Standard-based data structures: Building the foundation of BIM

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Chair of Construction Products Europe Digitalization & BIM Task Group
Chair of BIM4M2
CEN TC442 and ISO SC 13/WG6

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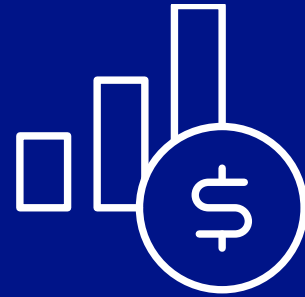# Three main questions

Does it matter? Why

Will it work ? How ?

Can we win? What ?

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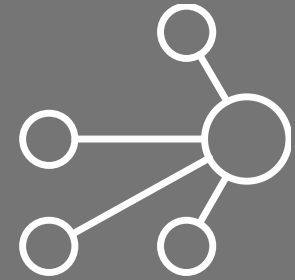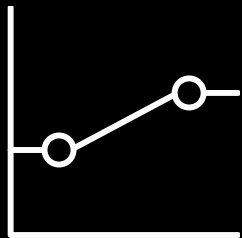
Key drivers for Supply Chain leaders

Continual downward pressure on cost and working capital

Technology must support increasingly complex supply networks

New markets available to leaders and innovators

Risk of serious disruption to the free flow of goods between UK and EU

Digital Supply Chains require digitally-enabled talent

High awareness of the urgency of digitalisation globally where the construction industry is among the least digitalised industry sectors

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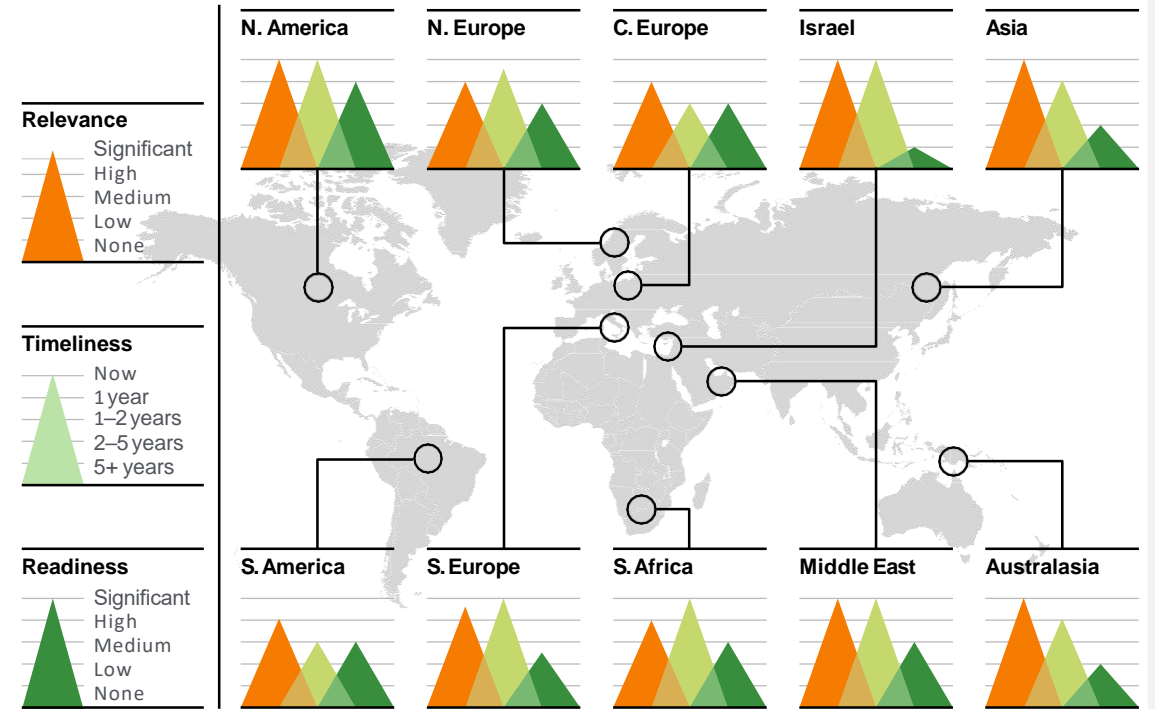## Construction industry is one of the least digitalized sectors

The MGI Industry Digitization Index for Europe

Relatively *low* digitization — Relatively *high* digitization

Sector	Overall digitation	Assets		Usage		Labor			
		Digital spending	Digital asset stock	Digital transactions	Digital interactions	Digital business processes	Digital spend per worker	Digital spending	Digitization of work
ICT									
Media									
Finance and services									
Professional services									
Wholesale trade									
Advanced manufacturing									
Chemicals & pharmaceutical									
Utilities									
Oil and gas									
Basic goods manufacturing									
Mining									
Real Estate									
Transport & warehousing									
Retail trade									
Pers. and local service									
Government									
Education									
Health care									
Entertainment & recreation									
Hospitality									
Agriculture									
Construction									

- o After agriculture and hunting, the construction industry is the least digitalized sector in all categories; assets, usage and labor
- o Notable difference on digital status for similar sectors between different countries. However, the construction industry is in general among the least digitized sectors

Reengineering technology trend is a global phenomenon

Relevance
- Significant
- High
- Medium
- Low
- None

Timeliness
- Now
- 1 year
- 1–2 years
- 2–5 years
- 5+ years

Readiness
- Significant
- High
- Medium
- Low
- None

N. America | N. Europe | C. Europe | Israel | Asia

S. America | S. Europe | S. Africa | Middle East | Australasia

- o North America the only market which is ready and have understood the high importance of the digital transition
- o Most regions are starting to realize the relevance and timeliness of the digital transition but lacks readiness to manage the impact of the "Data wave" which affects all parts of industry segments across the globe

Source: (left) McKinsey Global Institute analysis; (right) Deloitte analysis - Deloitte Insights (Survey of Deloitte leaders across 10 regions)

A window exchange – what is a window?

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Search result: **Window**
Context: **Product**

Search result: **Window**
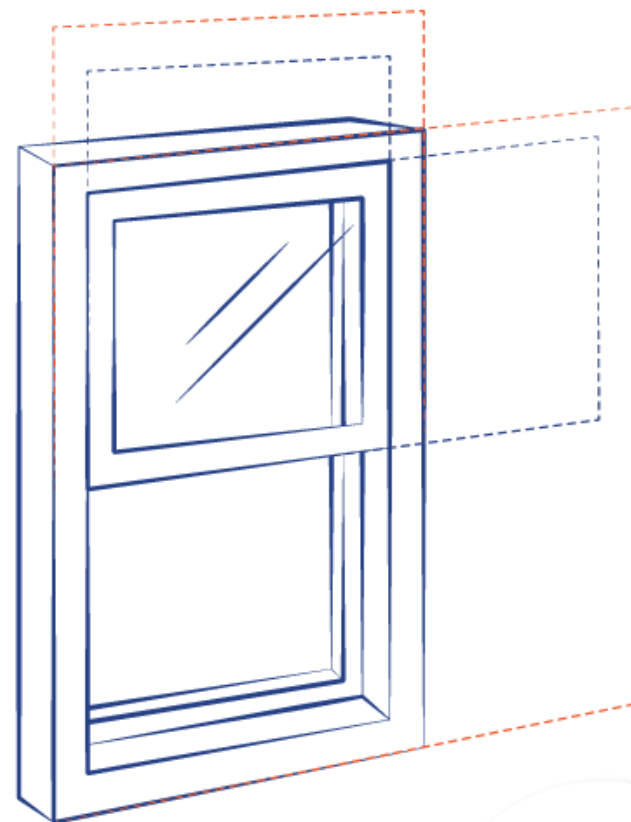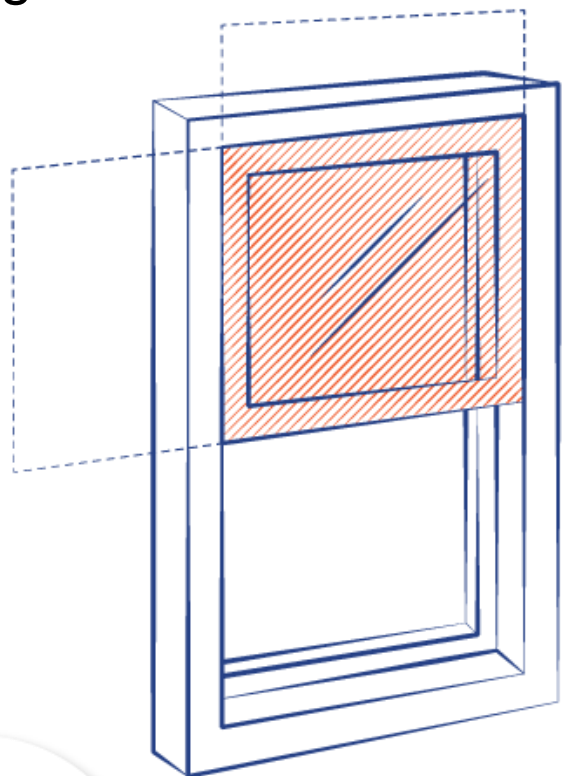Context: **Client email**

