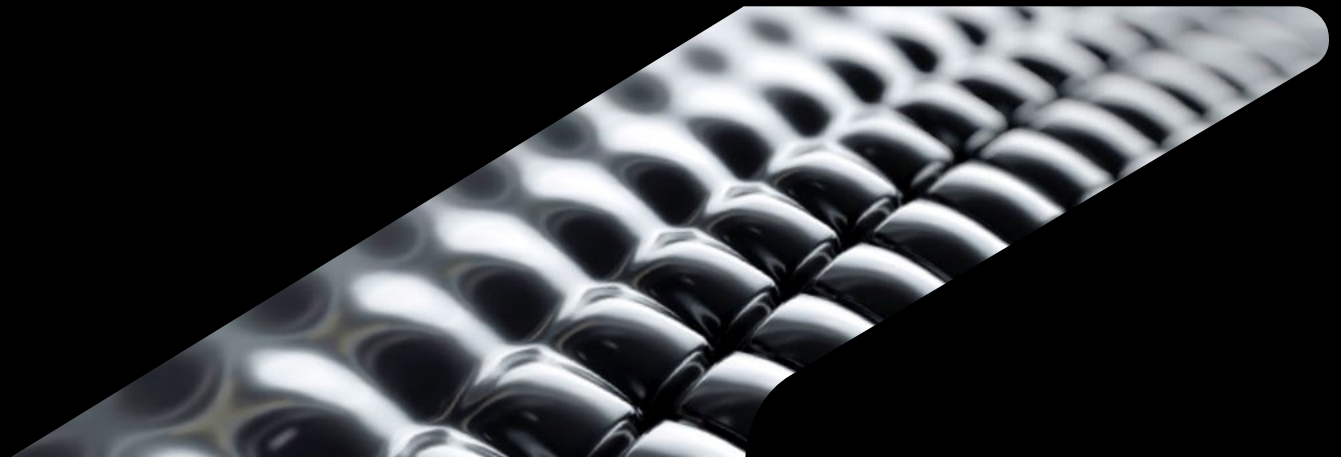
AUTODESK UNIVERSITY

Harnessing the Power of Platform through BIM and GIS

Arnold LEDAN
Civil Engineer / BIM Manager

Lionel FABRE
Director

Jeremy MOLS
Civil Engineer / BIM Manager



Key Learning goals

1. Use GeoBIM projects to **organize and link GIS and BIM** content on a single platform

2. Create GeoBIM apps to visualize geographic insights for **construction issues and projects**.

3. To understand the **concept of BIM and GIS combination** on a web app

4. The **analysis** that can be done using **GIS** on **spatial data** from **BIM**

Team

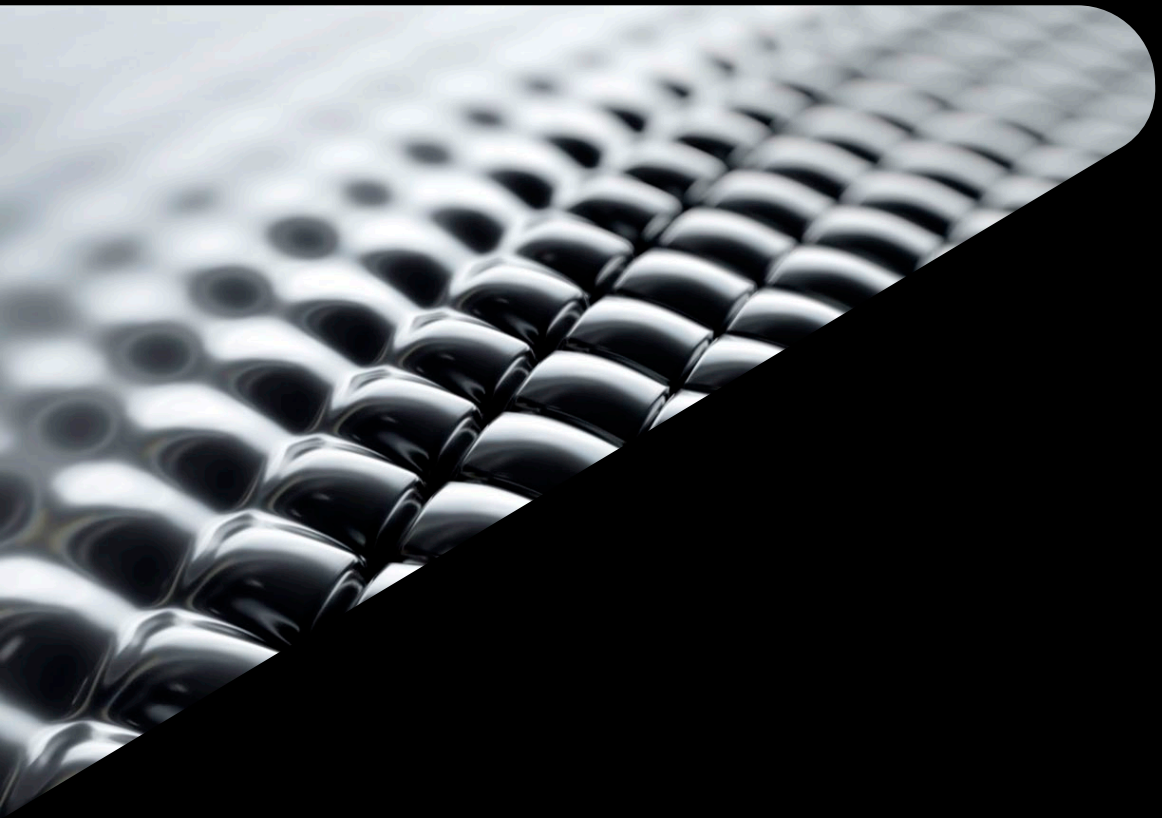
1 Concepts

2 Project

3 Conclusion

Egis

What are we going to talk about ?



Team

About the Speaker

Arnold LEDAN

- BIM Manager & Civil engineer
- I’ve been working at Egis since 1997.
- Responsible for the strategy, development BIM Process.

Location Limoges, France

arnold.ledan@egis-group.com

www.linkedin.com/in/arnold-ledan

About the Speaker

Lionel FABRE

- Director – Digital Engineering
- I’ve been working at Egis for 10 years
- Ensuring the consistency of the digital strategy in the group
- More than 20 years of experience in Civil Infrastructure projects

Location Paris, France

lionel.fabre@egis-group.com

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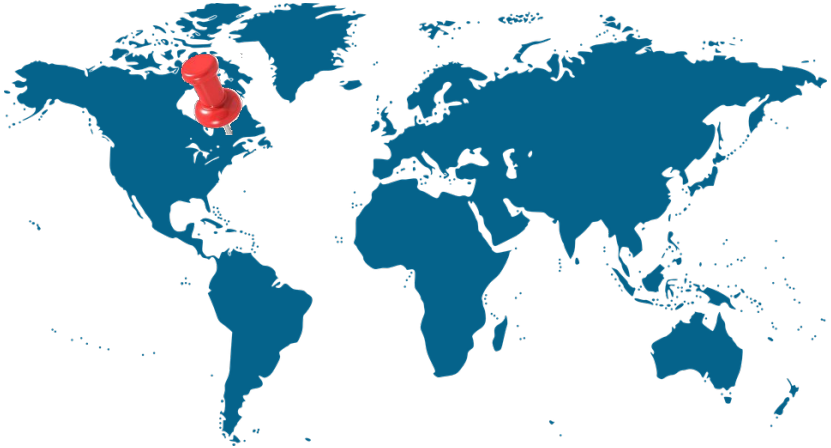
About the Speaker

