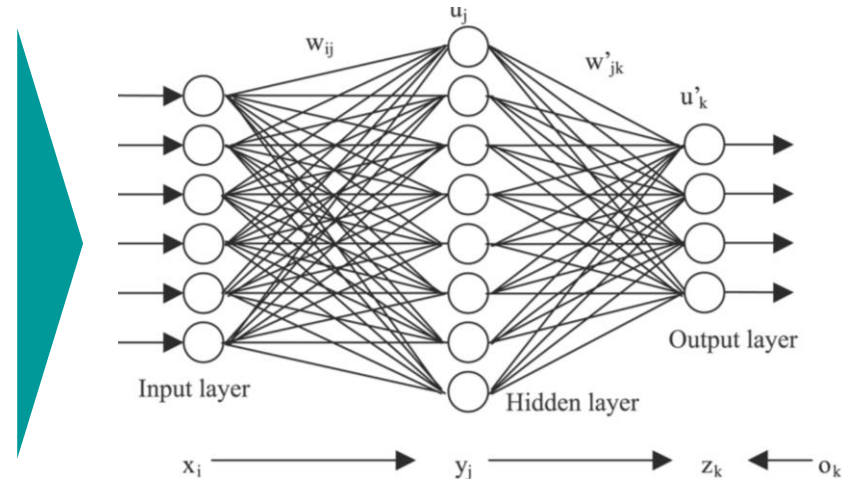
Schall



Luft



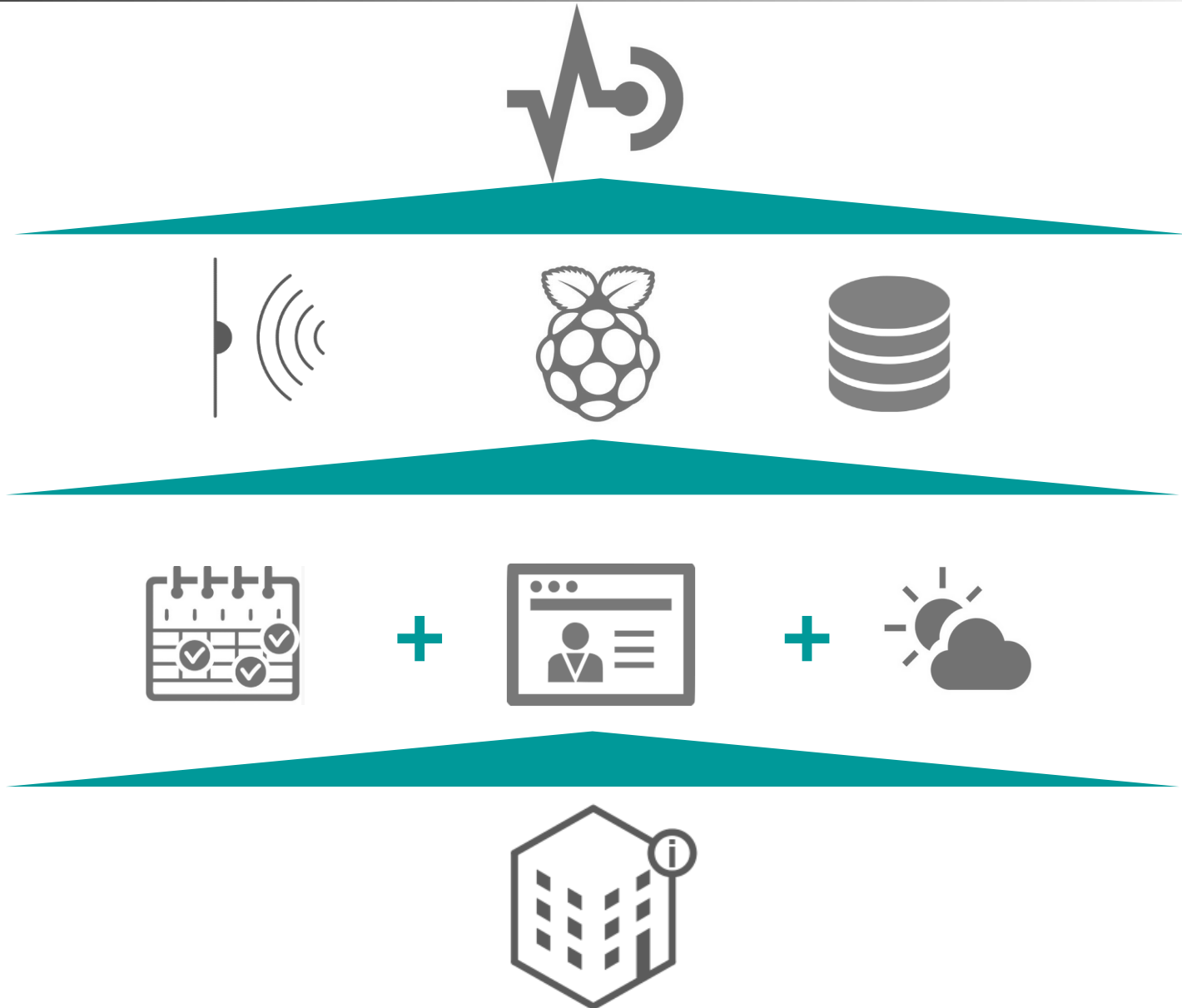
Optimierung mit neuronalen Netzwerken



Quelle: Bild - Clivland Brain Klinik, HealthyBrains.org



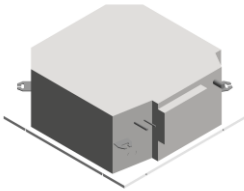
System-Architektur





Echtzeit Smart-Systems-Aktivierung

