Standard-based data structures: Building the foundation of BIM

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Chair of BIM4M2
CEN TC442 and ISO SC 13/WG6
Three main questions

Does it matter? Why

Will it work? How?

Can we win? What?
Key drivers for Supply Chain leaders

- Continual downward pressure on cost and working capital
- Technology must support increasingly complex supply networks
- Risk of serious disruption to the free flow of goods between UK and EU
- New markets available to leaders and innovators
- 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

**Construction industry is one of the least digitalized sectors**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Assets</th>
<th>Usage</th>
<th>Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall digitation</td>
<td></td>
<td></td>
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<tr>
<td>Digital spending</td>
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<td></td>
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<tr>
<td>Digital asset stock</td>
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<td></td>
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<tr>
<td>Digital transactions</td>
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<td></td>
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<tr>
<td>Digital business processes</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Digital spend per worker</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Digital spending</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Digitalization of work</td>
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</tbody>
</table>

- After agriculture and hunting, the construction industry is the least digitalized sector in all categories: assets, usage and labor
- 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**

1. **Relevance**
   - N. America: Significant
   - N. Europe: High
   - C. Europe: Medium
   - Israel: Low
   - Asia: None
   - S. America: Now
   - S. Europe: 1-2 years
   - S. Africa: 2-5 years
   - Middle East: 5+ years
   - Australasia: None

2. **Timeliness**
   - N. America: Now
   - N. Europe: 1 year
   - C. Europe: 1-2 years
   - Israel: 2-5 years
   - Asia: 5+ years
   - S. America: Now
   - S. Europe: 1-2 years
   - S. Africa: 2-5 years
   - Middle East: 5+ years
   - Australasia: None

3. **Readiness**
   - North America: Ready and have understood the high importance of the digital transition
   - 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?
A window exchange – The need

NEED A WINDOW
Width = xxx?
Height = yyy?
A window exchange – understand the need

Duplicate content

Dictionary A

Dictionary B

wienerberger
A window exchange – a unique Source of Truth

Definition
Standard
document
Physical quantity
Unit …
How is digitalization revolutionizing the industry

Offline activities will still exist – but will be enhanced digitally

**Offline**

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 & BIM**
Digital transformation in the industry. 3 BIG trends

**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

- **Facilities**
  - Opportunity to discuss offer in terms of holistic/lifecycle value

- **Activities & Spaces**
  - Traditional design & assembly process
  - Opportunity to discuss offer in terms of system and element value

- **Elements**
  - Earlier product discussions and detail

- **Systems**
  - BIM process

- **Products**
  - Increased visibility of performance in use

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**Project stage**

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

**Asset Owner**

**Design Team**

**Main Contractor**

**Sub Contractor**

**Wienerberger**
A shift from modelling to intelligence
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?

Source: CB Insights https://www.cbinsights.com/research/construction-tech-startup-market-map/
Data sources
PIM/DAM Story

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

Lead to Prospect
Prospect to Order
Order to Cash
Cash to Lead

Consumption
Consumption Detail
Consumption High level
Data Owner Approach: Both top-down and bottom-up

<table>
<thead>
<tr>
<th>INTERNAL CONSUMERS</th>
<th>EXTERNAL CONSUMERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong> Internal &amp; Who’s the customer</td>
<td><strong>Current</strong> digital and non-digital consumers</td>
</tr>
<tr>
<td>→ CPR, MII, Plant level, CMS, ERP</td>
<td>→ BIM Level 2/3 business as usual, Digital Built Environment, Circular Economy, contractors, asset owners, Mr &amp; Mrs Smith</td>
</tr>
<tr>
<td><strong>Future</strong> projects</td>
<td><strong>Future</strong> digital consumers</td>
</tr>
<tr>
<td>→ CMS, marketing automation tools, …</td>
<td>→ BIM Level 2/3 business as usual, Digital Built Environment, Circular Economy, contractors, asset owners, Mr &amp; Mrs Smith</td>
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</tbody>
</table>

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 INFORMATION VALUE CHAIN

Product development → ITT → Production → Warehouse → Marketing & pricing

Sales → Shipment → Value added service request → Aftersales

End of Live → Disposal elements

PIM SCOPE

Accounting / Controlling
Legal
IT
Vertical and horizontal integration at Wienerberger