Jeremy MOLS

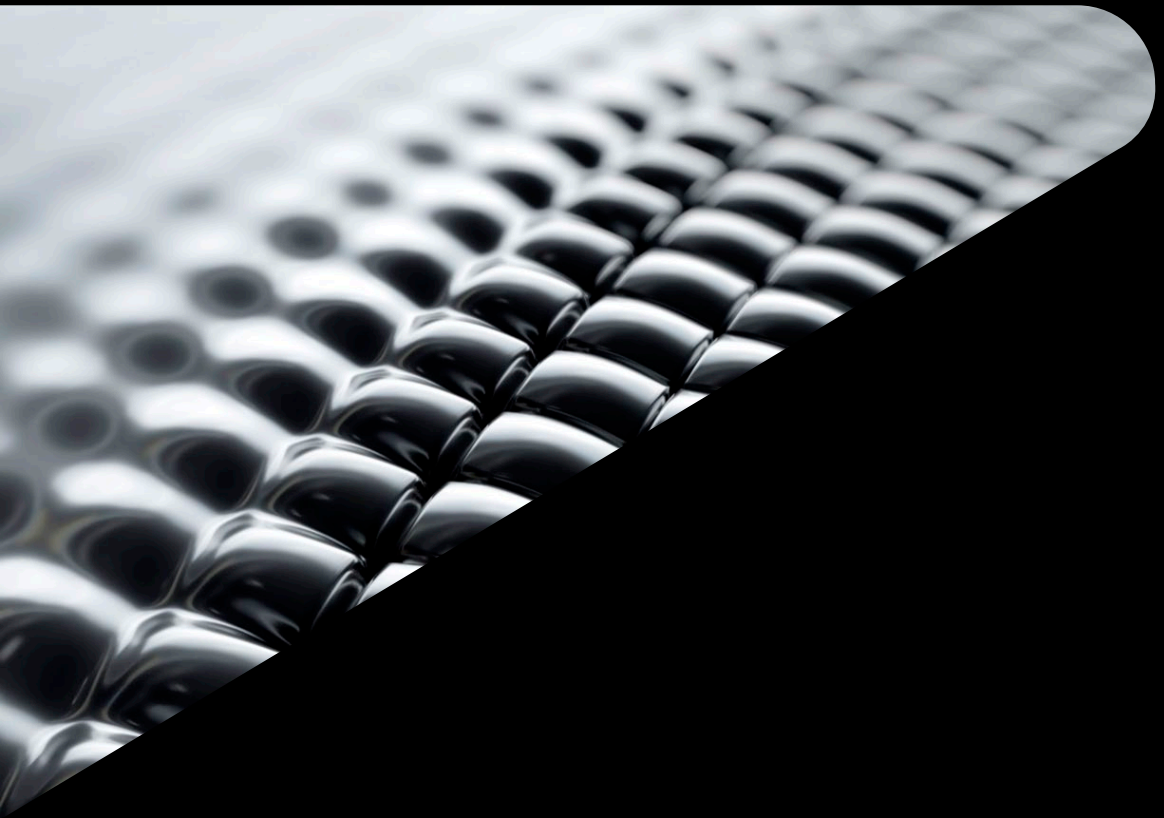
- BIM Manager & Civil Engineer
- In charge of improving skills in BIM and 3D modeling at Egis since 2020
- Egis's ambassador in North America for Twin & Digital Services to Operators
- Specialized on the following BIM topics : analytical modeling, 3D software, data management and analysis, visual programming



Location Montréal, Canada

jeremy.mols@egis-group.com

www.linkedin.com/in/jeremy-mols



Egis

About Egis

Egis is an international player active in the consulting, construction engineering and mobility service sectors.

We **design** and **operate** **intelligent infrastructure** and **buildings** capable of responding to the **climate emergency** and helping to achieve more balanced, sustainable and resilient territorial development.