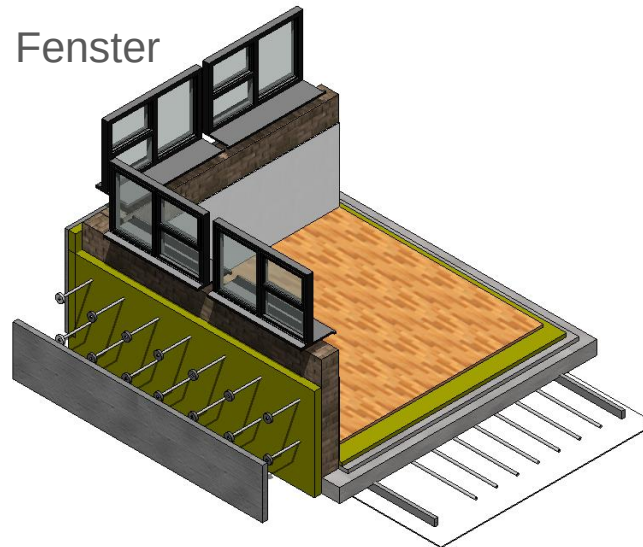
Aktive Elemente



Lüftung



Licht

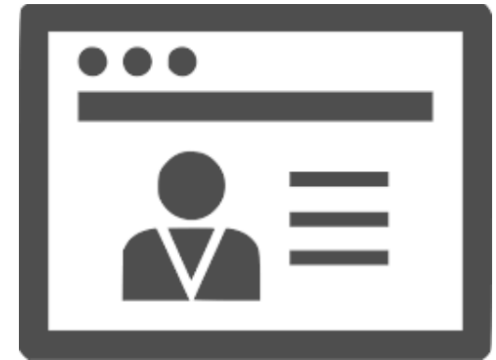


Fenster

Heizung



Verschattung



Nutzerspezifische
aktive Szenarien



***All things BIM – Dokumentierung,
Materialsicherheit, Materialkreislauffähigkeit***



