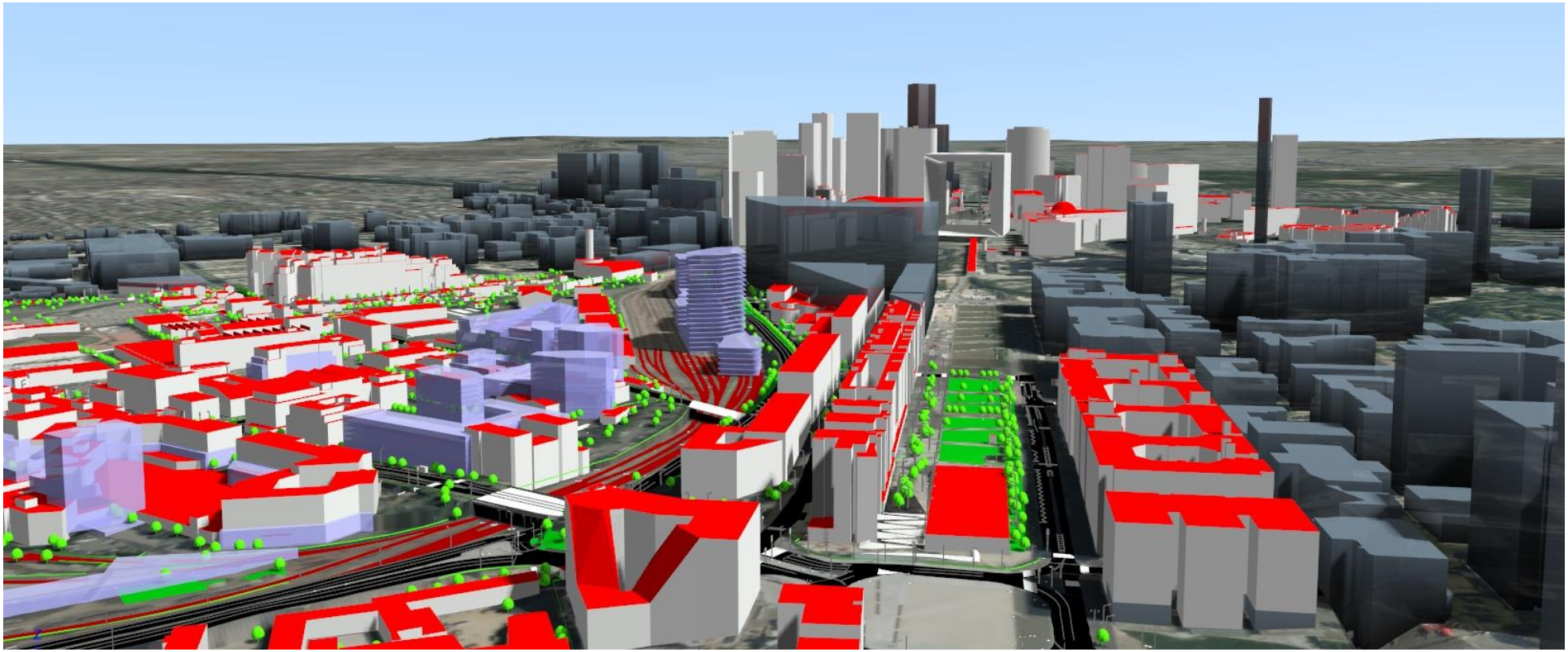
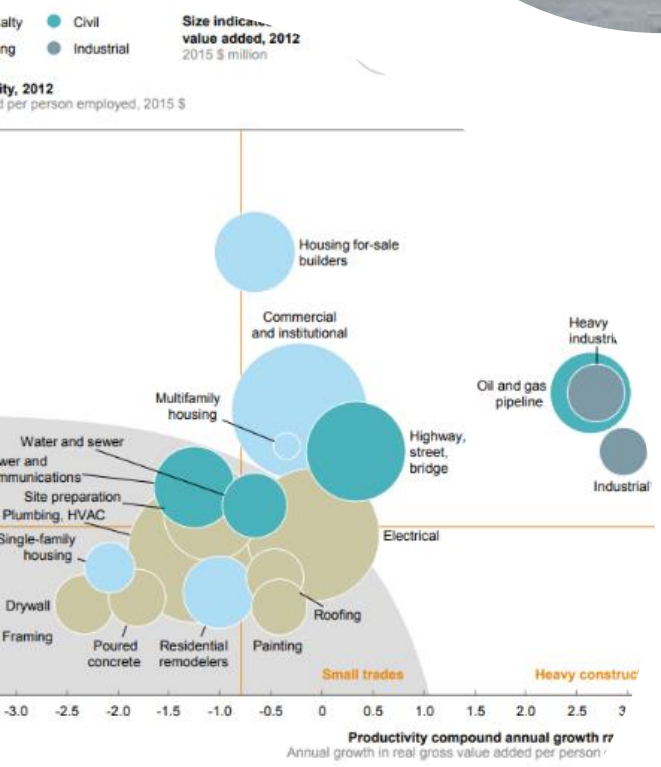
CSTB
le futur en construction

