Data Space & Digital Twins toward Climate-Resilient Infrastructures

The proposals from MINnD
Agenda

1. Successes of MINnD season 2
2. MINnD’s positions
3. Next steps towards a data space for construction
MINnD / A UNIQUE FRENCH « NATIONAL PROJECT »

› BIM for infrastructures
› Launched in 2014, closing its second season NOW
How to define a process & data strategy at a territory scale?

- Owners
- Engineering
- Contractors
- Laboratories
- Federations
- Software vendors
- Experts & Consultants
- Universities
MINnD SEASON 2 – WORKING GROUPS

/ Observatory / Project Mgmt
- WG0.1 - Development
- WG0.3 – Competences
- WG0.5 – Carbon impact

/ Data Structuring
- WG1.1 - IFC Bridge
- WG1.2 - IFC Rail
- WG1.3 - IFC Road
- WG1.4 - IFC Tunnel
- WG1.5 - IFC Geotechnic
- WG1.6 - IFC Earthworks
- WG1.7 - BIM & Archiving

/ Data Qualifying
- WG2.1 - Hand over modality
- WG2.2 - Uncertainties and tolerances management

/ Data Generation
- WG3.1 - PLM Integration during operation phase
- WG3.2 - Continuity BIM and Digital twin
- WG3.3 - Data management in collaboration mode

/ Data Collecting
- WG4.1 - Smart cities & IoT
- WG4.2 - Continuity of territory BIM-GIS

/ Data Using
- WG5.1 - Data Modeling (retro-engineering)

/ CDE - Collaboration
- WG6.2 - Collaboration platform & Platform collaboration
- WG6.3 - Project review

Numerous (big) deliverables to be released by May 12th
1. Targeting social & environmental & economical benefits at a territory scale
2. The strategy for digital twins and collaborative platforms in an open Common data environment
3. The crucial role of the owners
4. Digital continuity between BIM & GIS
5. The Implementation of IFC 4.3 & IFC4.4 is a crucial step forward
6. Carbon footprint of digital in construction
WHAT’S NEXT?

› We have built a community that has worked in collaborative mode... and wishes to continue
› Much remains to be done to implement all that has been produced
› But we must also address the new challenges (climate, energy, cricular economy, etc.)
› Going from the scale of the building or the infrastructure to that of the city

› From a technical point of view
  ▪ Implement an interoperable collaborative platform model
  ▪ Implement data space for construction (EU strategy – GAIA-X)
  ▪ By developing digital commons

› Extend the partnership
  ▪ At the national level by mobilizing more widely the local authorities
  ▪ At European level by developing initiatives and partnerships
  ▪ And by continuing to bring the worlds of BIM and GIS closer together
MINnD’s positions

Vincent KELLER,
Egis, Head of Digital Engineering Department
MINnD co-Leader
Targeting social & environmental & economical benefits at a territory scale
MANIFEST « OPEN BIM, SUPPORT TOWARD THE ECOLOGICAL TRANSITION »

- Ambition 1: A COMMON VISION
- Ambition 2: A SHARED FRAMEWORK
- Ambition 3: A COMMON ROADMAP
Open BIM & Open CDE
Data sharing strategy at a territory scale: digital twins and collaborative platforms

- The use of standardized data models to model physical assets as designed, as built or as maintained allows to generate valuable digital assets which can be massively used during their lifecycle by the numerous stakeholders & users with their preferred tools.

- Interoperability & data sustainability are key requirements from appointing parties to generate digital twins and to leverage them at a territory scale.

- That is the aim of the open BIM & specifically through the IFC model.
General architecture

- DSAAS OUVRAJE
- DSAAS CONTRATS
- DSAAS PROJET
- DSAAS CAPTEURS
- DSAAS CDE

Agent CDE

Services de données dédiés
OUVRAJE
CONTRATS
PROJET
CAPTEURS
CDE

Services de données communs à tous les DSAAS

Services standards communs à toutes les plateformes

Services standard communs par famille d’outils

Services de données spécifiques par famille d’outils

Protocoles de service WEB
(SOA)

- IFC
- BCF

Protocoles WEB
(internet)

CityGML
railML

Protocoles de service WEB
(SOA)

- openBIM

Couche de protocoles
https://egis-minnd-dev.k8s-lyon.oudou.fr/restart

Specifications

Generic use cases x 5
The crucial role of the owners

The owners as appointing parties have the power / responsibility to mandate / require,

- interoperable information
- for valuable usages.

The ecosystem actors as appointed parties develop & provide the means to implement as required.
### Information requirements (regulation or contractual)

- **Organizational Information Requirements (OIR)**
- **Information to be exchanged**
- **Digital assets**
- **Generic object libraries**
- **Digital models**
- **Manufactured products**

### Process

- **Inputs**
- **Outputs**
- **Digital twins**

### Deliverables > digital assets

- **Digital models**
- **Generic object libraries**
- **Manufactured products**

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**NOTE:** Sur cette figure, « accompagne » signifie « fournit l’information à », « contribue à » signifie « fournit une information à », « spécifique » signifie « détermine le contenu, la structure et la méthodologie ».
④ Digital continuity between BIM & GIS
HOW TO ENHANCE THE DIGITAL CONTINUITY BETWEEN BIM & GIS?

› Federate the BIM / GIS conceptual modeling approaches
› Federate the process of data sharing to:
  - Enhance the trust in the data
  - Enhance the usability of the data
› Develop services leveraging the federation of BIM & GIS databases
› Remove the (technological & human) barriers to change
› Complies with an open CDE architecture
The Implementation of IFC 4.3 & IFC4.4 is a crucial step forward
Collaborate on the Rules > a common Framework
Compete on the Game > enable the Services

Value >>> Use cases
Leverage an Implementation platform to implement use cases (UC) > IDM/MVD/IDS

**PAIN**
1 use case (UC1) is **not correctly specified** by appointing parties and **not correctly supported** by existing tools and **cannot be managed in IFC**

**GAIN**
1 use case (UC1) is **commonly specified** by appointing parties and **implemented** by several software vendors in several tools by using the **IFC4.3 model & data dictionaries**

& train BIM/GIS/data managers & users!
[Wrap up] MINnD’s positions

1. Targeting social & environmental & economical benefits at a territory scale
2. The strategy for digital twins and collaborative platforms: open BIM & open CDE
3. The crucial role of the owners
4. Digital continuity between BIM & GIS
5. The implementation of IFC 4.3 & IFC4.4 is a crucial step forward
6. Data sufficiency