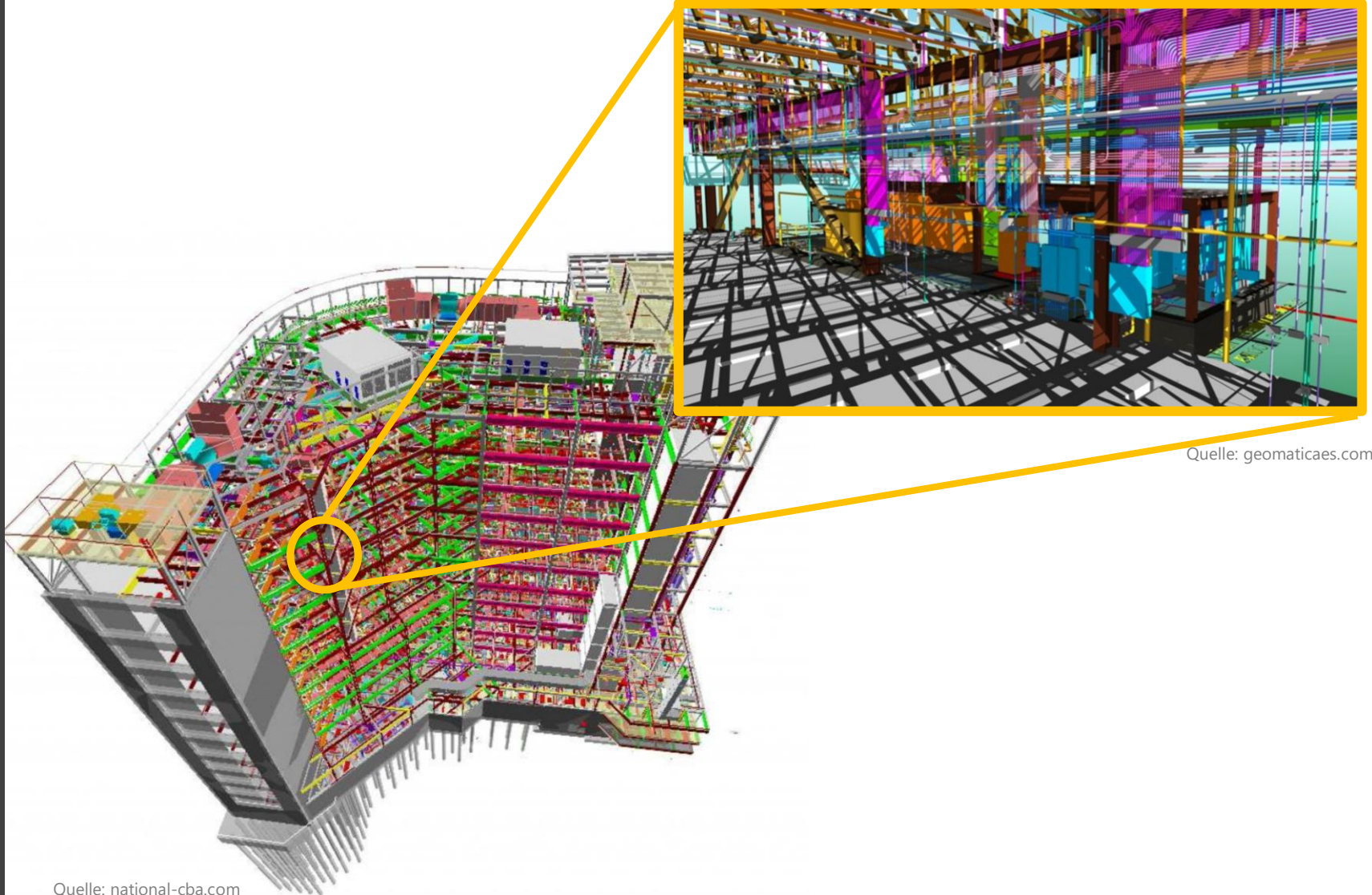
Das Problem



Quelle: [1] „A resource-efficient Europe“, EC, 2011; [2] „Roadmap to resource-efficient Europe“ (Com), EC, 2011; [3] Baugewerbeverb. Hessen, 26.Mai 2014; [4] Die Bayerische Bau-, Baustoff und Baurecyclingwirtschaft, 2014, Thomson Reuters, 2015; DVA, 2017