Digital Construction Issues and Challenges



The construction sector has a long record of poor performances…

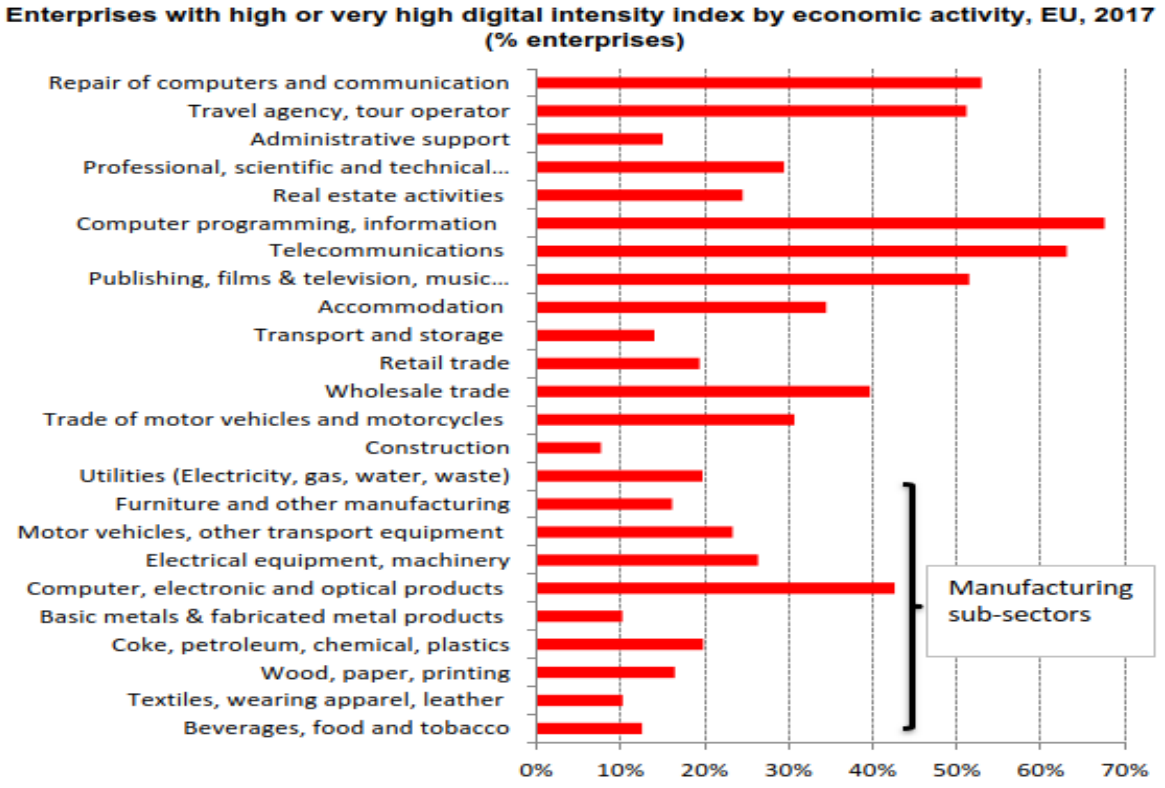
> Looking at construction projects today, I do not see much difference in the execution of the work in comparison to 50 years ago.
>
> John M. Beck, Executive Chairman, Aecon Group, Canada



Over the past two decades, the labour productivity has grown at around a quarter of the rate in manufacturing (1.0% vs. 3.6% respectively) making the construction sector the poorest performer in terms of productivity

Digitalization of the construction sector is increasingly recognized as a potential game changer for the sector*

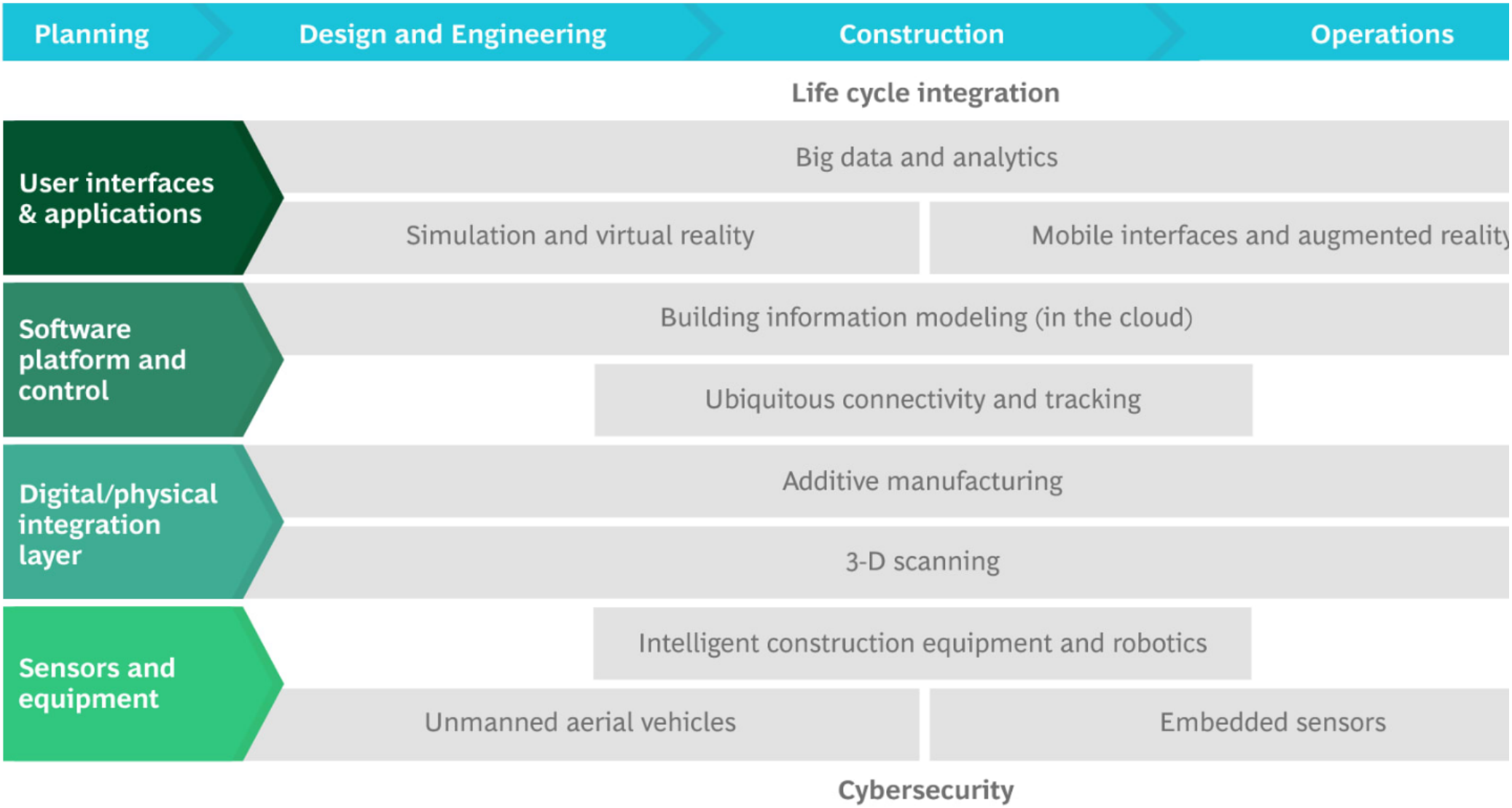
IT spending in construction does not exceed 1% and only agriculture and hunting seem to spend less…