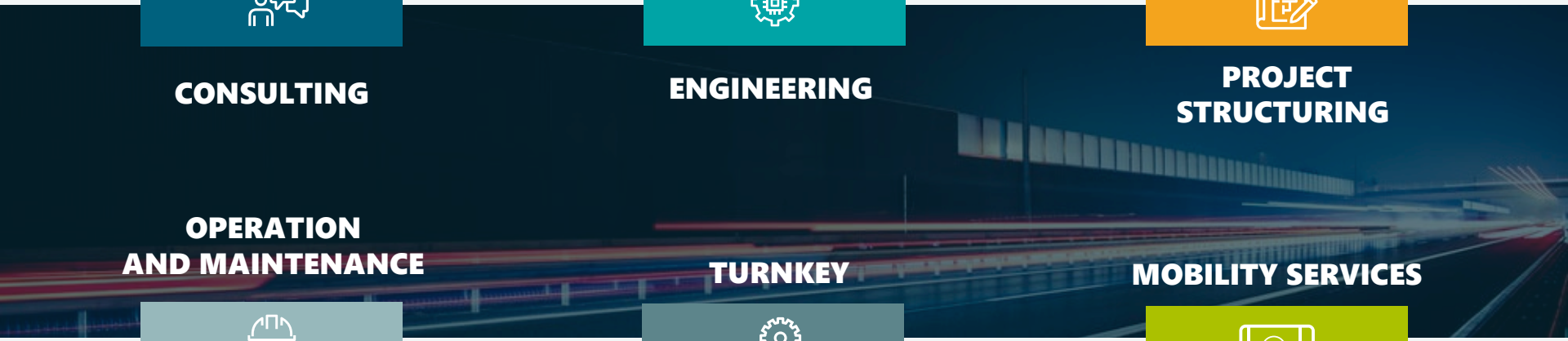
egis

Our global offer

FIELDS OF ACTIVITY UNDERPINNED BY CROSS-GROUP AREA OF EXPERTISE

ENVIRONMENT – MOBILITY AND SYSTEMS – GEOTECHNICAL & COMPLEX STRUCTURES – DIGITAL

Along the entire value chain of projects



CONSULTING

ENGINEERING

PROJECT STRUCTURING

OPERATION AND MAINTENANCE

TURNKEY

MOBILITY SERVICES

2021 key figures

€1.16 bn

TURNOVER

62%
international

79%
Consulting & engineering

21%
Operation & mobility services

28
ROAD OPERATING COMPANIES

17
AIRPORTS

43
URBAN PARKING LOTS IN FRANCE

ENR 22nd
ENGINEERING NEWS RECORD GLOBAL RANKING

1st
IN FRANCE

10th
IN EUROPE

Turnover

Engineering breakdown

€40 M
DISTRIBUTABLE
NET PROFIT
€144 M
EBITDA

16,200
EMPLOYEES
IN THE WORLD

62% Consulting & engineering **38%** Operation & mobility services

A local international player

egis

AUTODESK UNIVERSITY

Impact the Future, the group's strategy

Our 10 strategic priorities to 2026

01

Contributing to global **carbon neutrality** by 2050

02

Become a **leading industry figure**

03

Accelerate in Egis' most **successful markets and zones**

04

Impose the **transition to a low-carbon future** as the Group's third pillar

05

Place **intelligence** at the heart of cities and mobility

06

Stay **close to our clients**

07

Step up our **development in North America and Southeast Asia**

08

Link up the **chain of expertise**

09

Enhance **technical and digital excellence**

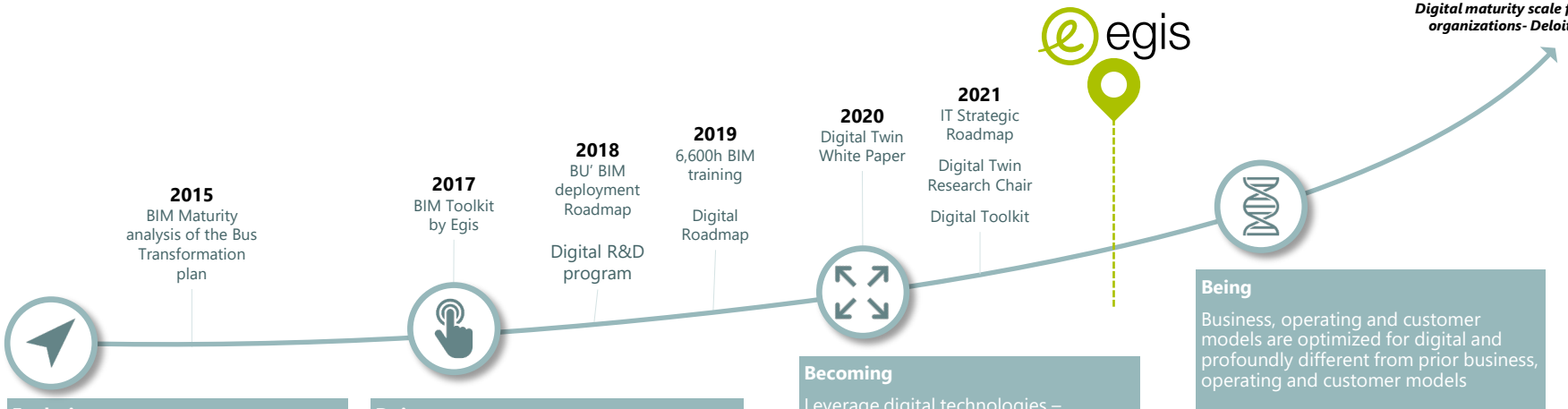
10

Help our employees grow, and continue to attract **new talent**

egis

AUTODESK UNIVERSITY

Making Egis a major player in digital engineering



SILVER BIM 2015 in the infrastructure category for its successful implementation of a digital model for the L2 ring road in Marseille – France.

GOLD BIM 2017, infrastructure category, for **line 16 of the grand Paris metro**, with the Société du Grand Paris (France)

GOLD BIM 2017, jury's choice award, in the category " renovation project of more than 40,000 m² " for the **Cité des Sciences et de l'Industrie à Paris - France**

2020

ESRI USER CONFERENCE

Two Awards for egis !

BUILDING SMART AWARD 2019, " Construction " category – for the ICOS consortium (Egis/ Tractebel/ Setect), the BYLOR business consortium (Bouygues TP/ Laing O'Rourke) and the EDVANCE group (EDF subsidiary), for the collaborative work carried out in openBIM on the **EPR** project (Evolutionary Power Reactor) at **Hinkley point**, England.

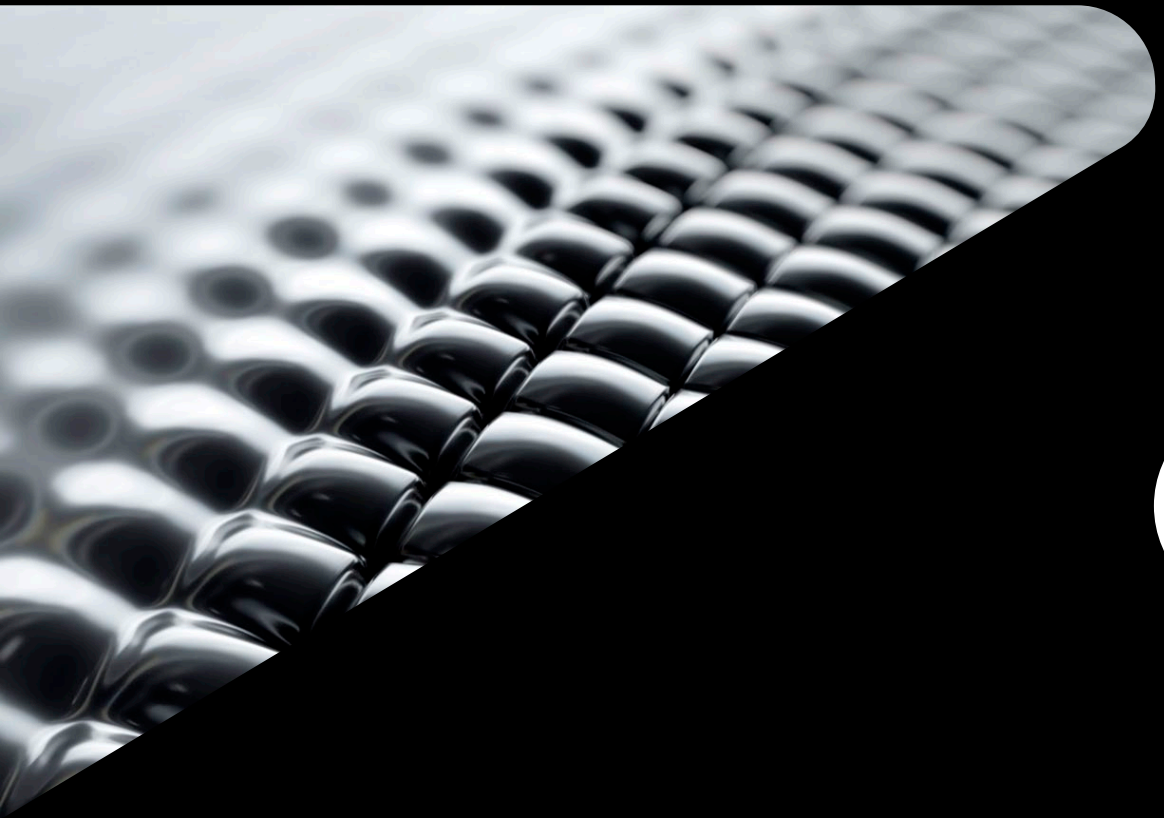
2021

SILVER BIM 2021, infrastructure category, for **Canal seine nord Europe Paris metro**, with the Société du Grand Paris (France)

We early made the choice to be an active player in the modelling and standardization of data exchanges for the construction industry