Das Problem



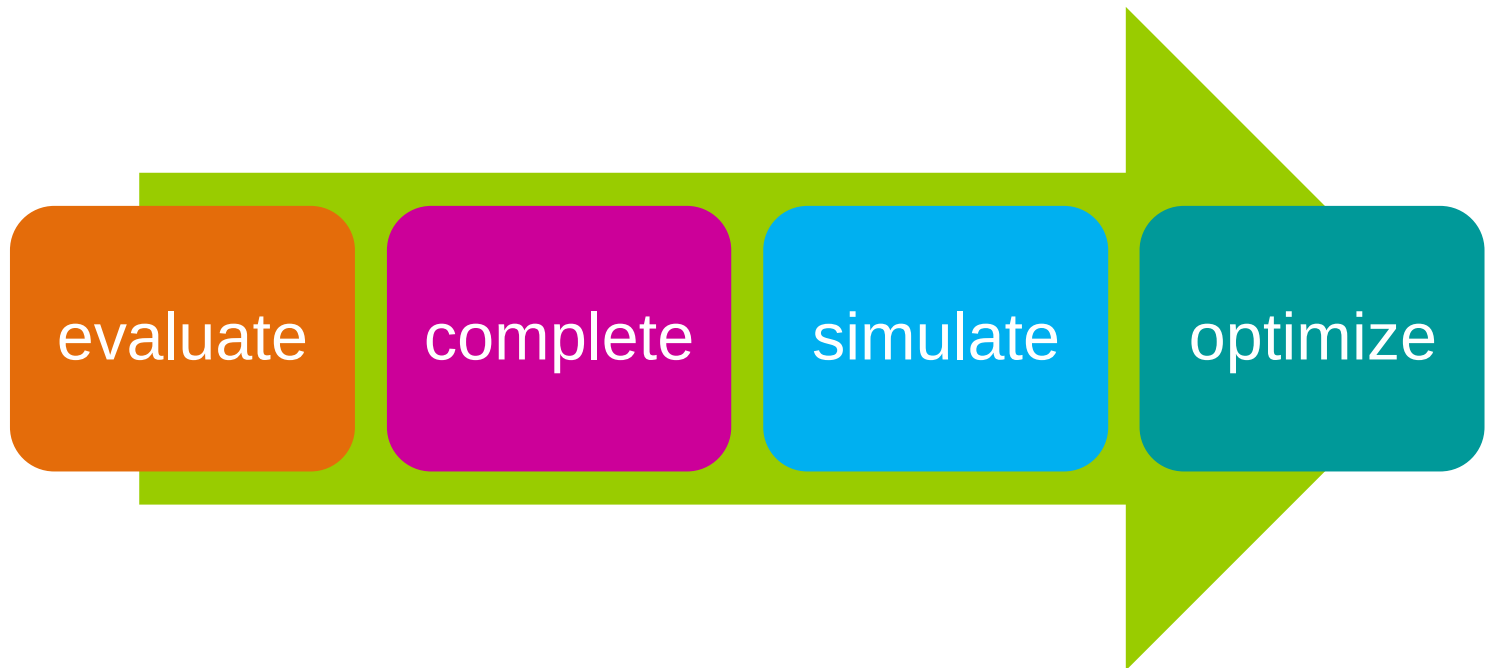
Quelle: geomaticeas.com

Quelle: national-cba.com



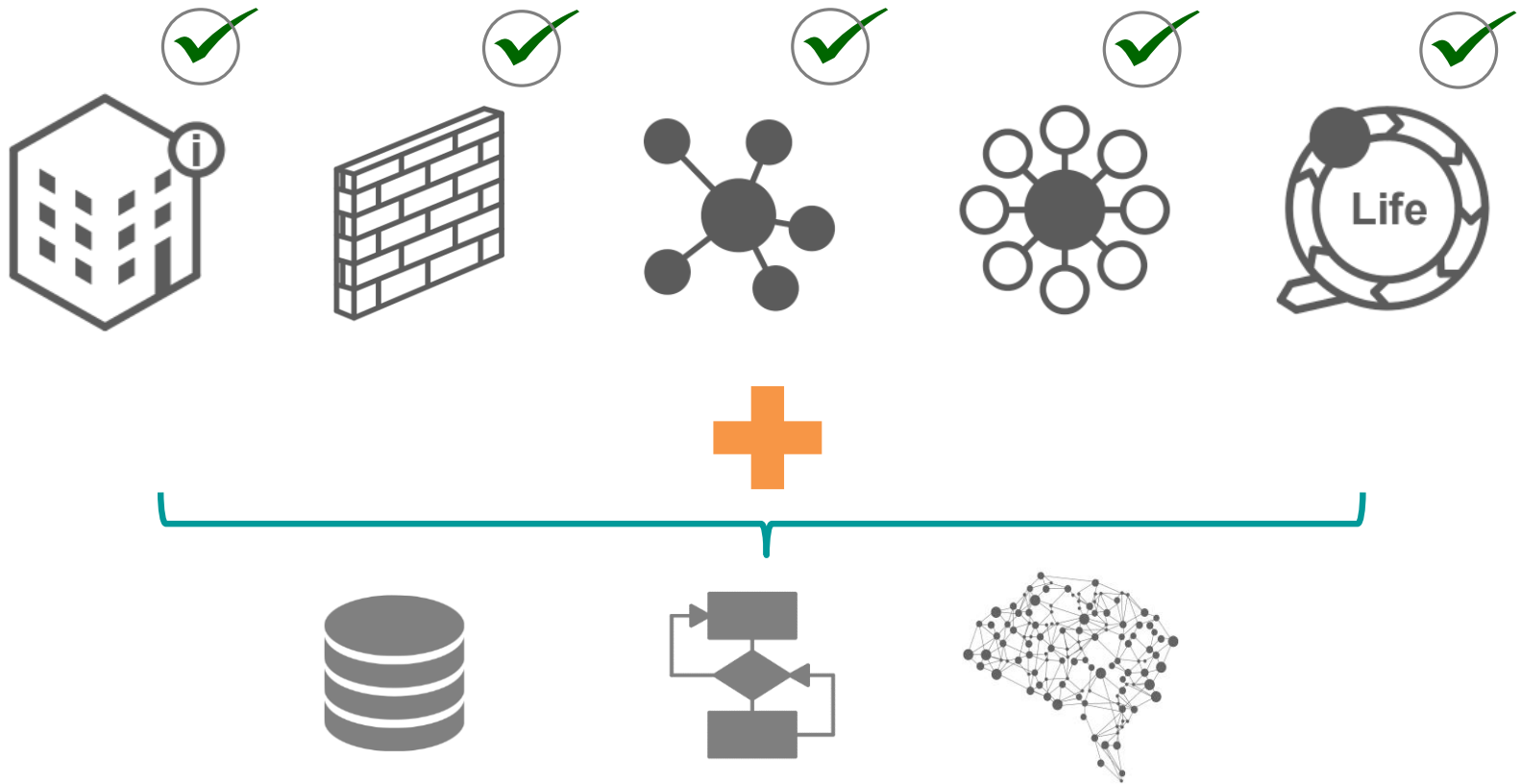
Was ist es?