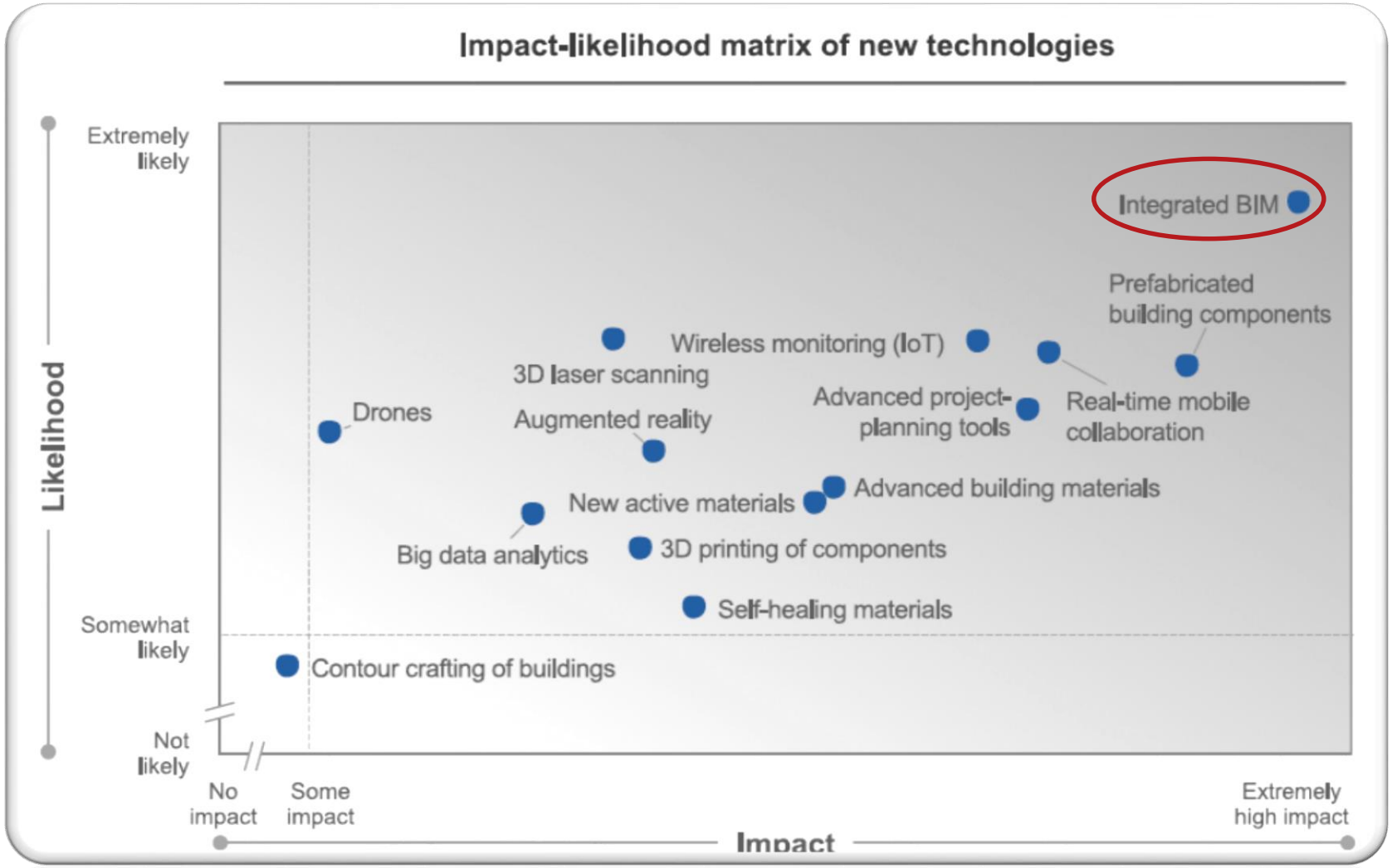
Source: European Commission services based on Eurostat data

- BCG (2016). Digital in Engineering and Construction
  https://www.bcg.com/industries/engineered-products-infrastructure/digital-engineering-construction.aspx
- Branthonne (2017). Can the Construction Industry Catch Up on Digitization?
  http://www.novade.net/construction-industry-digitization/
- WEF (2016). Shaping the Future of Construction A Breakthrough in Mindset and Technology
  http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_full_report__.pdf

