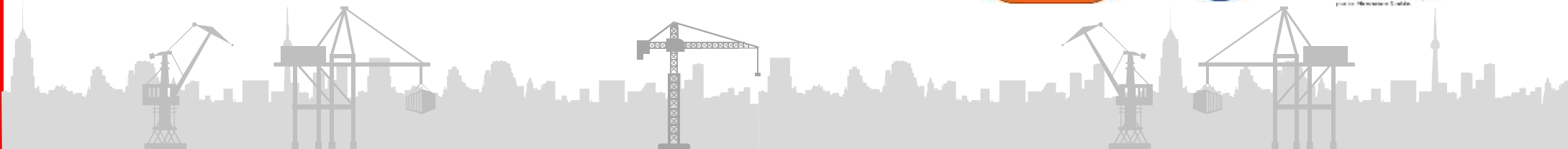


Digitalization of the construction sector

Pierre BENNING
IT Director – Bouygues Travaux Publics

November 13th 2019





Agenda

- 01** Stakes and new trends
- 02** BIM Concepts
- 03** Standards and Research
- 04** Legal issues
- 05** Perspectives / Prospects

01 Stakes and new trends

Digitalization of traditional process ➔ « Doing otherwise»

Data management

➔ **Input data**

- ➔ Expected Performances
- ➔ Existing (Environment / Context)

➔ **Generated Data**

- ➔ Design
- ➔ Construction
- ➔ « Data right »

➔ **Implemented Data**

- ➔ Maintaining
- ➔ Operating

➔ **Requirement management /
GIS (Geographic Information)**

➔ **Standardization / Data Structuring /
Ontologies**

➔ **Procurement / Digital Twin /
System Engineering / Asset Management**

➔ **Predictive analyses / Services to final users**

02 BIM Concepts

BIM = Building Information Model (Data)

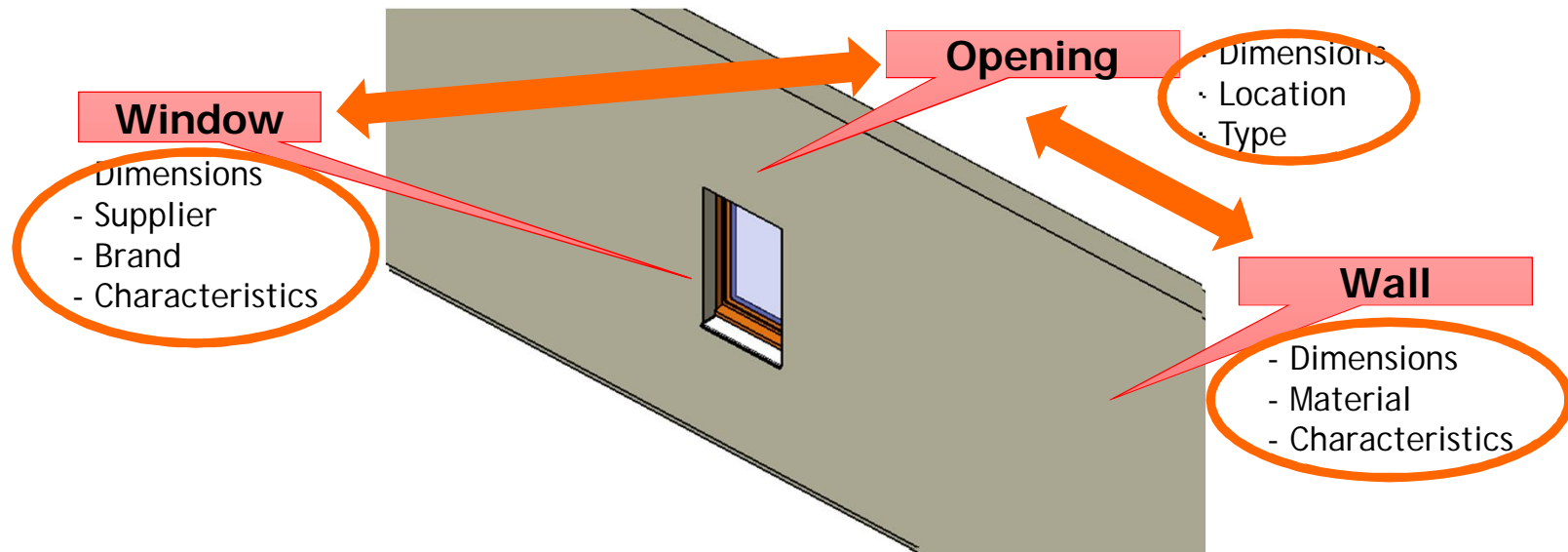
BIM = Building Information Modeling (Data Process)