Eine Softwarelösung für die Designphase und den Gebäudebetrieb, die automatisiert und in Echtzeit **Dokumentierung**, **Materialsicherheit** und **Materialkreislauffähigkeit bewertet, simuliert** und **optimiert**, und dabei die **resultierenden Lebenszykluskosten** significant **reduziert**.



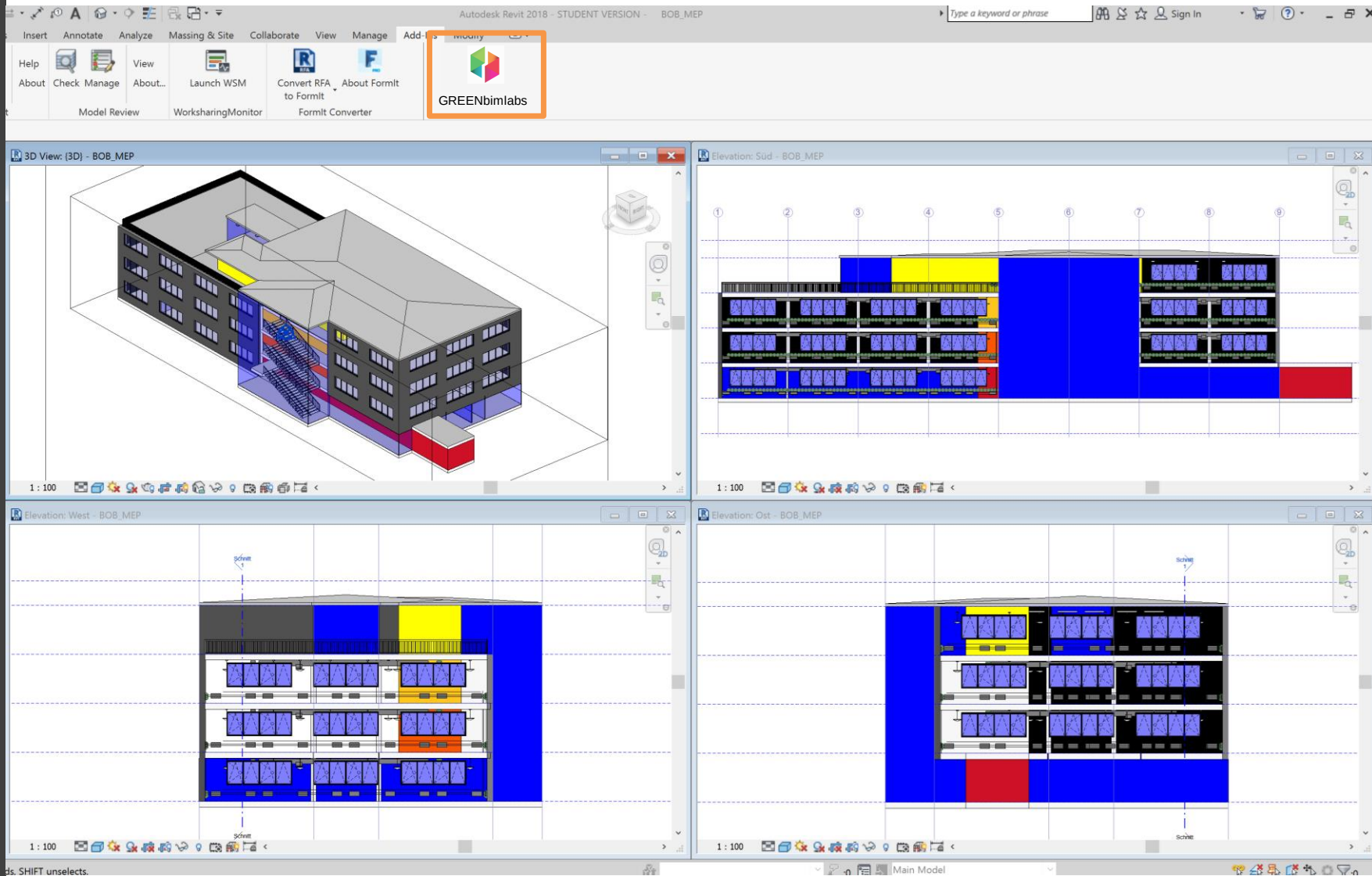


BIM+ real data + AI





Integration in BIM



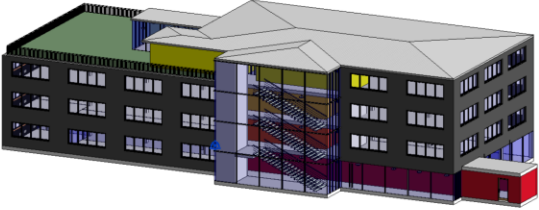


Aikana- GUI

Aikana
Rocky

Home Project Data Model Data 0/141 Analysis Result

Project Information



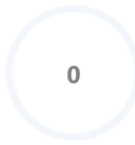
Project Name	GREENbimlabs HQ
Location	Karlsgraben, Aachen
Year Of Construction	2020
Owner	GREENbimlabs
Partner	Carpus & Partner
Estimated building costs	3,5 Mio. €
Estimated total life cycle costs	6 Mio.€
Number of full simulations:	4
Number of full optimisations	0

Current Analysis

NEW ANALYSIS

Project Data
Design Phase:
Type:
Construction:
Life Duration:

Model Data


Model Prepared: 0/141 Defined

Analysis
Sustainability Analysis:
Not yet performed
Cost Analysis:
Not yet performed
Life Cycle Analysis:
Not yet performed

Results
 Recyclability
 Reusability
 Waste Reduction