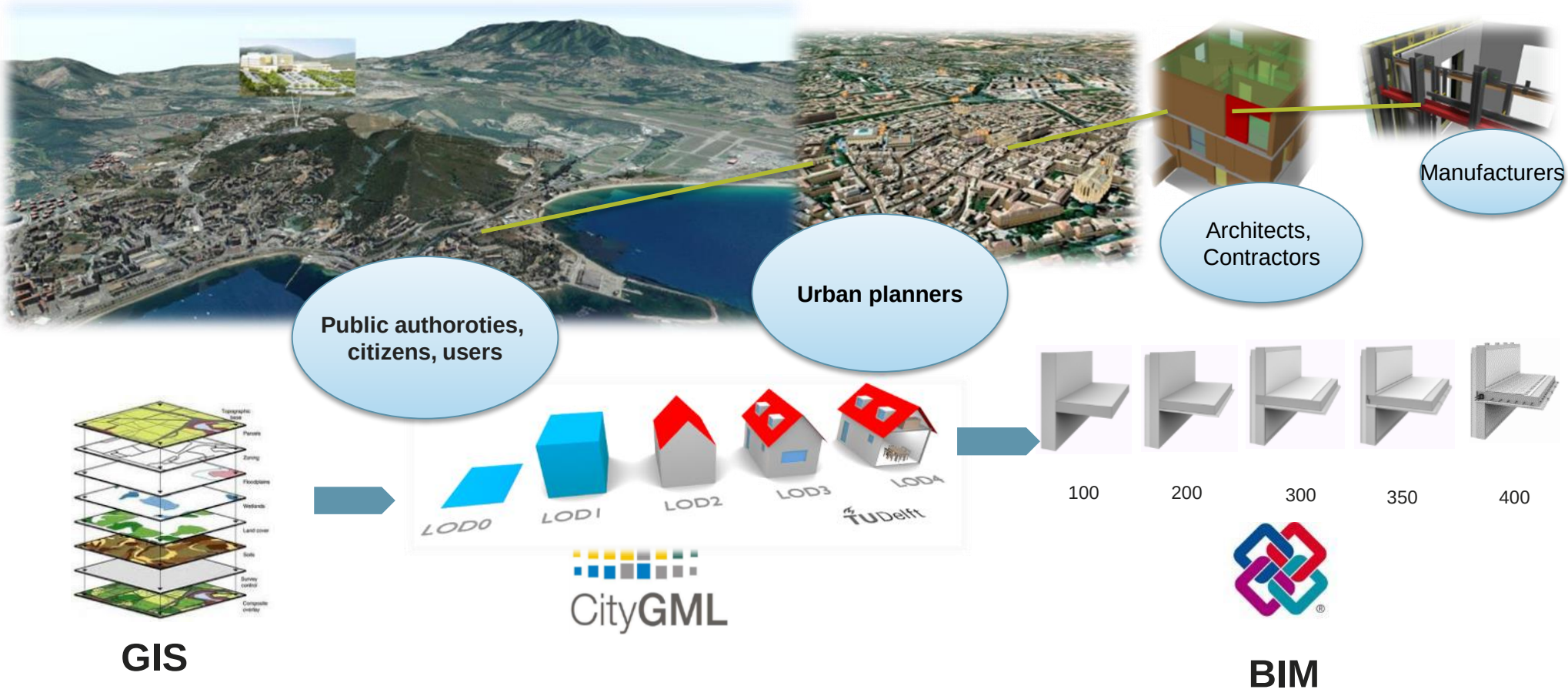
Digital technologies



Impact / Likelihood analysis



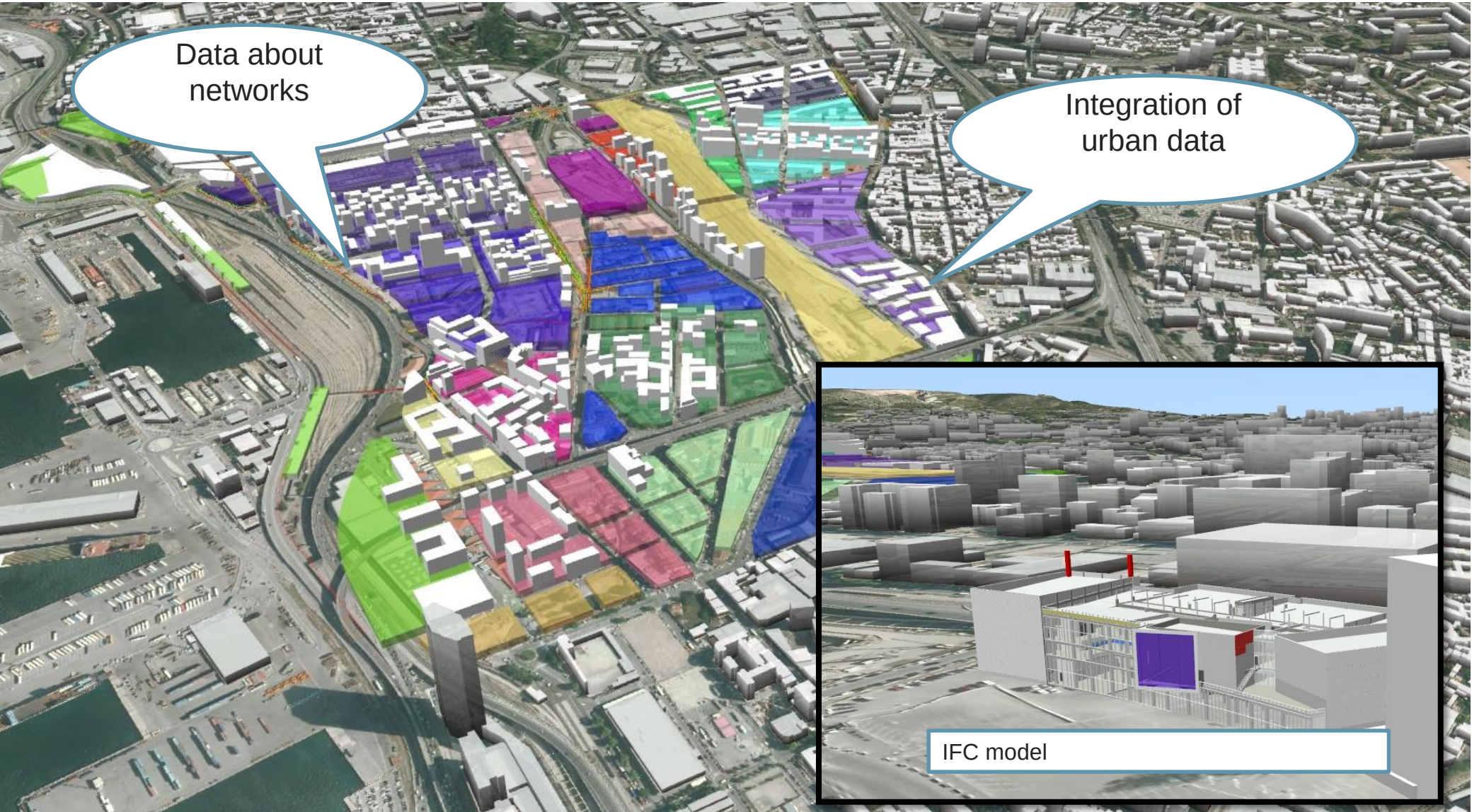
Multi-scale BIM for various stakeholders