Search result: **Window**
Context: **Support backlog**

Search result: **Window**
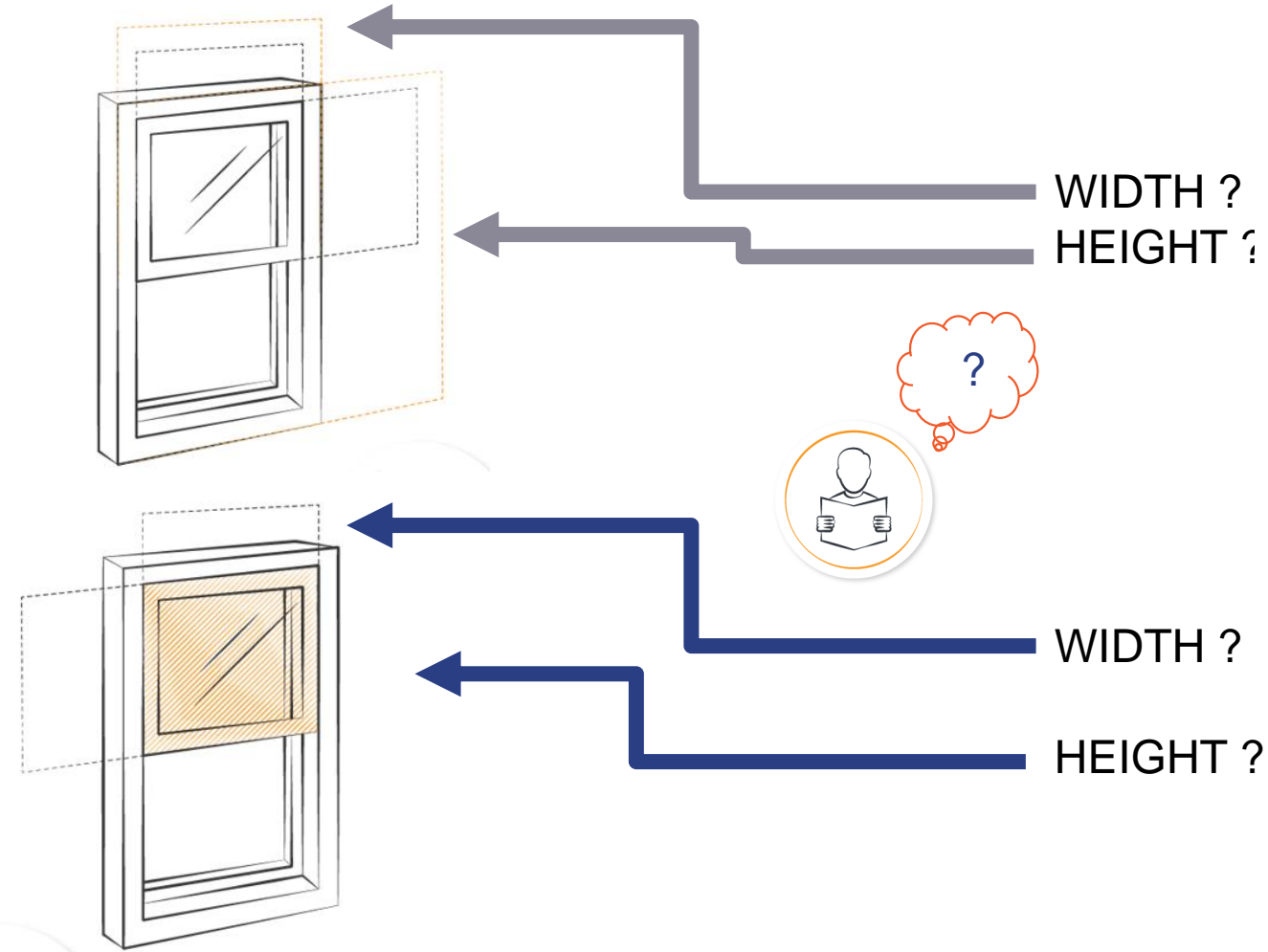Context: **Microsoft OS**

A window exchange – The need

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NEED A WINDOW
Width = xxx?
Height = yyy?

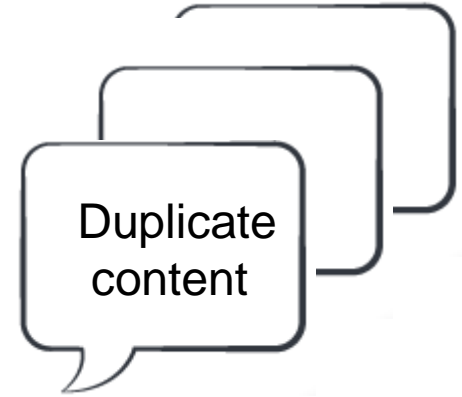# A window exchange – understand the need

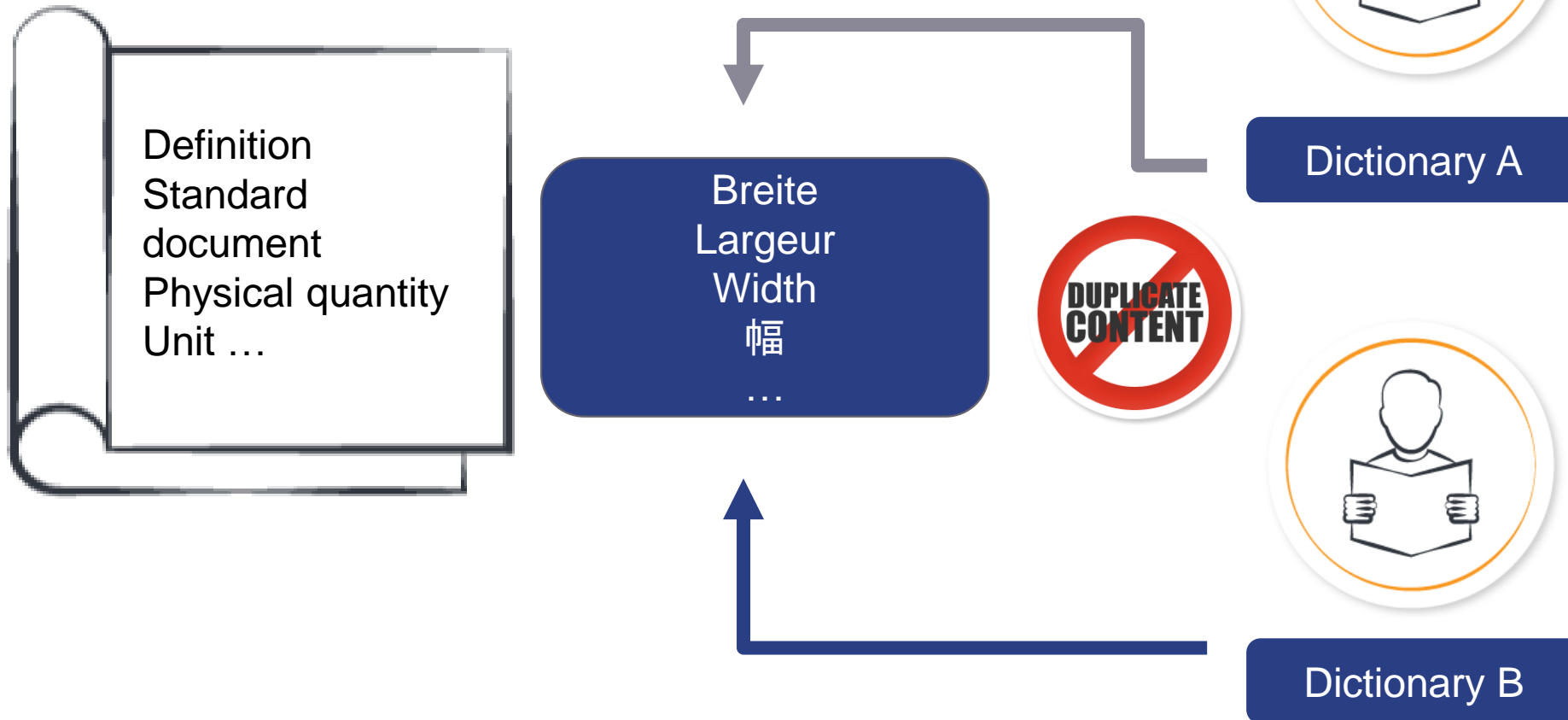# A window exchange – a unique Source of Truth

Definition
Standard
document
Physical quantity
Unit …

Breite
Largeur
Width
幅
…

DUPLICATE CONTENT

Dictionary A

Dictionary B

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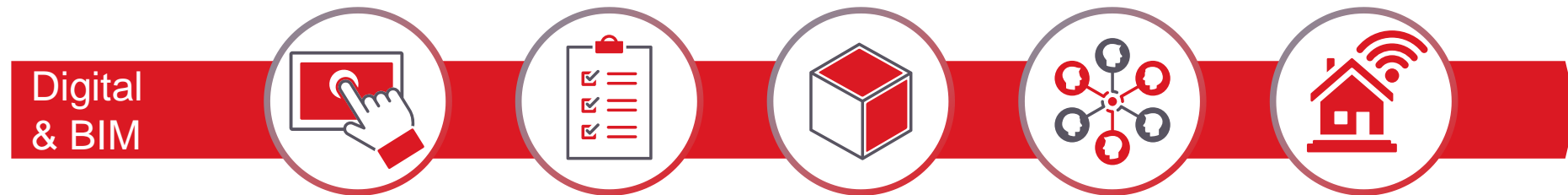# How is digitalization revolutionizing the industry

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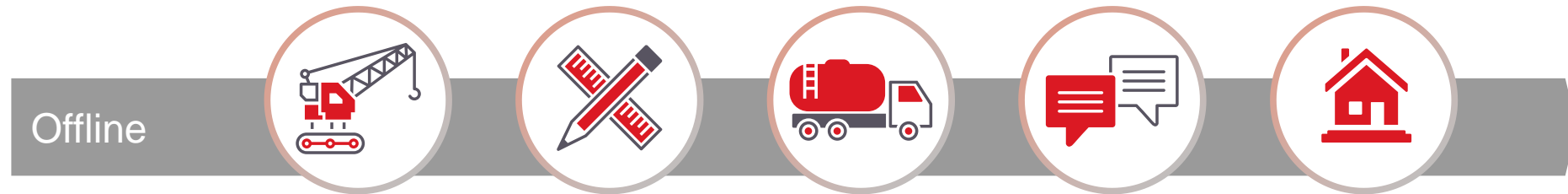
Offline