Analyse des Daten- und Informationsinhalts



ElementSelection

 Home Project Data Model Data 0/141 Analysis Result

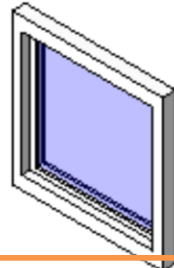
Categories

-  Windows
-  Doors
-  Walls
-  Floors
-  Roofs

Element Types

	Fenstererelement 1-flg	• •
	Fenster 2-flg - Variabel	• •
	Fenster 1-flg - Variabel	• •
	Fenstertür 1-flg	• •
	Fenster 1-flg - Anschlag	• •
	Fenster 2-flg - Anschlag	• •
	Fenster 4-flg	• •
	Fenster 4-flg	• •

Element Type



Name	Fenstererelement 1-flg
Material	unknown
Linked Product	not mapped LINK



Analyse des Daten- und Informationsinhalts



ElementSelection

 Home  Project Data  Model Data 0/141  Analysis  Result 

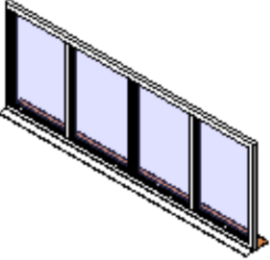
Categories

-  Windows
-  Doors
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Element Types

	Fenstererelement 1-flg	• •
	Fenster 2-flg - Variabel	• •
	Fenster 1-flg - Variabel	• •
	Fenstertür 1-flg	• •
	Fenster 1-flg - Anschlag	• •
	Fenster 2-flg - Anschlag	• •
	Fenster 4-flg	• •
	Fenster 4-flg	• •

Element Type



Name	Fenster 4-flg
family ID	wa1478
frame material	aluminum
glazing	double glazing
special functions defined	-
connection defined	-
mapped to product	none LINK