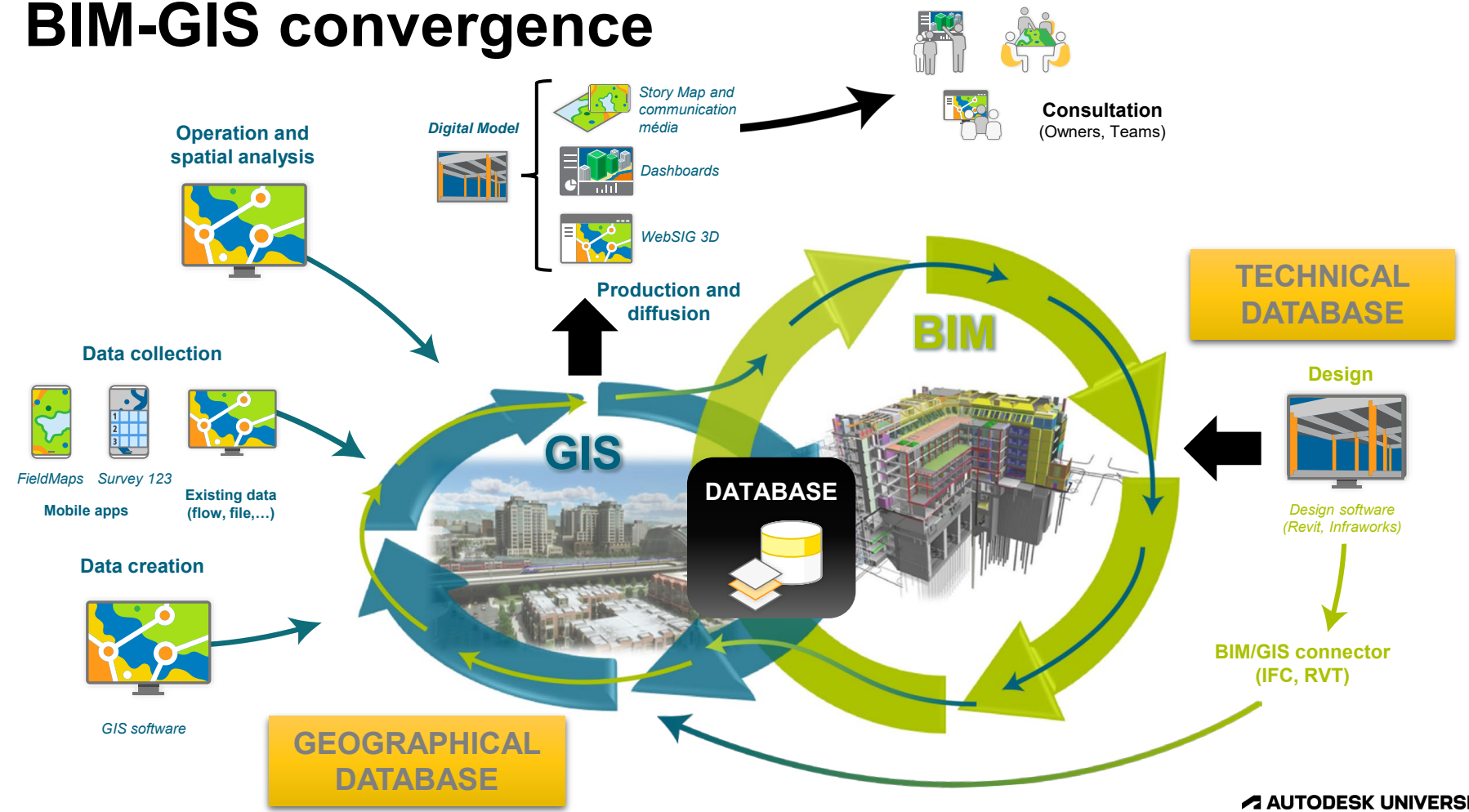
buildingSMART International home of openBIM

egis



Concept

BIM-GIS convergence



Challenges of BIM-GIS convergence

INFORMATION

Integration of process updates in **compliance with BIM standards** (ISO 19650)

Interoperability, reversibility and long-term sustainability of data

Connection to other tools (EDM, CMMS, Technical management …)

More natural access to **documents**: notices, specs, manuals….

24/7 access to data via the web

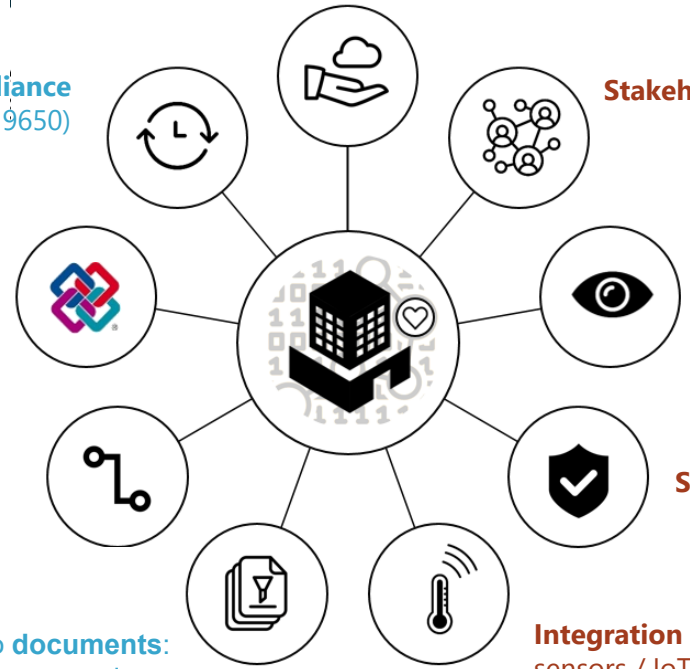
COLLABORATION

Stakeholder collaboration

Shared understanding of the project : simulations, training

Secure hosting

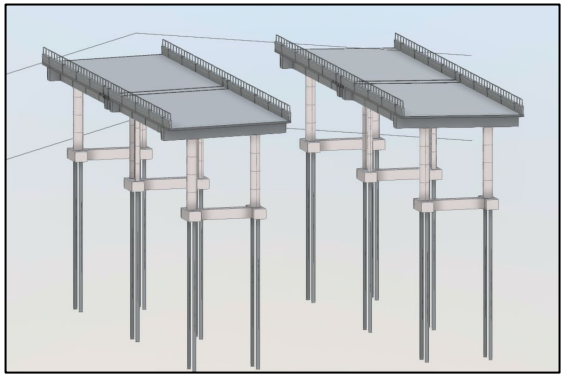
Integration of real-time data from sensors / IoT