Offline activities will still exist – but will be enhanced digitally

Digital & BIM
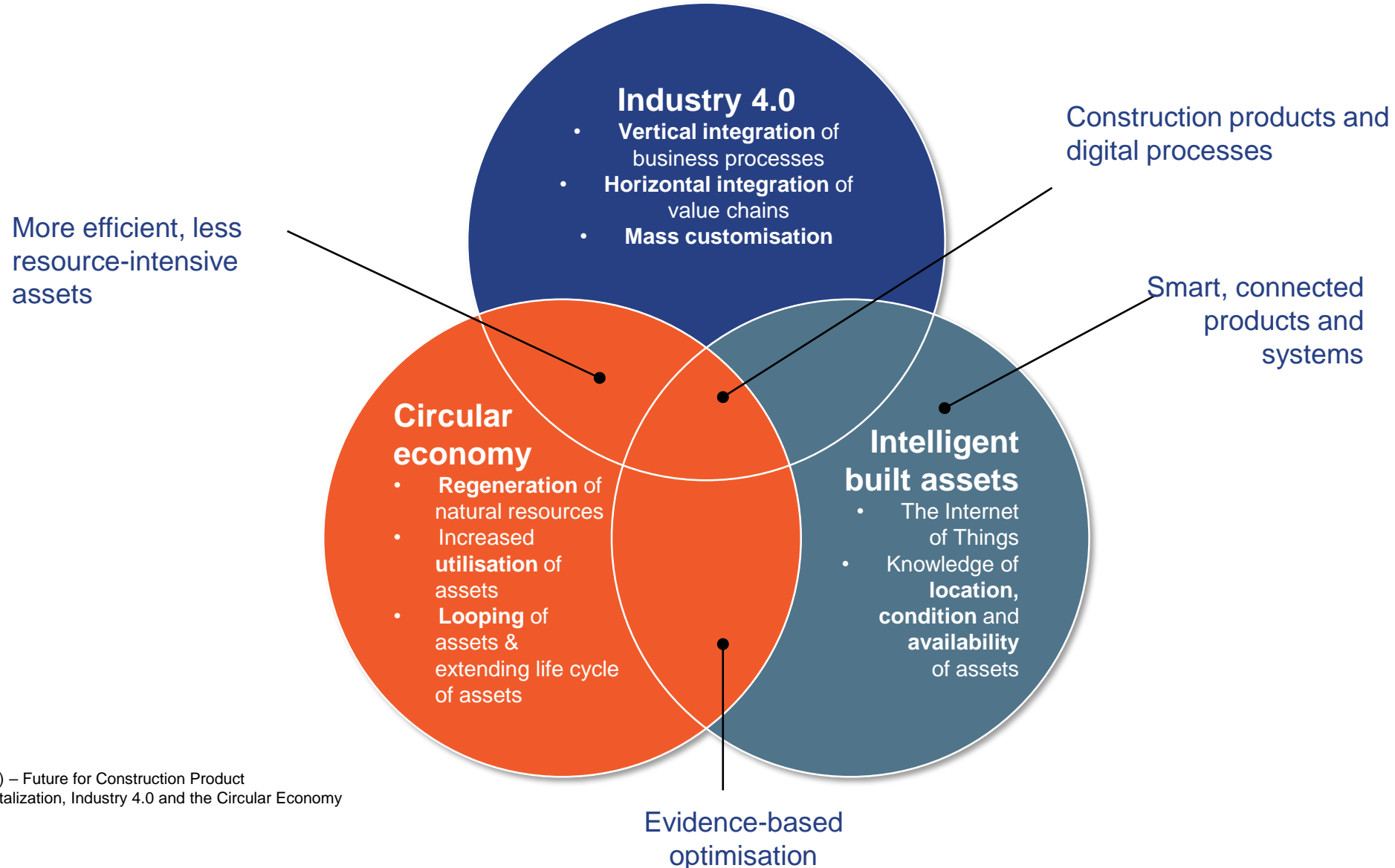
Planning and enhanced assessment

Design standards and automated clash detection

Creation of digital twin as one building masterplan
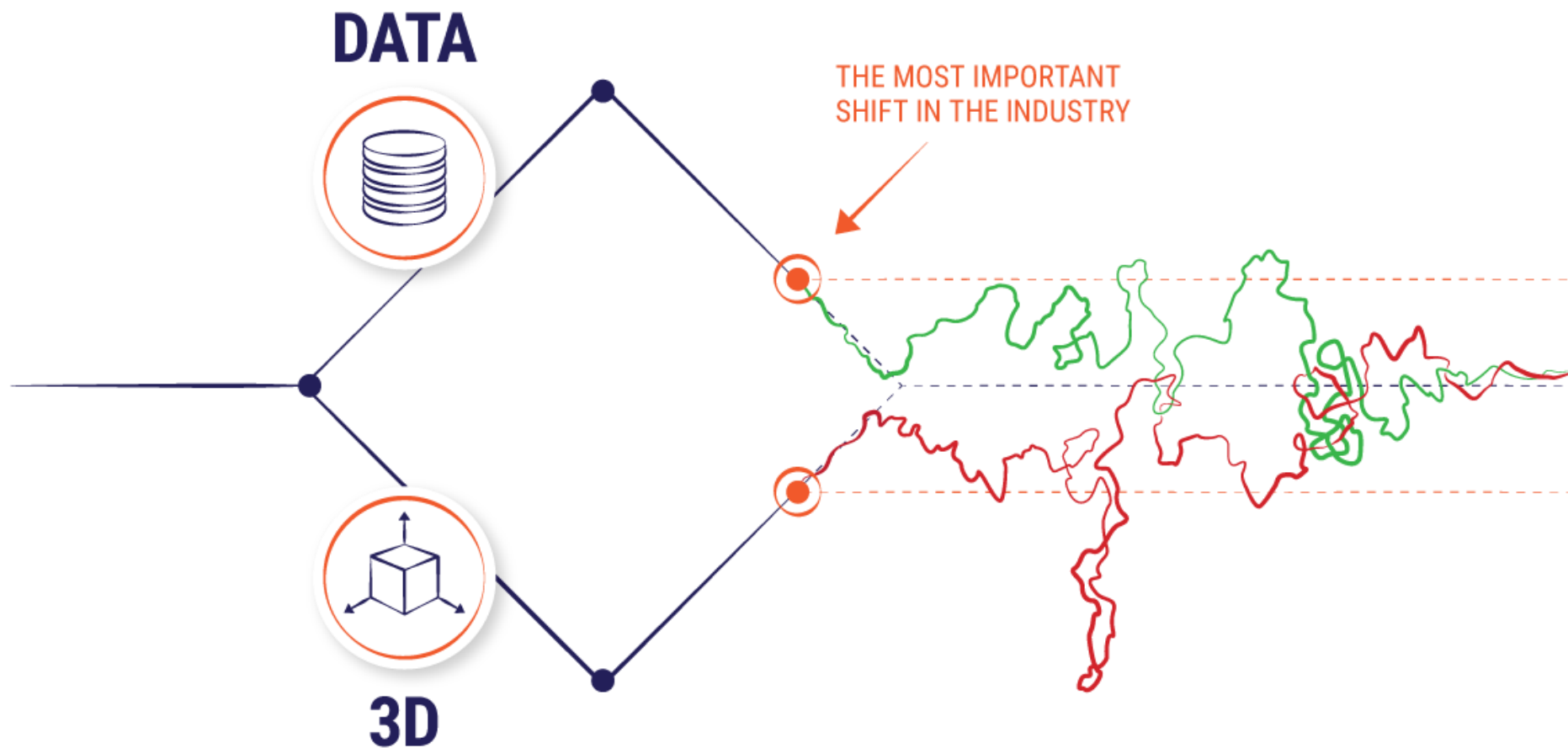
Next level BIM collaboration platforms

Connected physical assets ("smart" homes)

Digital transformation in the industry. 3 BIG trends

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Industry 4.0
- **Vertical integration** of business processes
- **Horizontal integration** of value chains
- **Mass customisation**

Circular economy
- **Regeneration** of natural resources
- Increased **utilisation** of assets
- **Looping** of assets & extending life cycle of assets

Intelligent built assets
- The Internet of Things
- Knowledge of **location, condition** and **availability** of assets

More efficient, less resource-intensive assets

Construction products and digital processes

Smart, connected products and systems

Evidence-based optimisation

BIM, really is all about data

How BIM is changing the points of interaction

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Level of information

- Facilities
- Activities & Spaces
- Elements
- Systems
- Products

Asset Owner

Design Team

Main Contractor

Asset Owner

Traditional design & assembly process

BIM process

Opportunity to discuss offer in terms of holistic / lifecycle value

Opportunity to discuss offer in terms of system and element value

Earlier product discussions and detail

Increased visibility of performance in use

Sub Contractor

0	1	2	3	4	5	6	7
Strategic Definition	Preparation & Brief	Concept Design	Developed Design	Technical Design	Construction	Handover & Closeout	In Use