Vertical integration of smart production systems

Mainly internally focused or upstream functions

Mainly externally focused or downstream activities

Vertical and horizontal integration at Wienerberger

Building Information Modelling (BIM)

- Mass customisation
- Product selection & specification
- Design
- After sales
- Assembly
- Building operation & maintenance

Interface with construction supply chain through BIM levels 2 and 3

Supply partners

Vertical integration of smart production systems

Manufacturing supply chain

Manufacturing business

Construction supply chain & customers

Key:
- Typical manufacturer
- Potential additional services
PRODUCT DATA ELEMENTS & ORGANIZATIONAL LEVEL

CORPORATE LEVEL
- General Data of a product
- Standards links

COUNTRY LEVEL
- Fi&Co
- Sales organization related information
- Marketing information
- Solutions
- Aesthetics
- Purchasing

SALES COUNTRY

PRODUCTION
- Essential Specifications

PLANT LEVEL
- Certification (Quality & Warranty)
- Logistics
- Performance
- Supply Chain Management
## Data structure and source categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Finance &amp; Country</td>
</tr>
<tr>
<td>1 CPR</td>
<td>General data of a product</td>
</tr>
<tr>
<td>2 ISO, EN, National standards</td>
<td>Standard links</td>
</tr>
<tr>
<td>3 Industry standards</td>
<td>Performance</td>
</tr>
<tr>
<td>A - mandated</td>
<td>Certifications (Quality &amp; Warranty)</td>
</tr>
<tr>
<td>B - non-mandated</td>
<td>Essential specification</td>
</tr>
<tr>
<td>4 Industry agreed by Relevant Authority</td>
<td>Performance</td>
</tr>
<tr>
<td>5 Client specific</td>
<td>Certification (Quality &amp; Warranty)</td>
</tr>
<tr>
<td>6 User-defined</td>
<td>Logistics</td>
</tr>
<tr>
<td></td>
<td>Supply chain management</td>
</tr>
</tbody>
</table>

Structure based on industry Product Data Definition standard

25% reduction in product properties to manage using this structure
Context

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

Geography (& sector) variations

Lifecycle stage (product, project and asset)

Application

Governance
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

DNA Image courtesy of Steve Thompson
Data to share

- International standards, e.g. ISO, EN
- Internal manufacturer data
- Software specific
- National data dictionaries, e.g. LEXiCON, CEN/TC 442
- National specifications

Impacted by region

Impacted by product type

- General data on a product
- Corporate or production data
- Software specific parameters
- National parameters
- Specification system parameters
PIM into Data Templates via WB Connect
One single approach, mandatory for all Wienerberger BU within Wienerberger Connect

- goBIM contains additional and unique local market properties
- WB governance & Define to verify the local market properties
PIM and Wienerberger Connect

Lead to Prospect

Prospect to Order

Order to Cash

Cash to Lead

Data Sources

Legislation
- Harmonised standards
- European Assignment Documents (EAD)

Standards
EN, ISO, national standards

Industry recognized requirements
COBie, BREEAM etc.

Product Data Template

Product type/system

Manufacturer data

Performance data

Electrical data

Environmental data

OA&M data

Geometric data

Features data

Data Outputs

Internal systems
SAI, DAM, production plant

3D Objects
Form, AutoCAD, BRC

Properties

Properties Set 1

Properties Set 2

External systems
Distributors, Clients

DataPools

Digital Asset

DAM WB

WB PIM
Future Wienerberger Platform

LEGEND PLATFORMS

- Web applications
- Dynamic Web Content Platform
- Product Information Management (PIM)
- Digital Asset Management (DAM)
- Digital Marketing Platform
- Customer Engagement Platform
- Fulfilment Platform

PIM/DAM SSoT
Product Digital Twin

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

http://HOT SPOT LINK
Calculate, Organize and Distribute

- FLOORS/PAVERS
- WALLS
- ROOFS
- PIPES

Roofer's tool
BIM Software's Wall Tool
2D applications
Specification Documents
Landscaping Tools
AR/VR representation
Wall Tool
Plug-in
Digital Tools
Roofer's tool
2D applications

Algorithm/Logic Configurator
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
Thank you for your attention