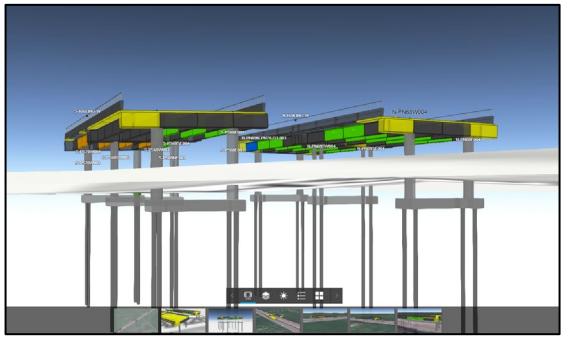


BIM-GIS : common rules

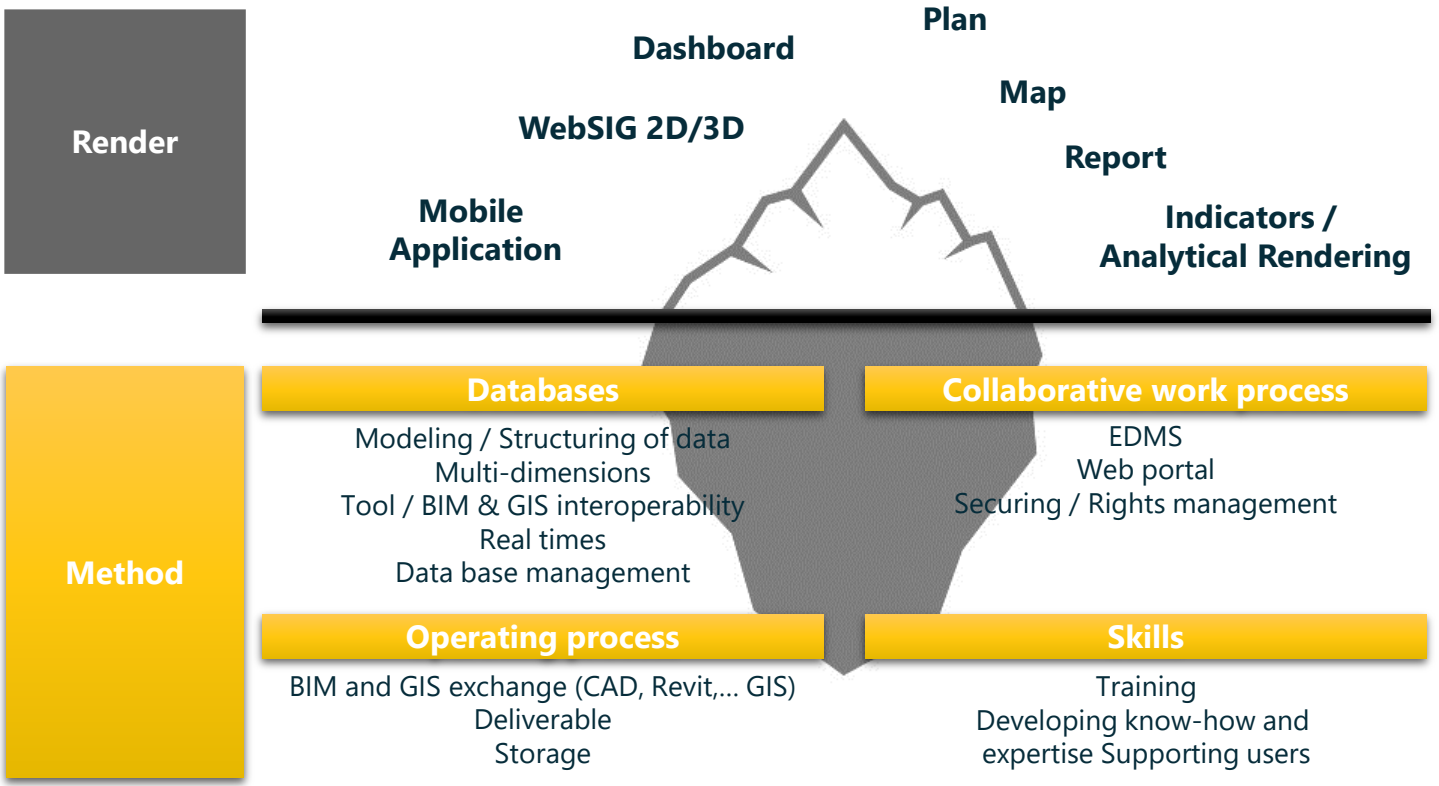
Common Rules

- Compliance with topology rules
- Object georeferencing system
- Data dictionary defined and accepted by all
- Compliance with traceability rules
- Transparent versioning management
- Respect for the completeness of the data (exhaustiveness)
- Assign attributes to build information





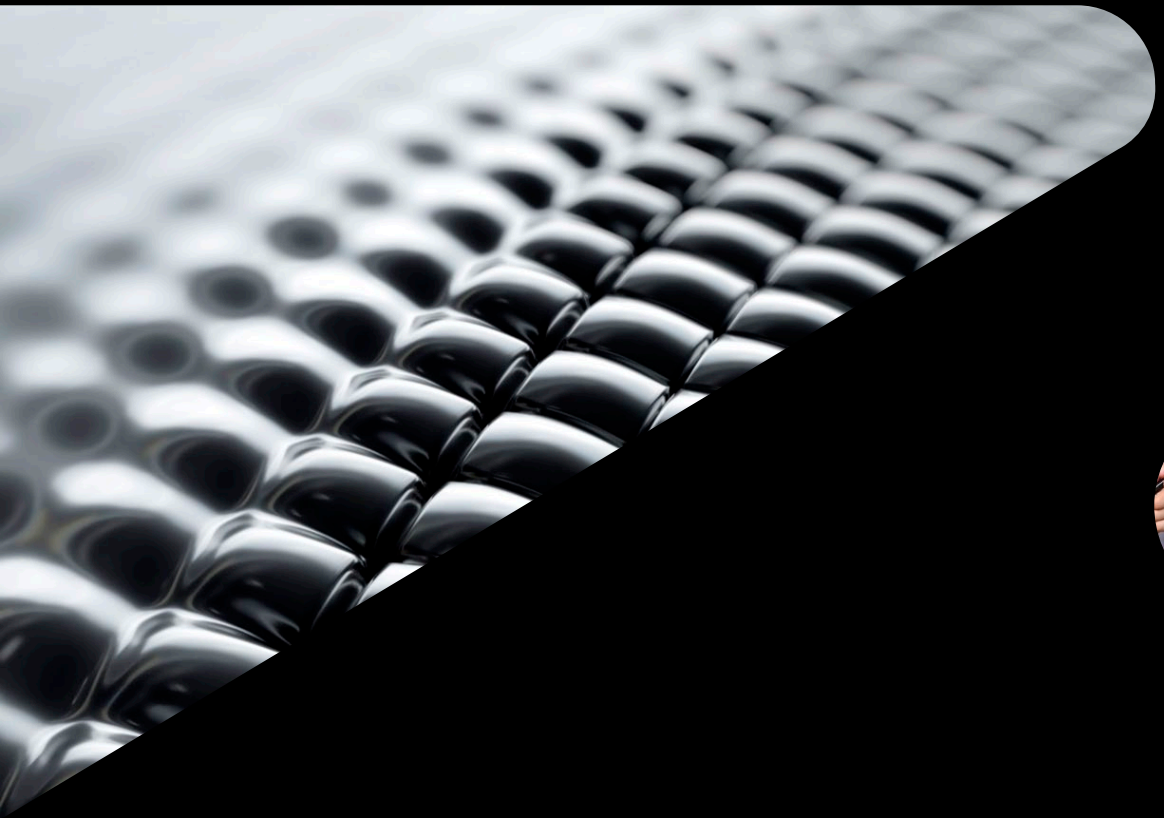
Follow the requirements



Necessary to produce the rendering.

Richness of the data will be done by the methods.