Examples of R&D projects

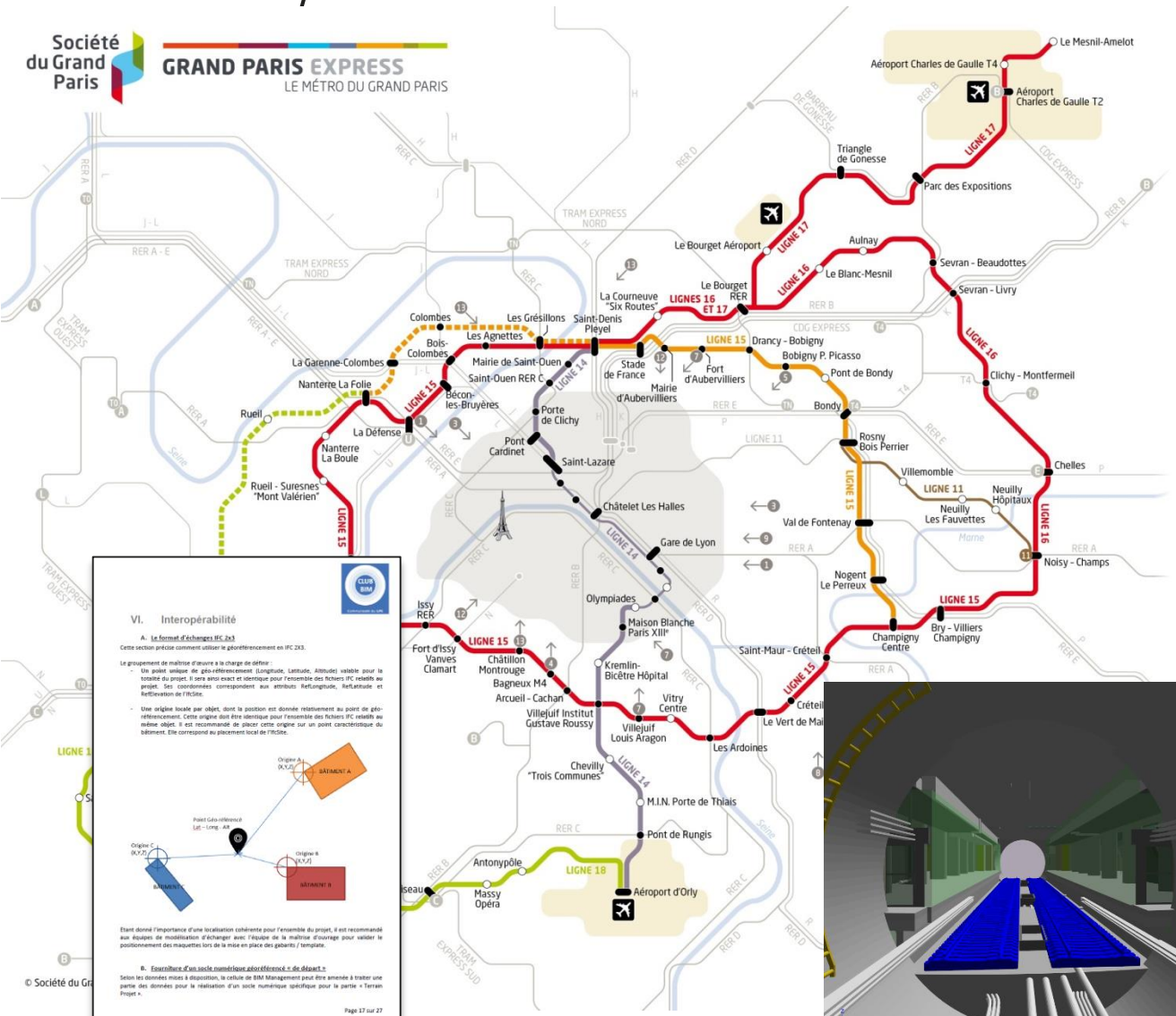
CSTB
le futur en construction

EUROMÉDITERRANÉE



Grand Paris Express (>50 compagnies) Guidelines and digital collaborative platform

CSTB
le futur en construction



VI. Interopérabilité

A. Le format d'échanges IFC 2x3

Cette section précise comment utiliser le géoréférencement en IFC 2X3.

Le groupement de maîtrise d'œuvre a la charge de définir :

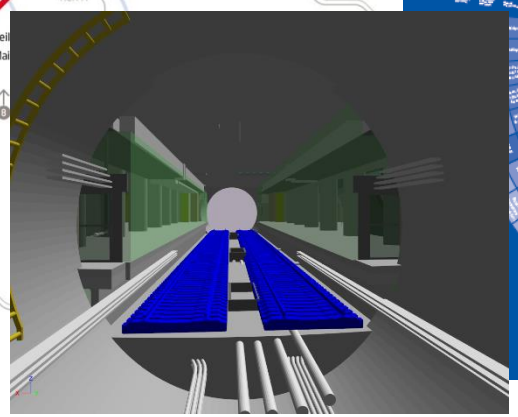
- Un point unique de géo-référencement (Longitude, Latitude, Altitude) valable pour la totalité du projet. Il sera ainsi exact et identique pour l'ensemble des fichiers IFC relatifs au projet. Ses coordonnées correspondent aux attributs RefLongitude, RefLatitude et RefElevation de l'IfcSite.
- Une origine locale par objet, dont la position est donnée relativement au point de géo-référencement. Cette origine doit être identique pour l'ensemble des fichiers IFC relatifs au même objet. Il est recommandé de placer cette origine sur un point caractéristique du bâtiment. Elle correspond au placement local de l'IfcSite.

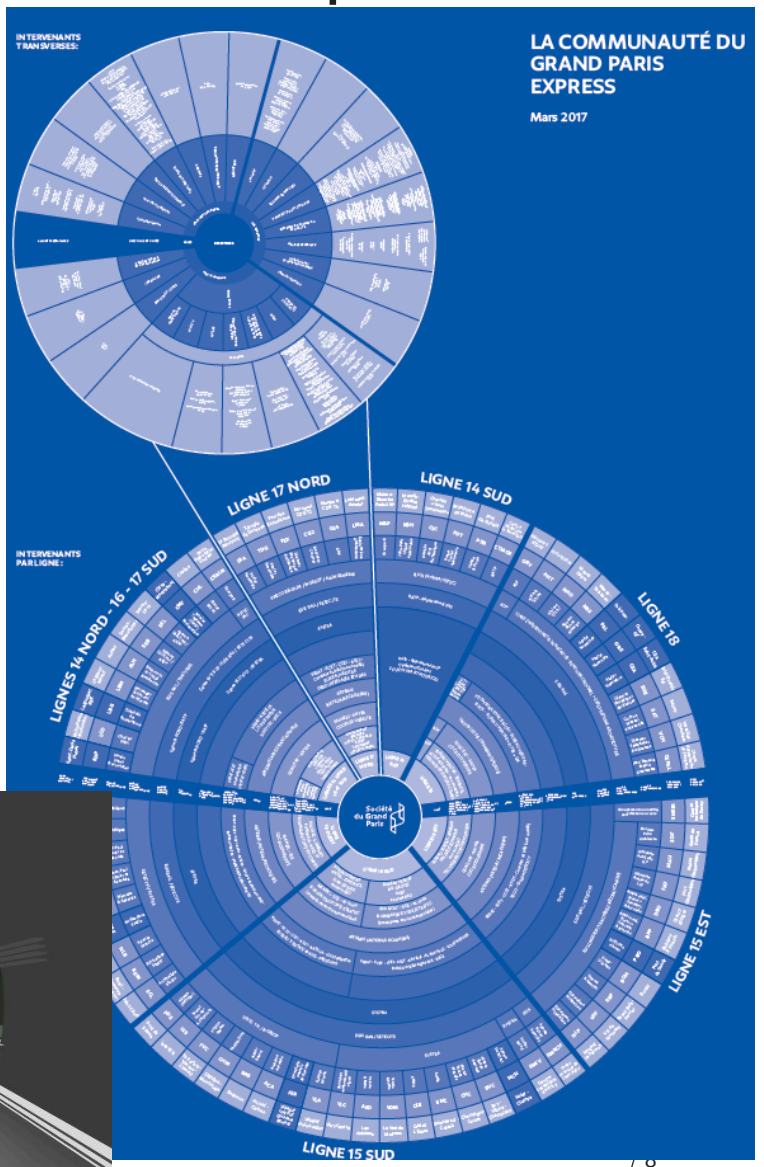
Etant donné l'importance d'une localisation cohérente pour l'ensemble du projet, il est recommandé aux équipes de modélisation d'échanger avec l'équipe de la maîtrise d'ouvrage pour valider le positionnement des maquettes lors de la mise en place des gabarits / template.