Unterschied zw. Standard- und verifizierten Produkten

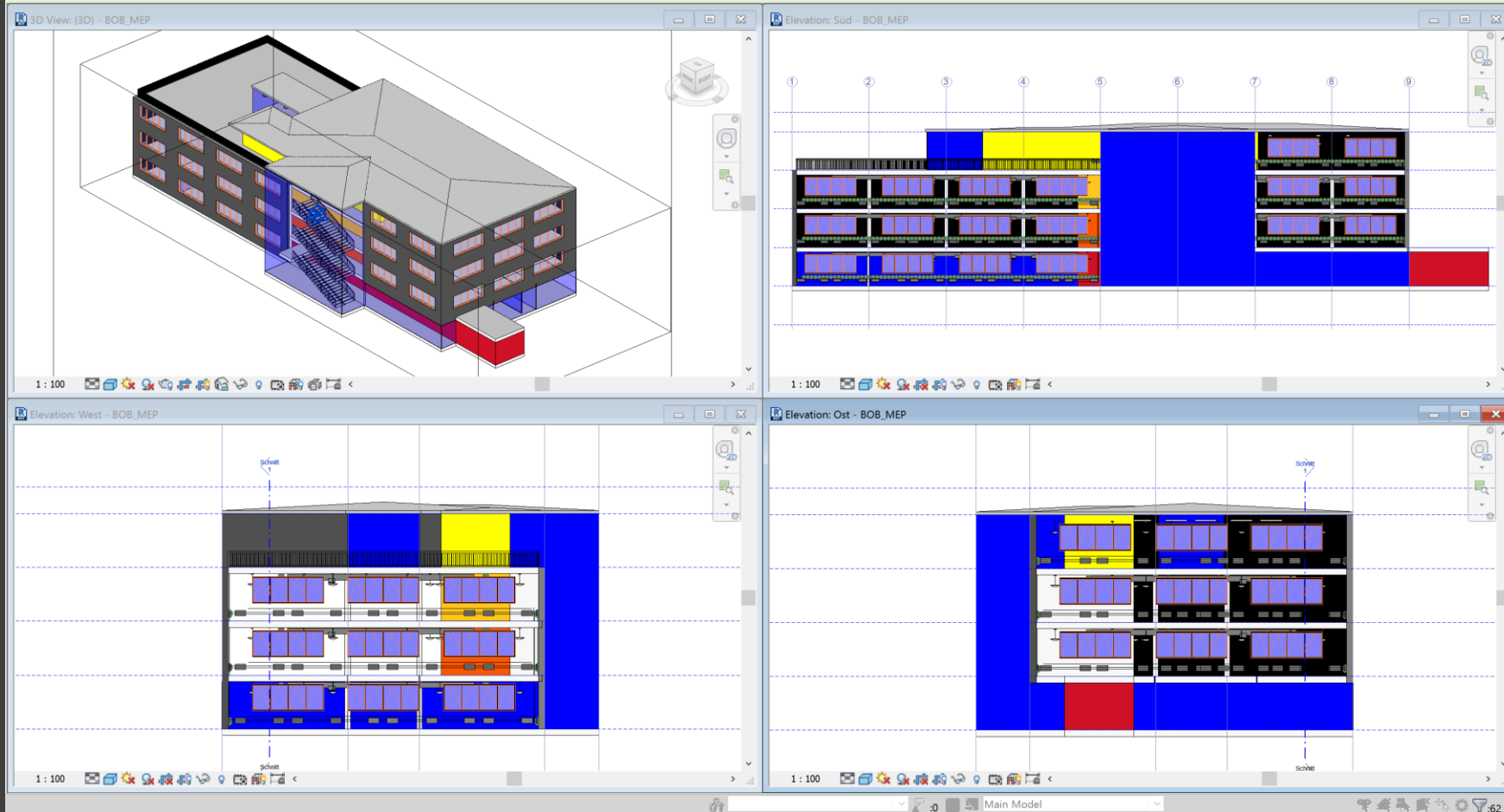
Standard	Verified
	
GREENbimlabs standard product	Rusch

Verified life duration information	approximation	verified
Verified material/ substance composition	based on statistic/s scientific/empirical data large variety	verified by producer & verified by GREENbimlabs specific
Verified installation data	standard data	verified data
Varified maintainance information	not available	verified
Recyclabiility	approximation	evaluated based on verified data