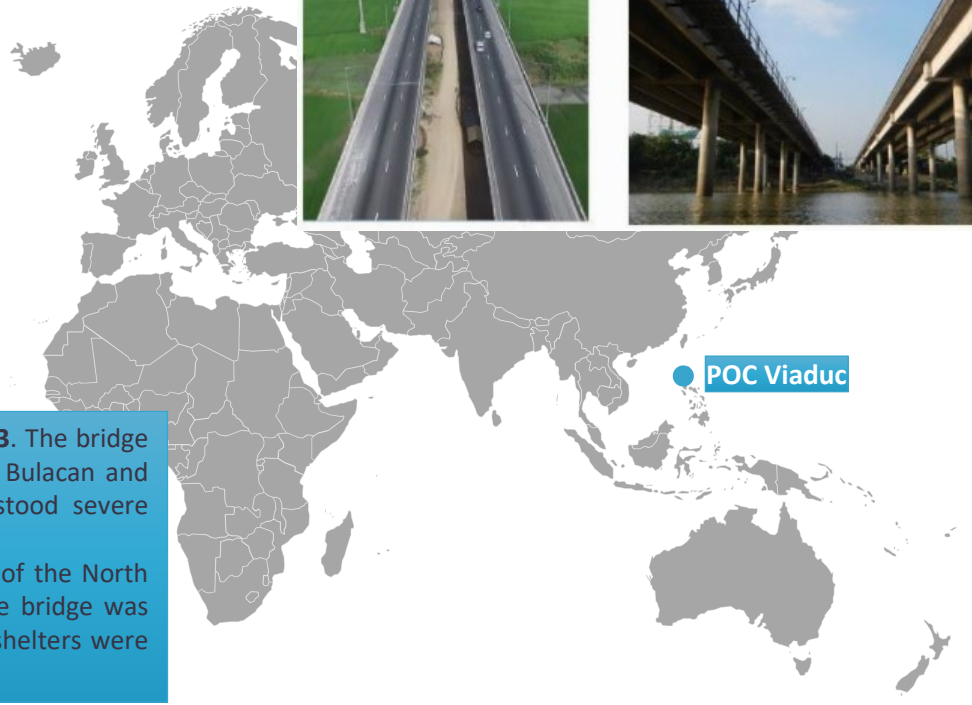
To have a coherence, a homogenization in the methods.



Project

PROJECT

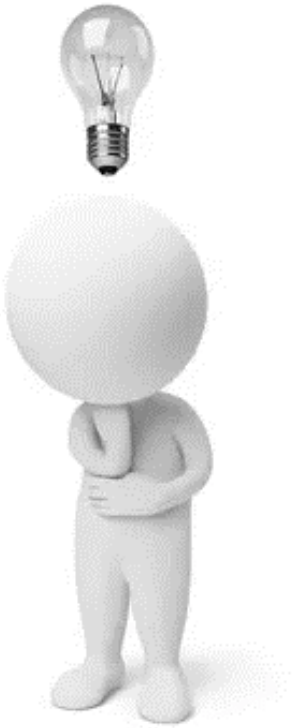
CANDABA VIADUCT



The Candaba Viaduct is a **5.3 km long bridge built in 1973**. The bridge serves as the main artery that connects the province of Bulacan and Pampanga through the Candaba wetlands. It has withstood severe storms and extreme earthquakes.

The **two parallel viaducts** each originally carried 2 lanes of the North Luzon Highway going in different directions. In 2017, the bridge was reconfigured to carry 3 lanes in each direction and new shelters were created.

PROBLEMATIC



How can we monitor and manage

all our data

related to the structural pathologies of the structure

in a unique system

shareable and secure system

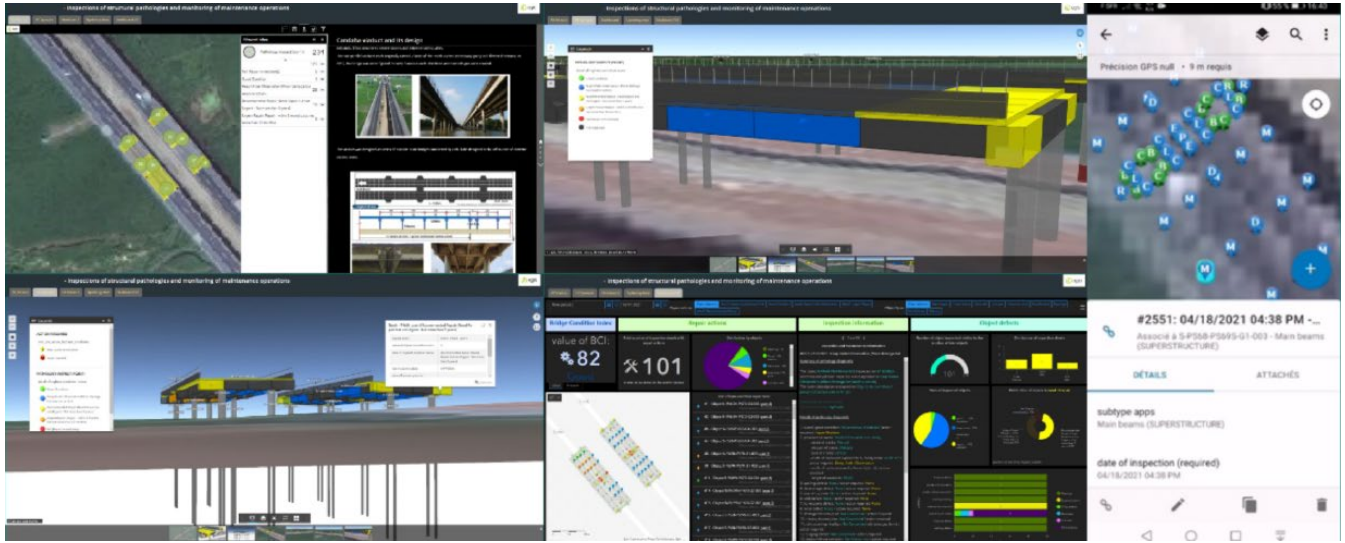
with the possibility of regular updates by the teams