Project stage

A shift from modelling to intelligence

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BIM

DIGITAL WORLD

as – DESIGNED model

3D Data Docs

3D Data Docs

as – BUILT model

DIGITAL TWIN

DIGITAL WORLD + PHYSICAL WORLD

STRUCTURED INTEROPERABLE DATA

☑ Machine Learning

☑ Predictive maintenance

3D Data Docs

Asset Info Model + Analytics + Knowledge Base

☑ Real Time Operational Data

☑ What if analytics

CONCEPT DESIGN ▶ DESIGN ▶ CONSTRUCTION ▶ OPERATION AND MAINTENANCE ▶ END OF LIFE ▶

Solution is coming—question is not if, but when and how

BIM is enforced by governments worldwide
› For public projects
› Increasingly in private sector

Increasing public awareness and demand
› Consumers demand more sustainable and affordable living standards
› Green innovation.- Governments and investors demand it

Digital step-change in E&C market expected
› Enhanced sophistication and coverage of BIM
› Disruptive technologies emerge

Competition is moving – careful approach needed
› Our direct competitors are reacting already
› Many new start-ups enter market

› The industry will be next in the digital transformation within the next 1-2 years

Can we win? WHAT next ?
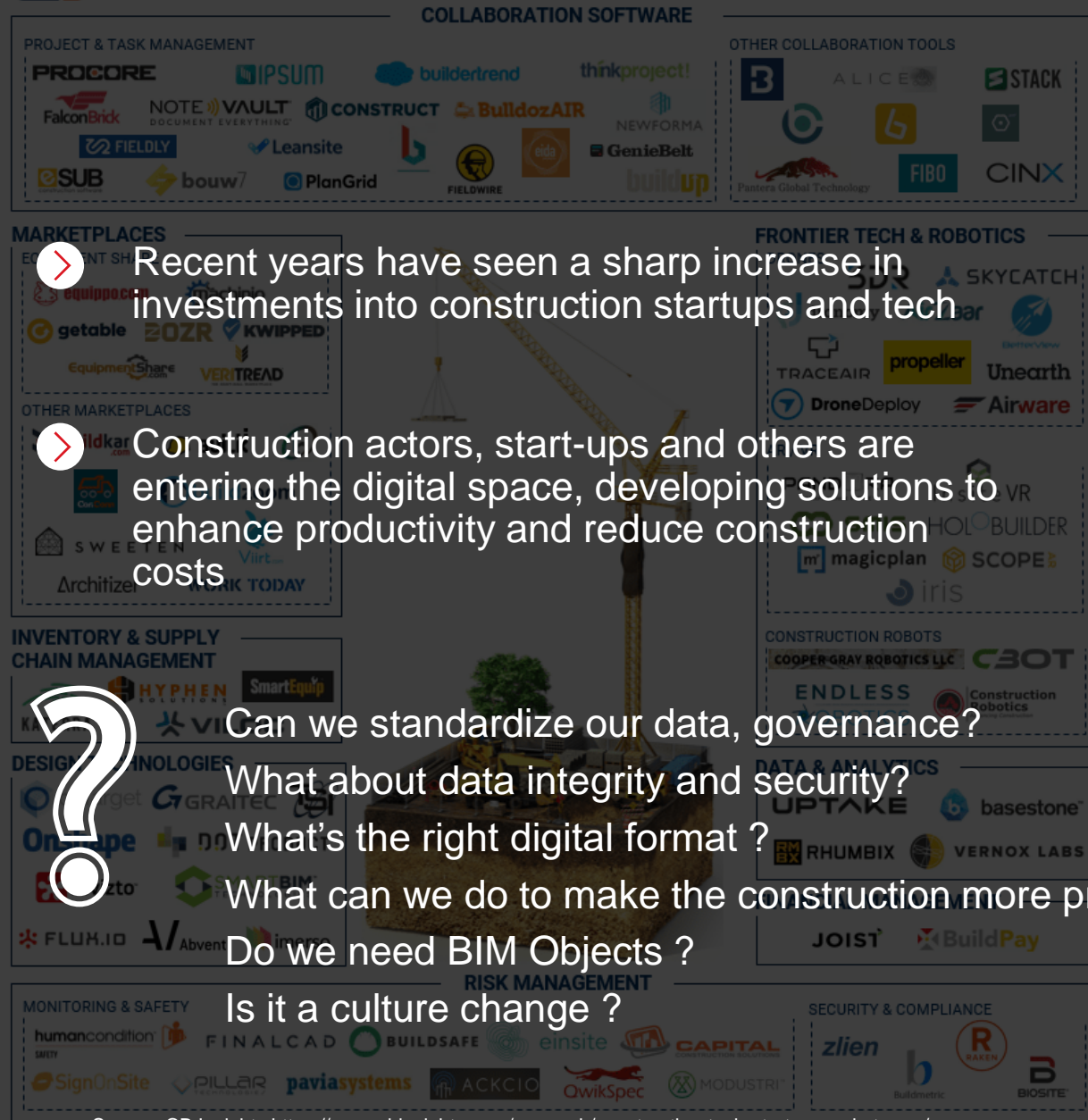
> Recent years have seen a sharp increase in investments into construction startups and tech

> Construction actors, start-ups and others are entering the digital space, developing solutions to enhance productivity and reduce construction costs

Can we standardize our data, governance?

What about data integrity and security?

What's the right digital format ?

What can we do to make the construction more productive ?

Do we need BIM Objects ?

Is it a culture change ?

Disconnected Silos

Data sources

PIM/DAM Story

Lead to Prospect

Prospect to Order

Order to Cash

Cash to Lead

Consumption Detailed

Consumption High level

PIM | PRODUCT | **DAM**

Non product digital assets

Core component track
> SSoT Detailed requirements

> Conceptual data model
> Governance processes and data consumption
> Data architecture
> Logical data model

ROADMAP
> High-level requirements

> Inside-out processes
> Roadmap
> RACI/KPI/Performance

18

Data Owner Approach: Both top-down and bottom-up

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INTERNAL CONSUMERS		EXTERNAL CONSUMERS	
Current Internal & Who's the customer → CPR, MII, Plant level, CMS, ERP	**Future** projects → CMS, marketing automation tools, …	**Current** digital and non-digital consumers → Classifications, ETIM, other BIM-comp. standards, regulators, contractors, merchants, asset owners…	**Future** digital consumers → BIM Level 2/3 business as usual, Digital Built Environment, Circular Economy, contractors, asset owners, Mr & Mrs Smith