B. Fournitures d'un socle numérique géoréférencé « de départ »

Selon les données mises à disposition, la cellule de BIM Management peut être amenée à traiter une partie des données pour la réalisation d'un socle numérique spécifique pour la partie « Terrain Projet ».

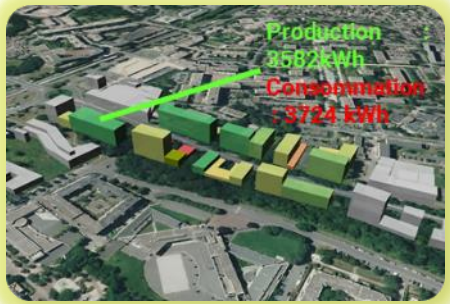
Page 17 sur 27

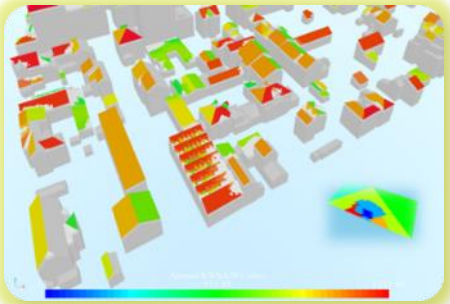


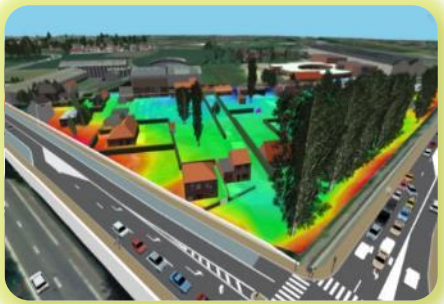


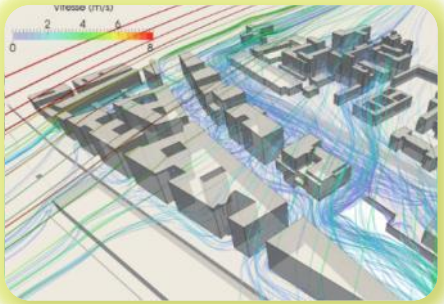
CSTB
le futur en construction

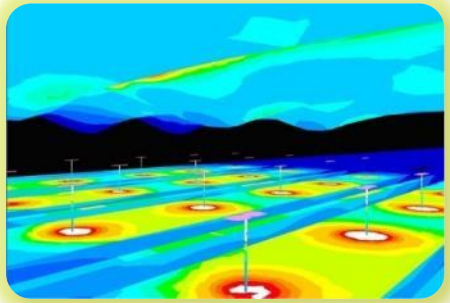
BIM2SIM and SIM2BIM

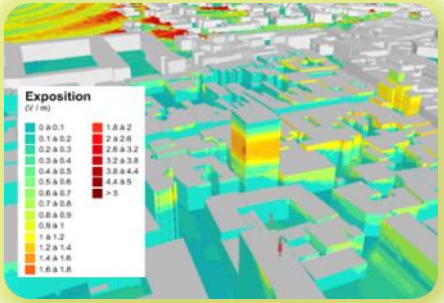


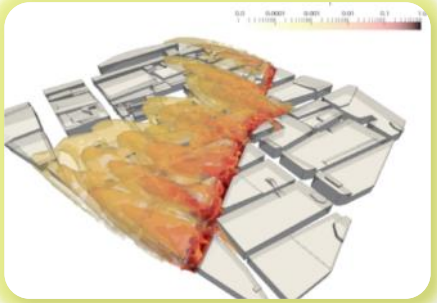


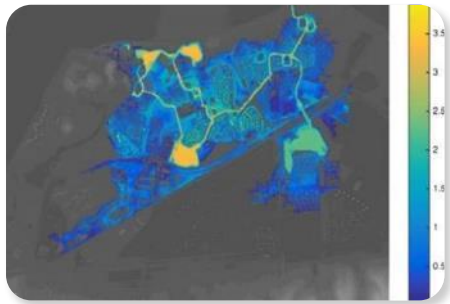


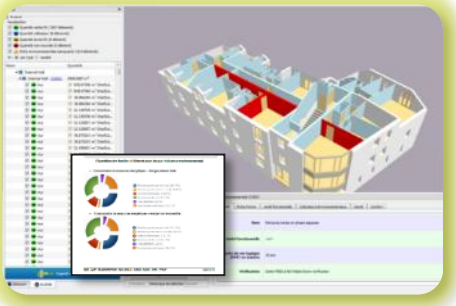


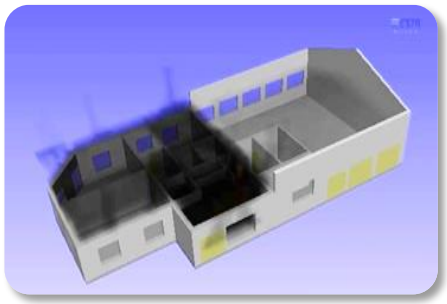