and on which

we can carry out detailed analysis

APPLICATIONS IMPLEMENTED

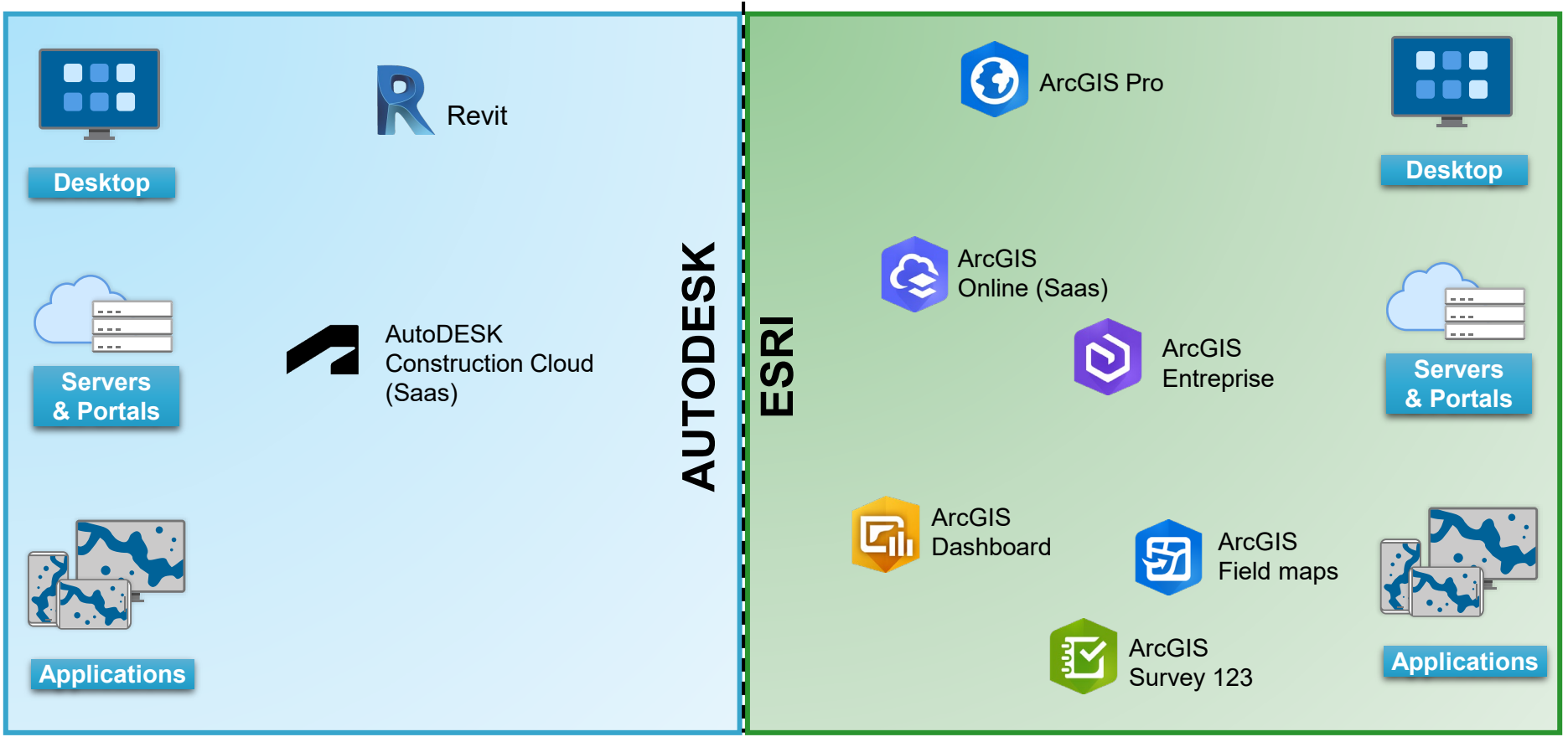
- Identification of pathologies in the field via an **application on mobile support**
- Visualization of results in a **3D WebGIS**
- Reporting in a **dynamic dashboard**
- Visualization all assets on **a single and secure platform**



Let’s go

But how does it really work?

Platform


Desktop
Revit
Servers & Portals
AutoDESK Construction Cloud (Saas)
Applications
AUTODESK
ESRI
ArcGIS Pro
Desktop
ArcGIS Online (Saas)
ArcGIS Entreprise
Servers & Portals
ArcGIS Dashboard
ArcGIS Field maps
ArcGIS Survey 123
Applications

Process before GeoBIM

Revit

ArcGIS PRO

Database

PostgreSQL

Webservice

ArcGIS Entreprise

Data

Scene Layer
3d object

Feature Layer
vectoriel object

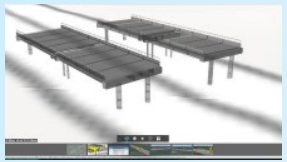
Map

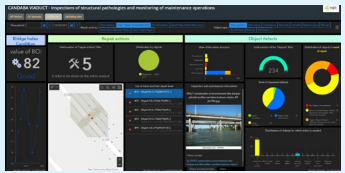
WebScene (3D)

WebMap (2D)