Requirements driven by standards and future data needs

Alignment exercise

Product Data Model

Governance processes

Requirements driven by existing models

SAP MM   ERP   Data Pools   Excel

DATA ALIGNMENT
> Replacement
> Deduplication
> Harmonization
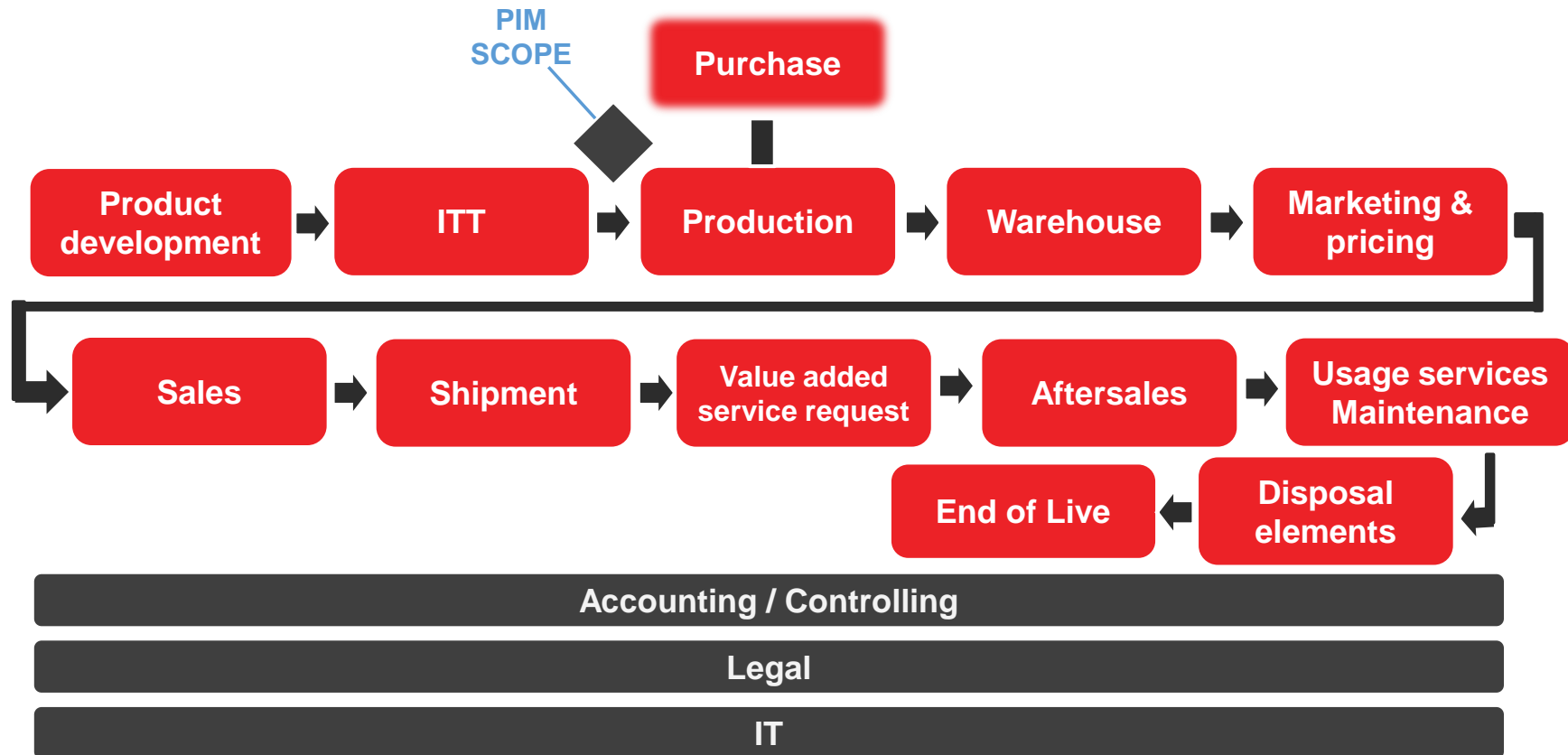> Centralization
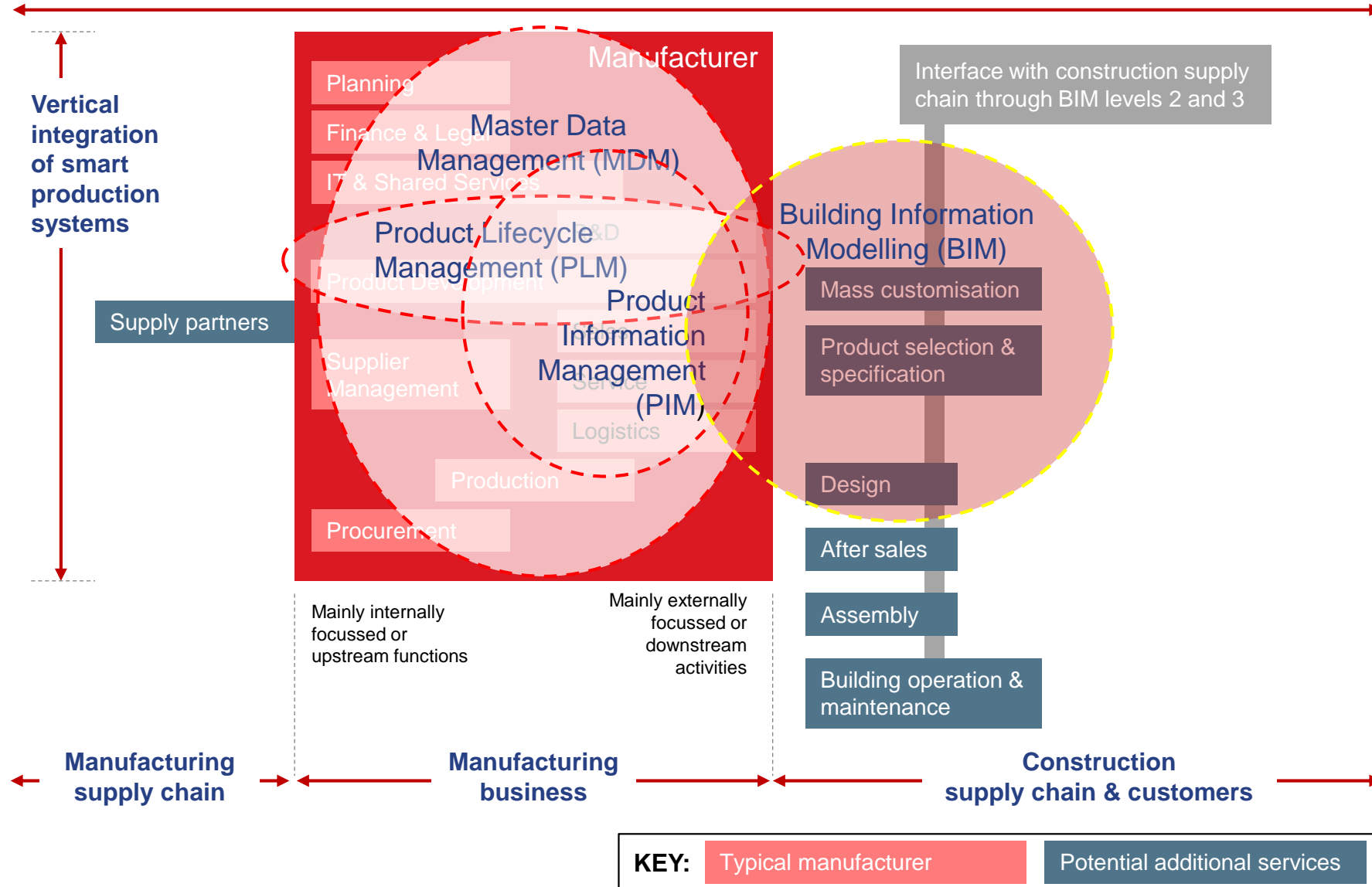
Wienerberger PIM – ALL COUNTRIES

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Wienerberger INFORMATION VALUE CHAIN

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Vertical and horizontal integration at Wienerberger

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Vertical integration of smart production systems

Manufacturer

Planning

Finance & Legal

IT & Shared Services

Master Data Management (MDM)

Product Lifecycle Management (PLM)

R&D

Product Development

Product Information Management (PIM)

Supply partners

Supplier Management

Service

Logistics

Production

Procurement

Building Information Modelling (BIM)

Interface with construction supply chain through BIM levels 2 and 3

Mass customisation

Product selection & specification

Design

After sales

Assembly

Building operation & maintenance

Mainly internally focussed or upstream functions

Mainly externally focussed or downstream activities

Manufacturing supply chain

Manufacturing business

Construction supply chain & customers

KEY: | Typical manufacturer | Potential additional services

PRODUCT DATA ELEMENTS & ORGANIZATIONAL LEVEL

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CORPORATE LEVEL

- General Data of a product
- Standards links

COUNTRY LEVEL

- Fi&Co
- Sales organization related information

SALES COUNTRY

- Marketing information
- Solutions
- Aesthetics
- Purchasing

PRODUCTION

- Essential Specifications

PLANT LEVEL

- Certification (Quality & Warranty)
- Logistics
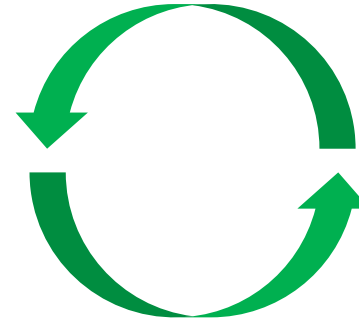- Performance
- Supply Chain Management

Data structure and source categories

Structure based on industry Product Data Definition standard

0				Finance & Country		
1 CPR	General data of a product	Standard s links			Performanc e	
2 ISO, EN, National standards						
3 Industry standards A – mandated B – non-mandated	Aesthetic s	Purchasing	Essential specificatio n			Certificatio n (Quality & Warranty)
4 Industry agreed by Relevant Authority						
5 Client specific		Reference s	Sales organisatio n related information		Logistics	
6 User-defined		Solutions				Supply chain managemen t

25% reduction in product properties to manage using this structure

Corporate　　Country　　Plant

Context

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BIM and Digital Maturity :
it isn't all about BIM!!

Lifecycle stage
(product, project and asset)

Governance
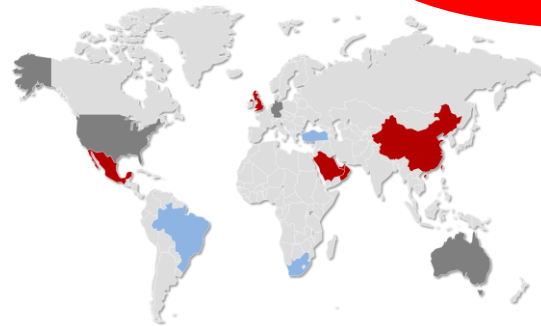
Geography
(& sector) variations

Application

Data Template development
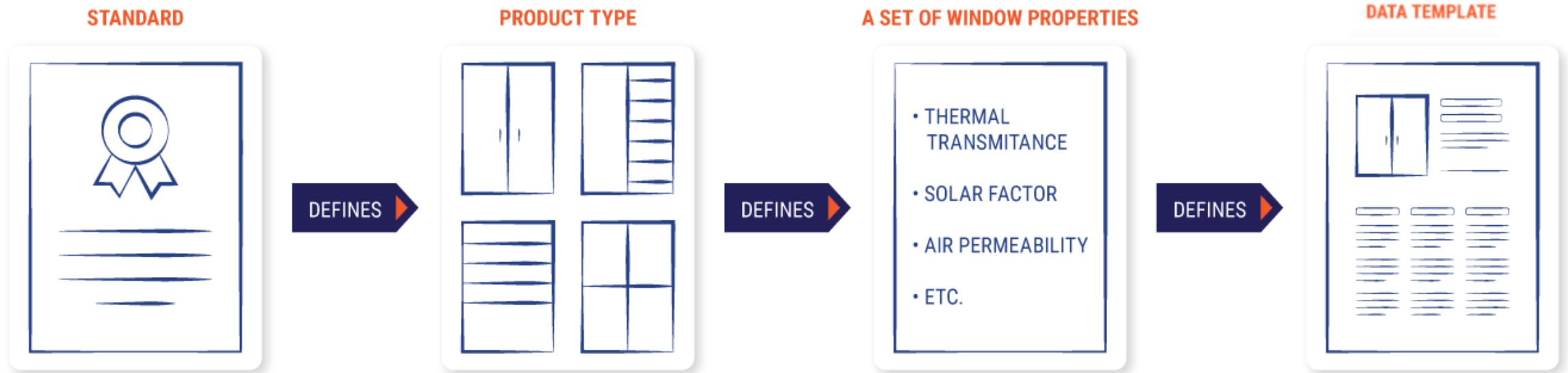
A Data Template is a **common data structure** defining the 'properties' (essential and non-essential product characteristics e.g. fire rating and colour) that describe any type of product in a way that can be traced to a credible source.