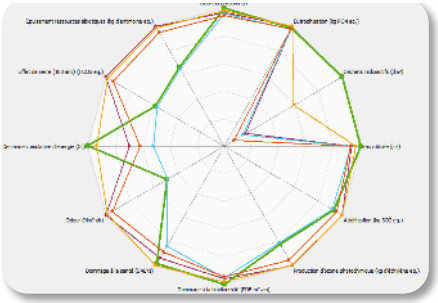




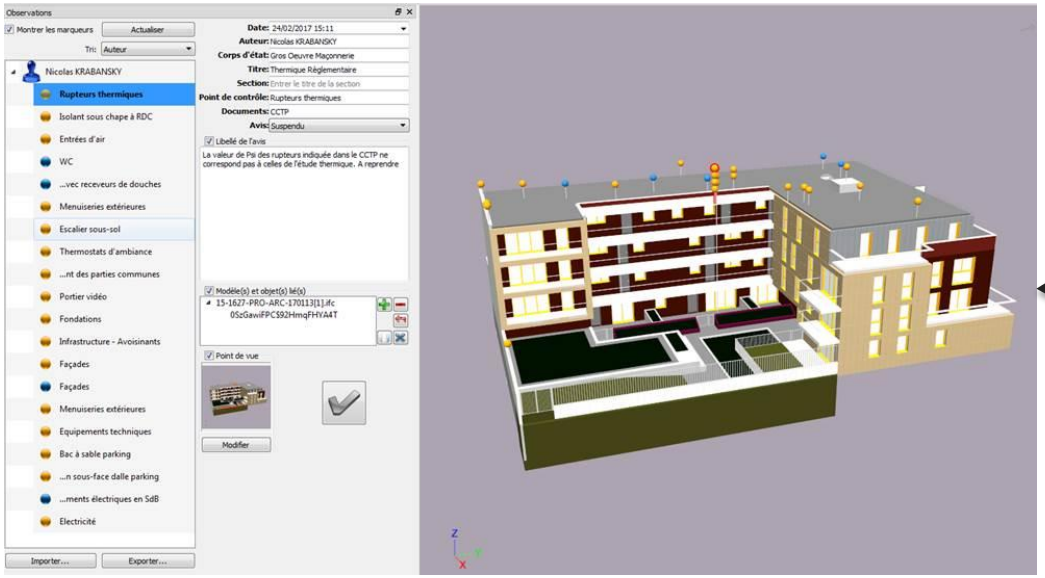


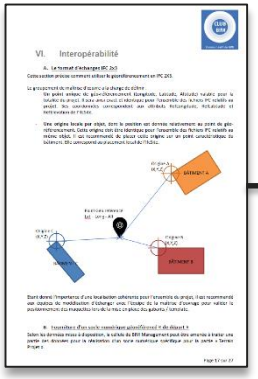






Checkers and annotations of BIM objects





IFC

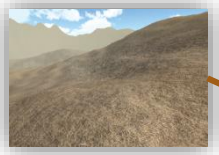
checkers

BCF

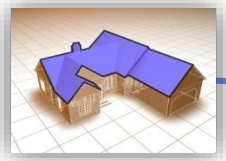
OK

R&D challenges : Semantization

- **EXTRACT SEMANTIC INFORMATION FROM GEOMETRY AND TEXTURES**
- **MANAGE EXOTIC GEOMETRIES, MASKING, DEFECTS, VARIATIONS IN RESOLUTION / ACCURACY**

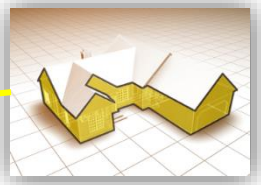


Ground



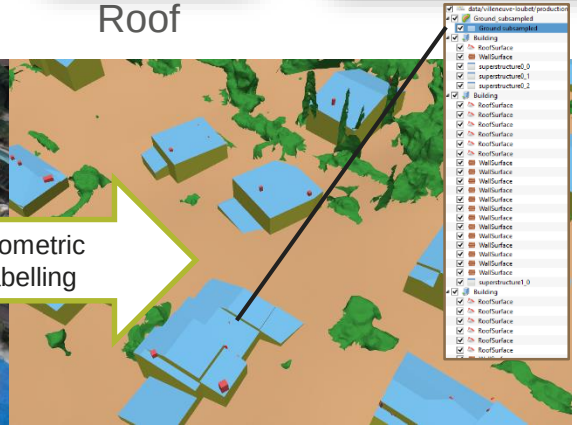
Roof

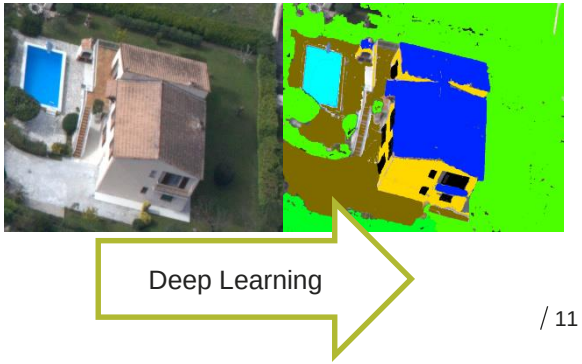
Vegetation



Facade

Geometric Labelling





Deep Learning

R&D Perspectives

Secure BIM

Legal
Confidentiality

Artificial Intelligence

Optimization
Configurators
(urban level, renovation)