BIM = Building Information Management (Data Management)

- Objects (Geometry & Properties)
- Data base (Semantics)
- Collaborative Process



02 BIM Concepts



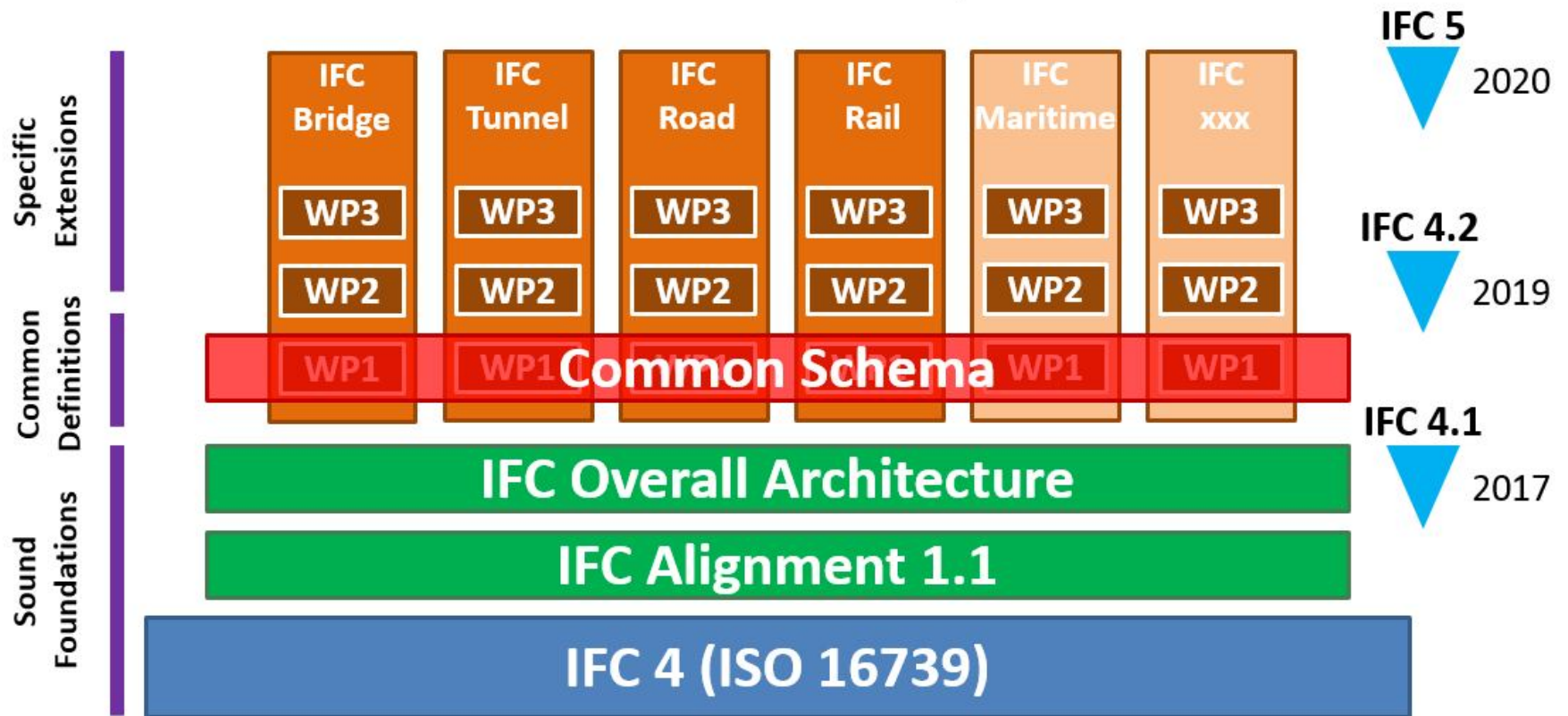
IFC: Industry Foundation Classes

A data model intended to describe architectural, building and construction industry data