General Scope

> Classification Translations

> Mapping to IFC, ETIM etc

> Standards translations

> Language variations and GUID's link

> BIM Objects/Data "on the fly" in multiple software's and versions

> BIM Elements – roof, wall, pavers, pipes

> Attributes search-ability + additional search capabilities

> Texture and different Level of Details

> Logical Data Model link and interoperability

> "Live" updates from PIM

> "BIM"/Digital Construction compliance and visibility

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Product & asset lifecycle

Plain Language Dictionary

Information Requirements

Information Response

Product Data
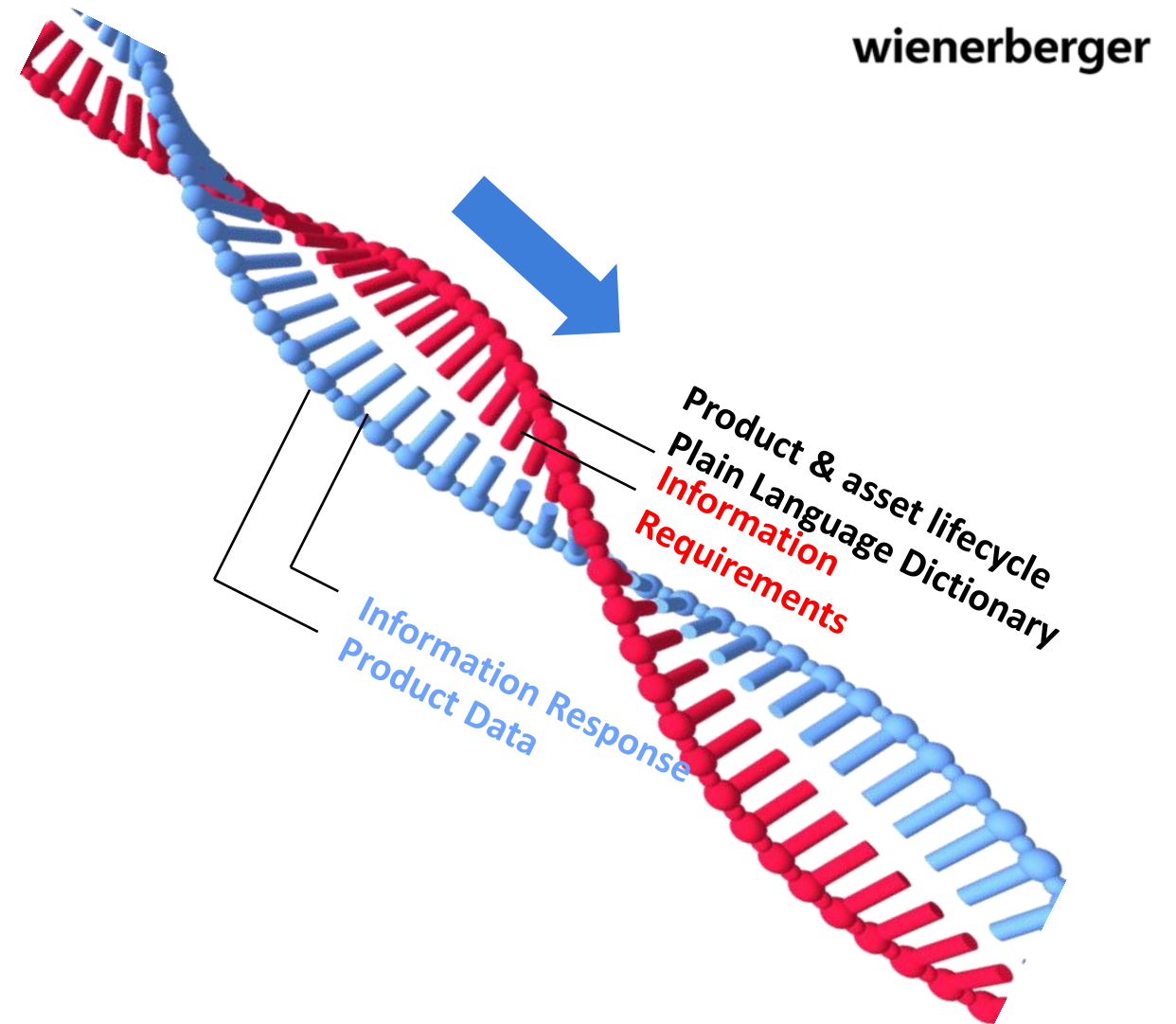
DNA image courtesy of Steve Thompson