Blockchain

Reliability
Versioning
Archiving

Construction site of the future

Mixed Reality, 4D
Comparison existing / digital

Multi-scale BIM

Digital twins
Smart Building / City

Cost / benefits analysis

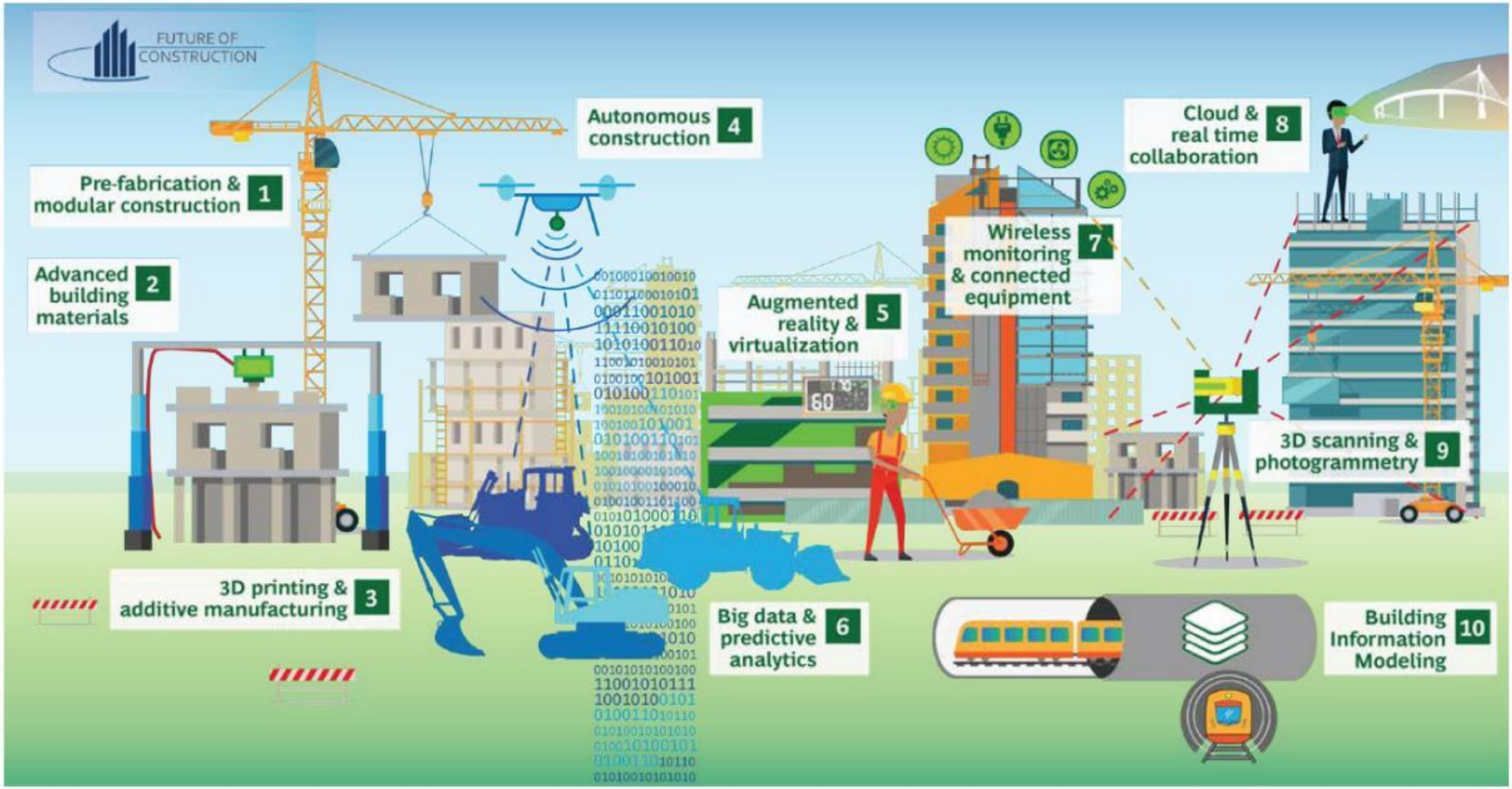
Energy
environment

Linked Data

Semantic web
Checkers

CSTB
le futur en construction

Where do we go from here ?



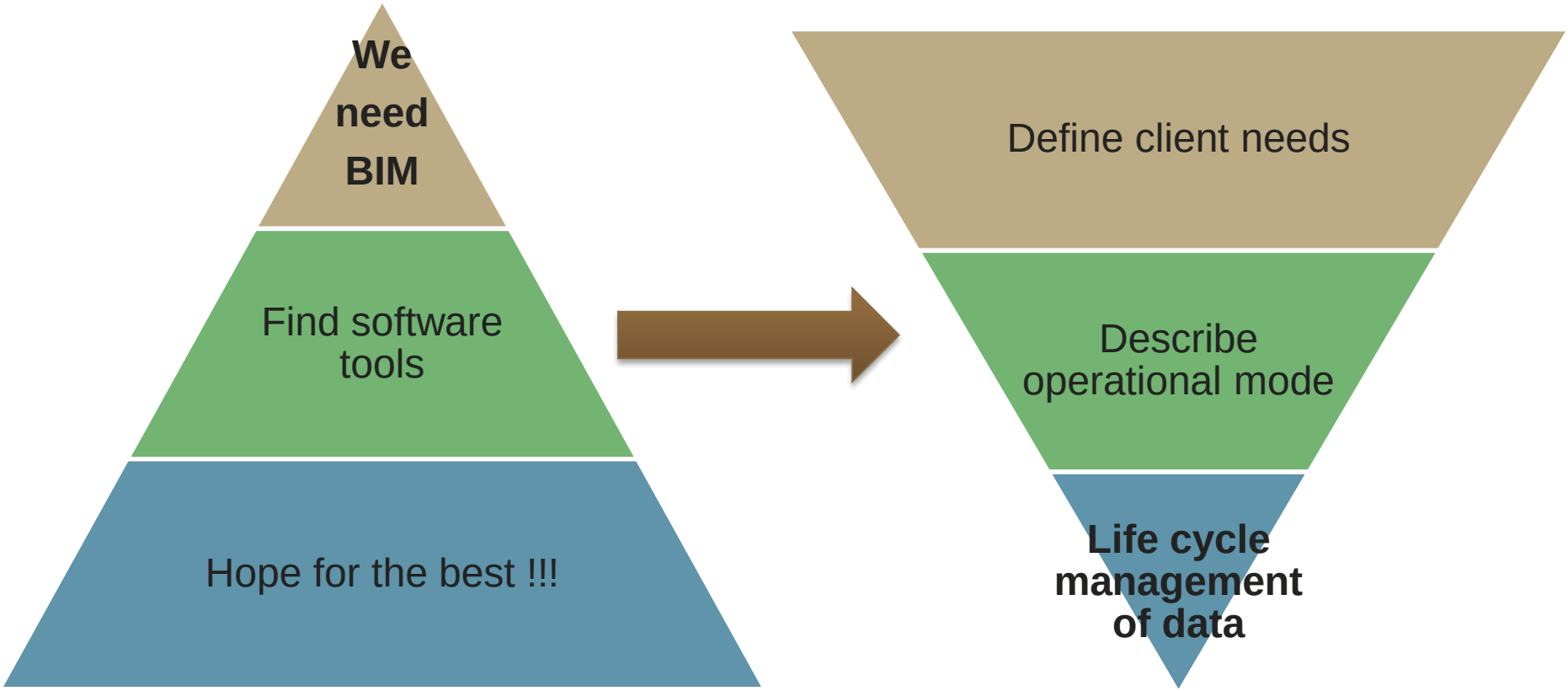
Source: World Economic Forum, The Boston Consulting Group

Future challenges
Digital hypertrophy ?

Massive collection of data raises questions about:

- sustainability and updating
- confidentiality and reliability
- the environmental cost that will quickly become prohibitive…

Future trends: from BIM to Information Management



Data flows across parties and processes for:

- Predictive decision support
- Optimization based on learning