- open file format (interoperability)
- object-based file format (enriched objects)
- data model developed by buildingSMART
- official International Standard ISO 16739-1:2018



02 BIM Concepts



03 Standards and Research



ISO 19650: Organization of information about construction works - Information management using **building information modelling**



ISO 16739: Industry Foundation Classes (IFC 4) for data sharing in the construction and facility management industries

MINnD (French Initiative)



DigiPLACE (European Initiative)

03 Standards and Research

openBIM
=
open standards
+
open workflows

- Independence from software vendors
- Data continuity (interoperability)
- Data durability



03 Success story

PROJECT EPR HINKLEY POINT C UNITED KINGDOM



3,2 GW - 7%
UK electricity



**THE BIGGEST
CONSTRUCTION**
site in Europe



FULL OPEN BIM
for
CONSTRUCTION



04 Legal issues : use of data

- GDPR : General Data Protection Regulation
- Abuse of dominance from US software vendors
- EULA (End User License Agreement)



04 Legal issues and public procurement

- Public Procurement and BIM : **neutrality**
 - Tools generally available
- Public Procurement and BIM : **confidentiality**
 - Data, part of technical and trade secrets
- Intellectual Property Rights
 - Generative Design
 - Know-how
- Data Storage
 - Cloud Act



04 Perspectives / Prospects

Strategic issues

- Build faster (+90 million people a year)
- Imagine new areas, transport systems, services
- Operate cities and services of tomorrow
- Stay alert to potential new entrants
- Disruption of the entire value chain

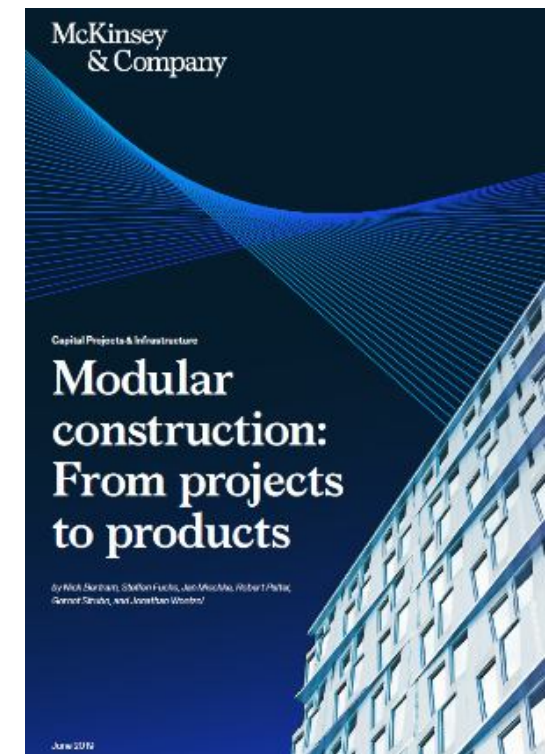


Autodesk

04 Perspectives / Prospects

Technological issues

- Develop modular construction (off-site construction)
- Design tomorrow's tunnel boring machines and robots
- Ensure better conditions for workers



Next steps

Towards digital engineering of the construction sector

- Collaboration
 - Construction Data structuring (European Standard ?)
 - Open Collaborative platform
- Data & Know-how protection
 - European cloud ?
 - Contractual issues (Digital Twin definition)
 - DataBase Regulation
- Services
 - To end-users
 - To operators & facility managers



CONSTRUCTION 4.0

COMPETITIVENESS

GROWTH

ENERGY NETWORKS

EMPLOYMENT

ENERGY EFFICIENCY

IT-NETWORKS

TRANSPORT INFRASTRUCTURE

SOCIAL INFRASTRUCTURE

BIM

WATER NETWORKS

ENVIRONMENT

CONSTRUCTION IS THE SOLUTION INDUSTRY

YOUTH EMPLOYMENT

RESOURCE EFFICIENCY

JOB

SKILLS TRAINING/EDUCATION

ENERGY PRODUCTION

STANDARDISATION

INFRASTRUCTURE

CLIMATE CHANGE
RECYCLING

INNOVATION