Data to share
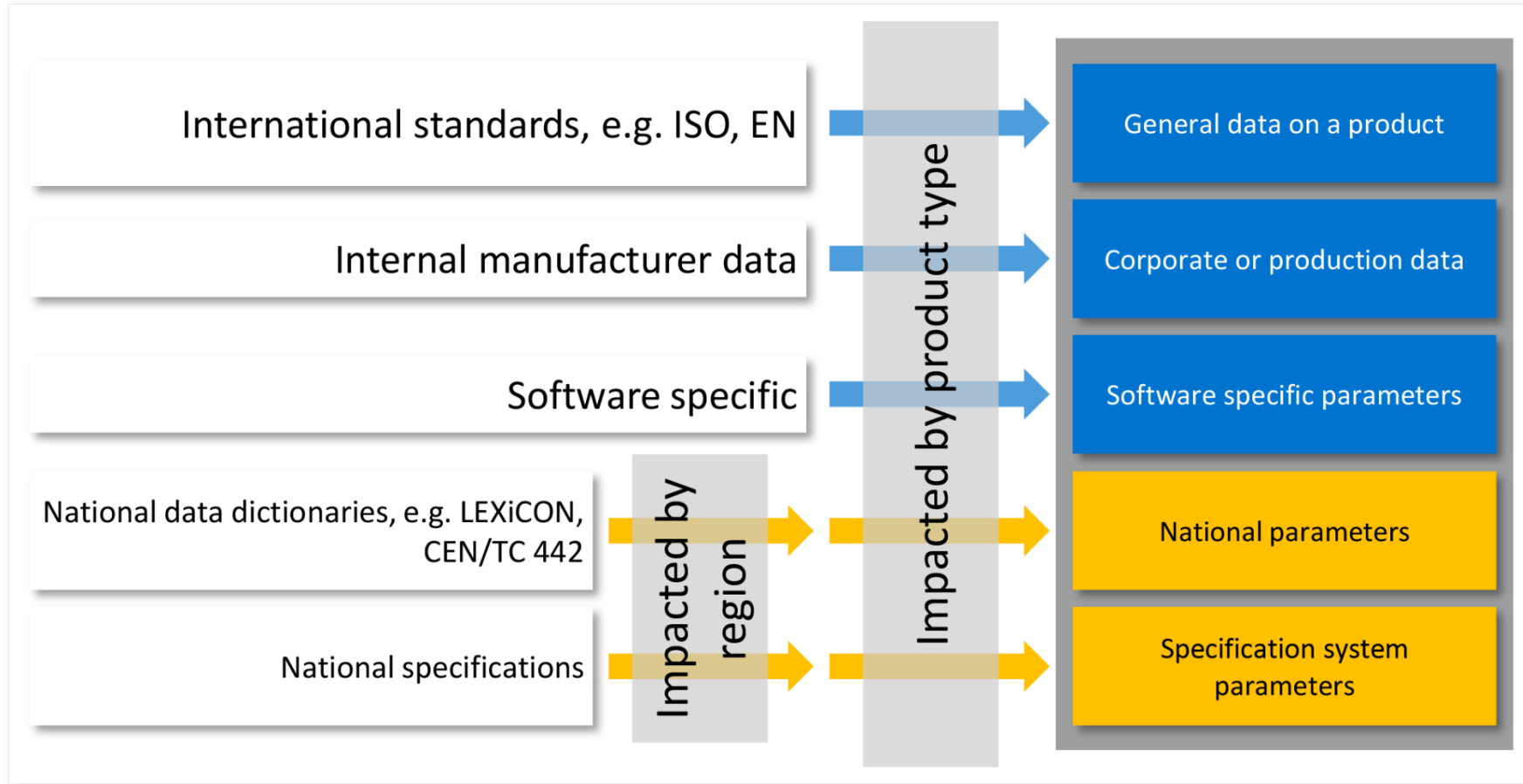
PIM into Data Templates via WB Connect
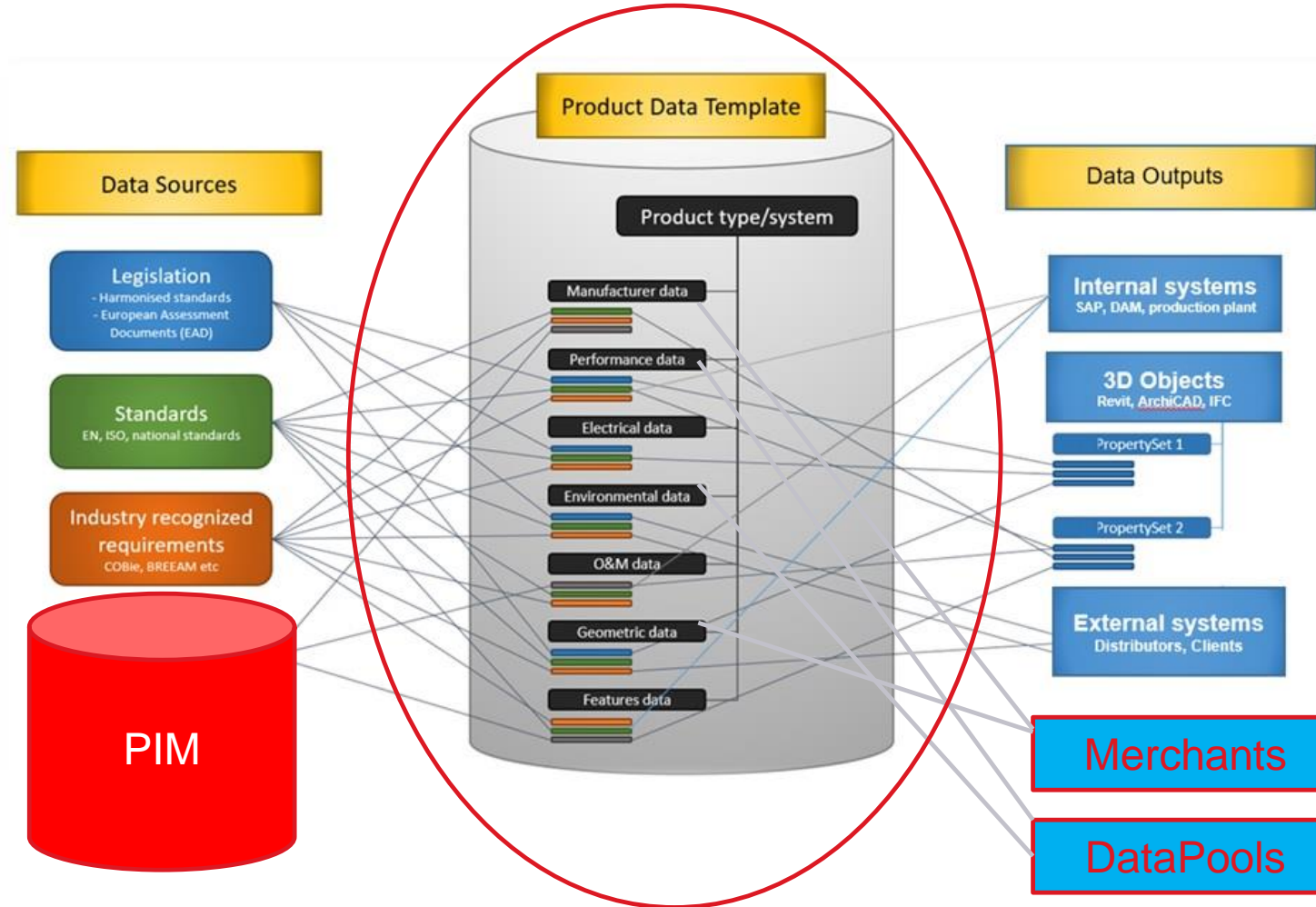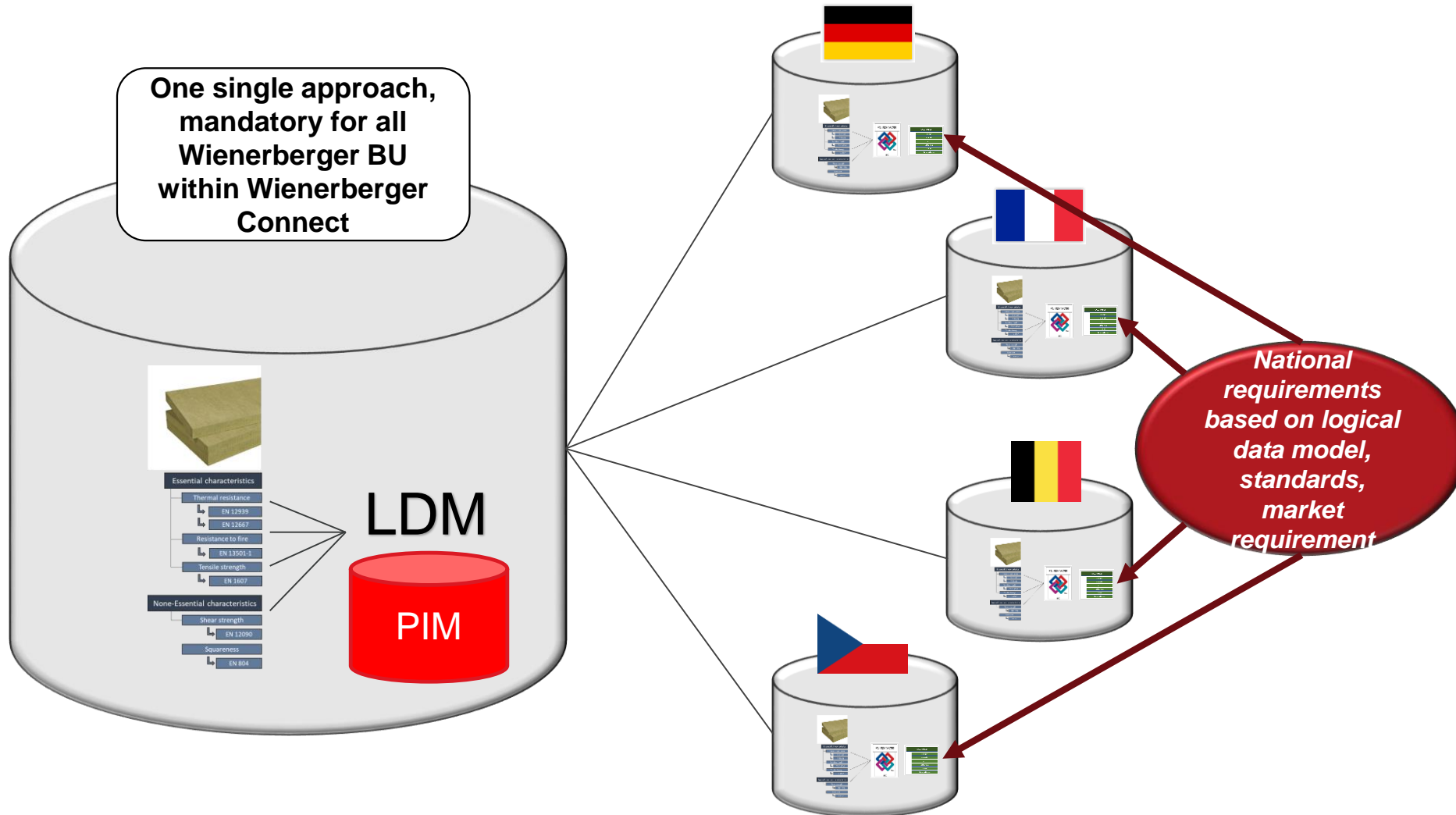
- goBIM contains additional and unique local market properties
- WB governance & Define to verify the local market properties

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PIM and Wienerberger Connect

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Lead to Prospect

Prospect to Order

Order to Cash

Cash to Lead

WB PIM
Digital Asset
DAM WB

Product Data Template

Data Sources

Product type/system

Legislation
- Harmonised standards
- European Assessment Documents (EAD)

Standards
EN, ISO, national standards

Industry recognized requirements
COBie, BREEAM etc

Manufacturer data

Performance data

Electrical data

Environmental data

O&M data

Geometric data

Features data

Data Outputs

Internal systems
SAP, DAM, production plant

3D Objects
Revit, ArchiCAD, IFC

PropertySet 1

PropertySet 2

External systems
Distributors, Clients

DataPools

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Future Wienerberger Platform

B2C Website

B2C Portal

Dynamic Web Content Platform/Wienerberger Connect

Product Information Management (PIM)

Digital Asset Management (DAM)