Over 300 parameters and sub-results



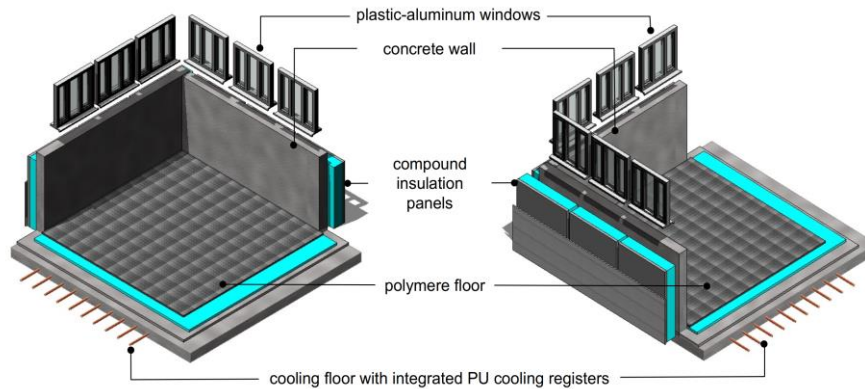
Visuelles Echtzeit-Feedback



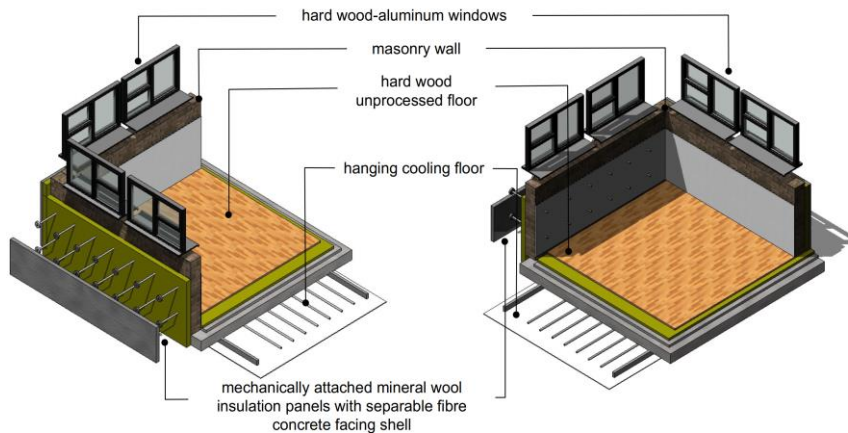


Variantenvergleich

Ursprüngliche Lösung

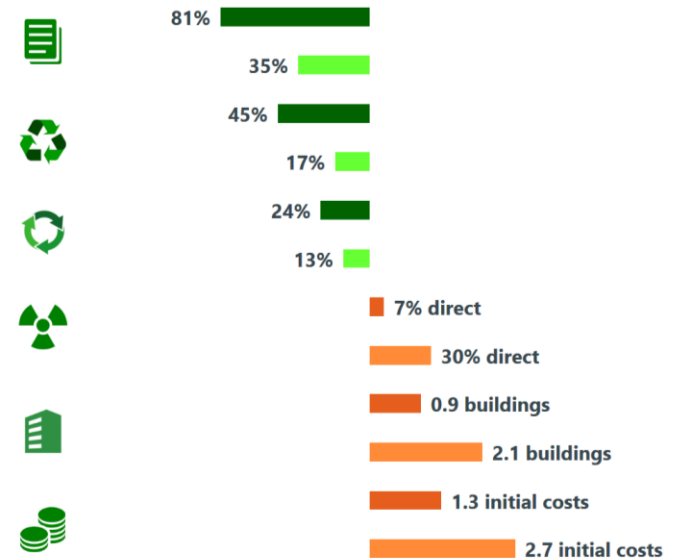


Design - Variante (3. Iteration)



Ergebnisse Variantenvergleich

Options comparison



Optimization iteration

Initial design

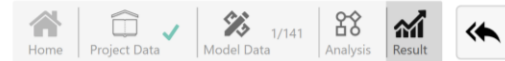




Ergebnisse - Detail



Detailed Results Dashboard



[Sustainability](#) Cost Evaluation Life Cycle Evaluation PDF Report

Summary

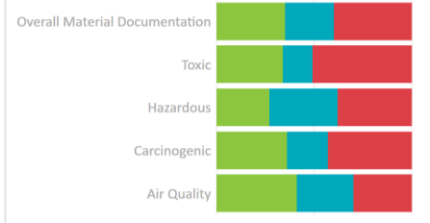
Elements Reusability
Material and Substance Documentation
Material Recyclability
Waste Potential

Substance Documentation for Building



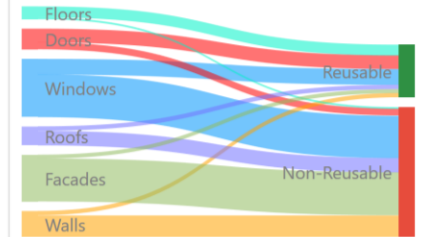
● Complete ● Partially Complete ● Incomplete

Substance Documentation for Building



● Complete ● Partially Complete ● Incomplete

Reusability

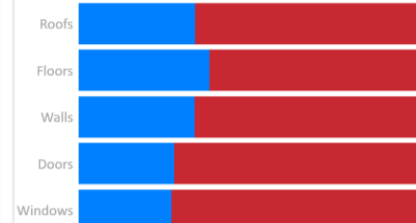


Recyclability



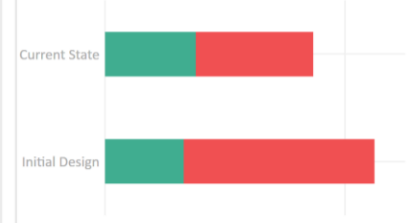
● Recyclable ● Non-Recyclable

Waste Potential



● Used Elements ● Caused Waste by Design

Building Life Cycle Costs



● Initial Cost(€) ● Total Life Cycle Cost(€)



Kontakt



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