Digital Marketing Platform

Customer Engagement Platform

Fulfilment Platform
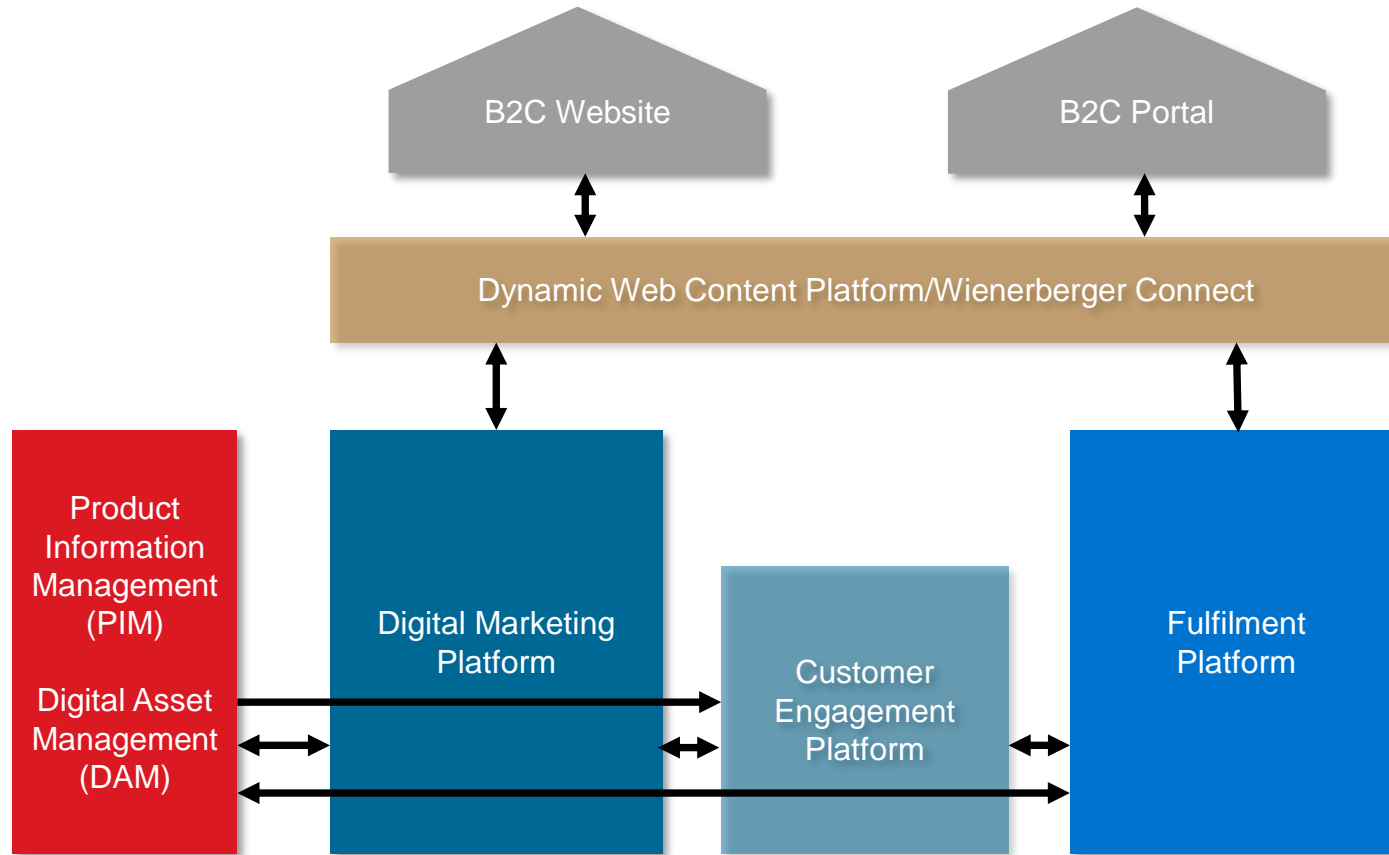
LEGEND PLATFORMS

Web applications

PIM/DAM SSoT

Customer Engagement Platform

Dynamic Web Content Platform

Digital Marketing Platform

Fulfilment Platform

Vlaamse pan 401 - Tuile galbée 401

[Export ▼]

Product Type	clay roofing tiles and fittings
Product standard	EN 1304 - clay roofing tiles and fittings - product definitions and ... see more ...
Product Type Definition	products for discontinuous laying on pitched roofs, and for wall ... see more ...
Country	▮ Belgium
Product code ⓘ	WNBE26
Status	Expired
Manufacturer	Wienerberger
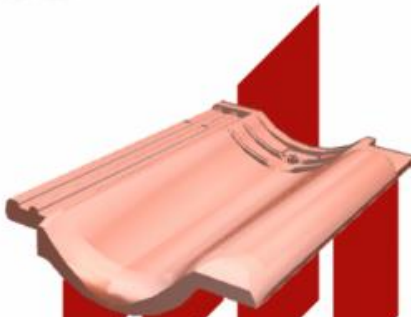
Properties **Classifications** **Documents** **BIM Downloads** **Components**

Order number	19885938	🔒
Product Name	Vlaamse pan 401	🔒
Product type	Clay Roofing Tiles and Fittings	🔒
LOD level	350 ▼	⊞
Color	Amaranth ▼	⊞
Nominal Length	368	mm	🔒
Nominal Width	248	mm	🔒
Cover Width	201	mm	🔒
Dimensional Tolerance	pass	mm	🔒
Cover Length Min.	300		🔒
Cover Length Max.	300	mm	🔒

By default all properties are visible.
Use the checkboxes below to restrict the property list as you wish.

☐ EPD
☐ Other
☐ General properties
☐ Execution
☐ Frequently used properties

☐ COBie.Type
☐ EN 1304
☐ Design & Tender
☐ Facility

☐ Ifc
☐ LDM
☐ Execution et logistic
☐ Merchant Data

General	▶
Harmonized Standards	▶

3D	2D

Email Address →

☐ Accept licence agreement

⚙ CAD download

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Product Digital Twin

https://b2b.partcommunity.com/community/partcloud/?route=part&name=13844800-Porotherm+190+architecture350&model_id=69229
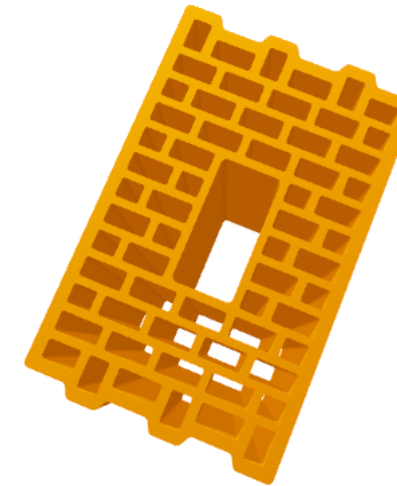
Hot Spot Links, Social Media integraiton
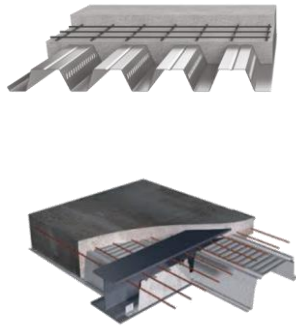

http://HOT SPOT LINK

Calculate, Organize and Distribute

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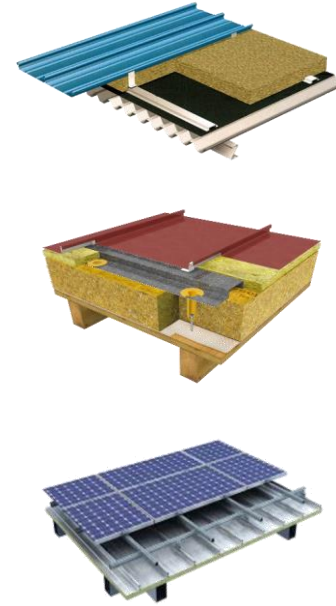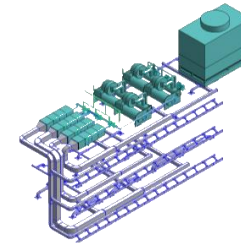
FLOORS/PAVERS

WALLS

ROOFS

PIPES

Algorithm/Logic Configurator

Landscaping Tools
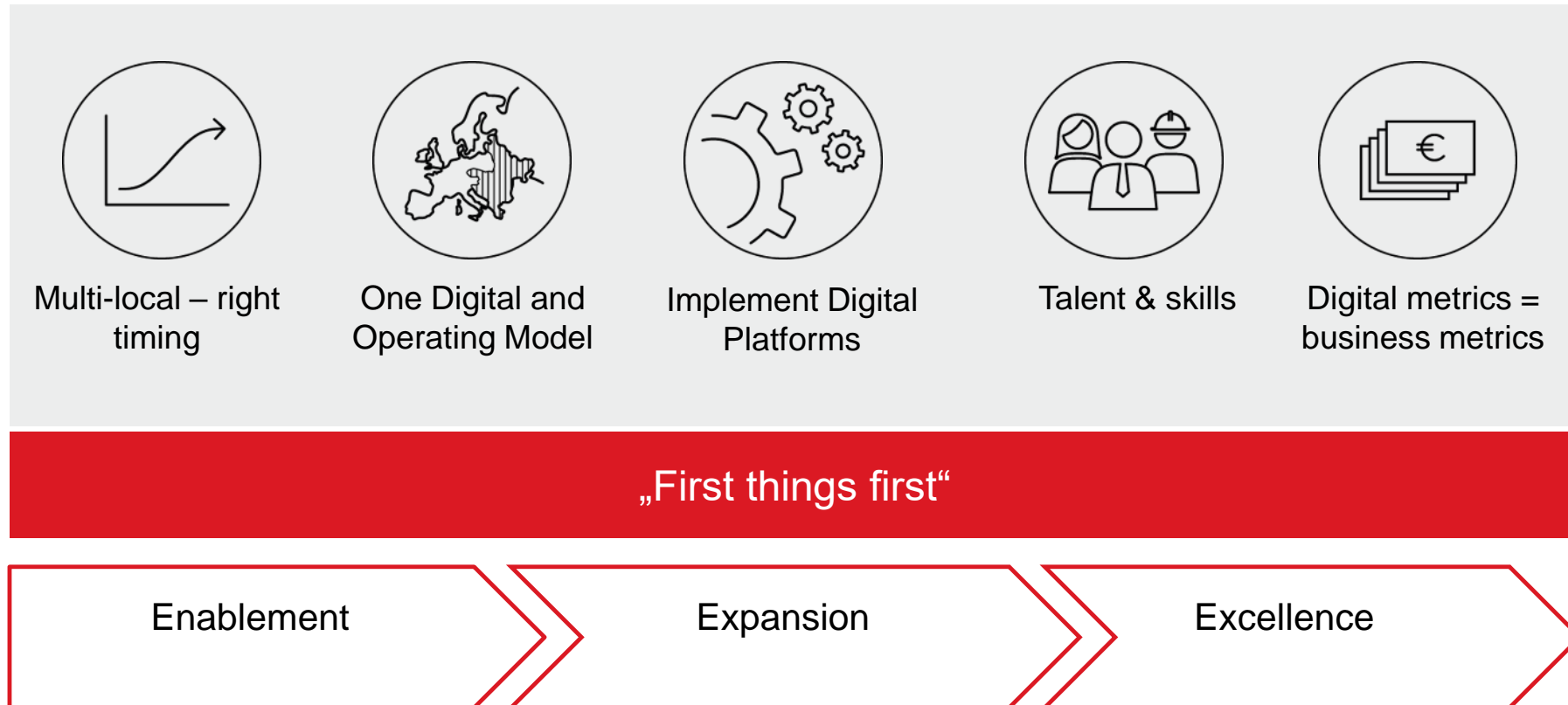
Wall Tool

Plug-in

Digital Tools

Roofer's tool

2D applications

AR/VR representation

Texture Generator Data

BIM Software's

Specification Documents

Summary

| Multi-local – right timing | One Digital and Operating Model | Implement Digital Platforms | Talent & skills | Digital metrics = business metrics |

„First things first"

Enablement → Expansion → Excellence

Establish a strong foundation to build the digital future

Paul Surin
@PaulSurin
paul.surin@wienerberger.com

Thank you for your attention

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