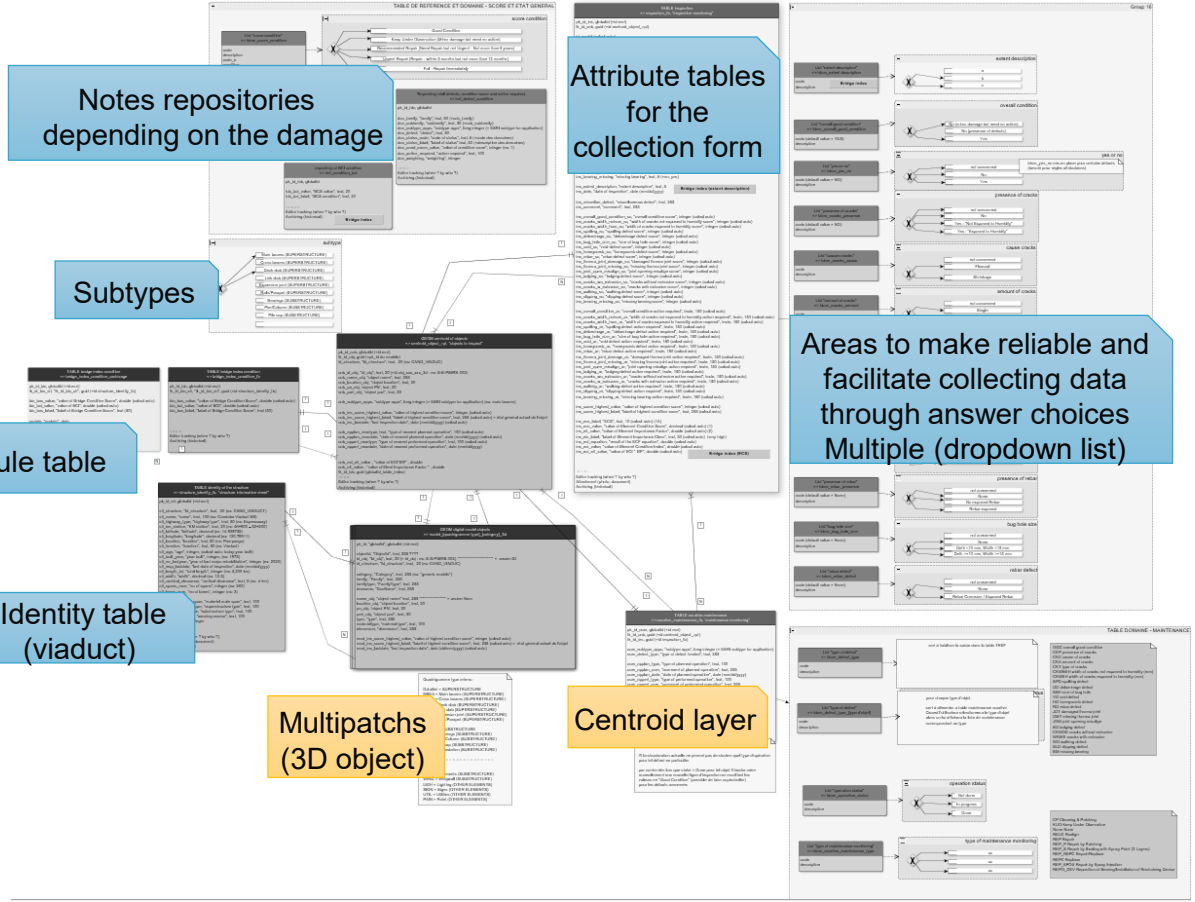
Applications

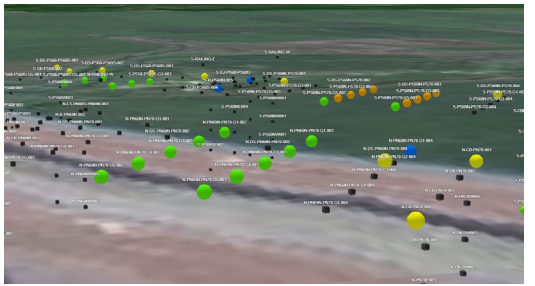
Autodesk
Construction
Cloud

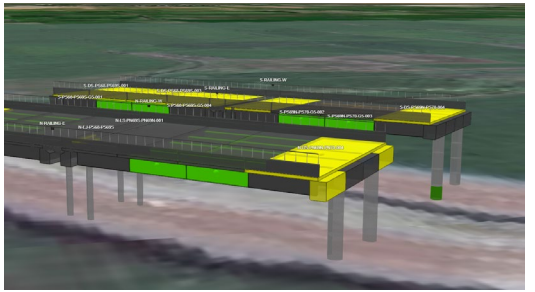




Global Conceptual Model



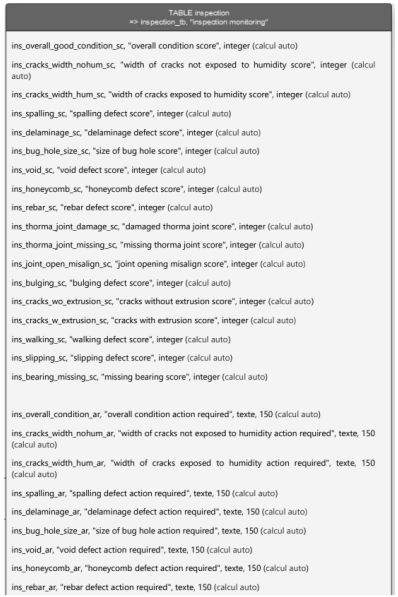




Automation (script)
Using ARCADE expressions

- We used arcade (private language) expressions in attribute rules for all the automatic calculations we had to do in the database fields *(example: structure degradation note).*

- For the following two cases:
  - Simple: Field values that depend on other field values in the same table
  - Complex: Field values that depend on multiple field values in different tables

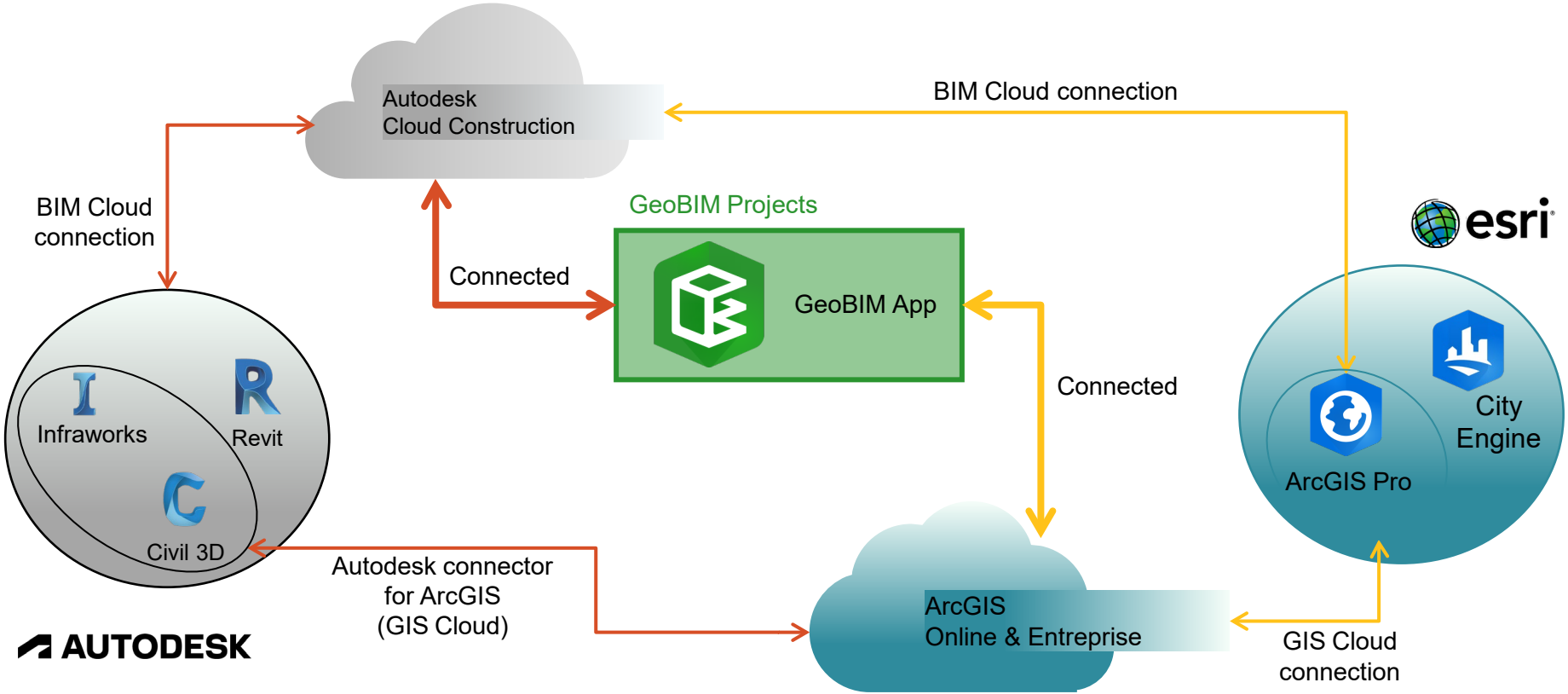


And GeoBIM in all this?

GEOBIM =

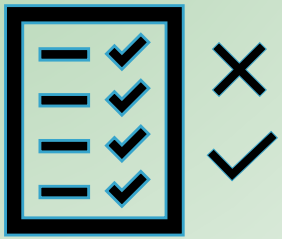

Partnering to Bring Together GIS & BIM
esri
+
AUTODESK
GIS
BIM
. . . Imagine, Plan, Design,
Build and Manage a Better World

BIM-GIS ~~without~~ GeoBIM

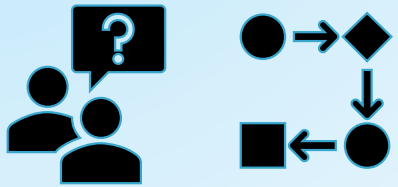


GeoBIM : Egis feedback

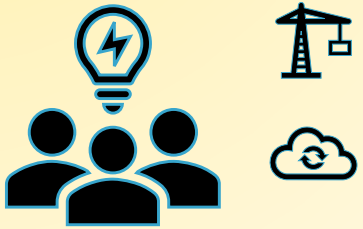
- Main ***pratical steps*** to setup GeoBIM App

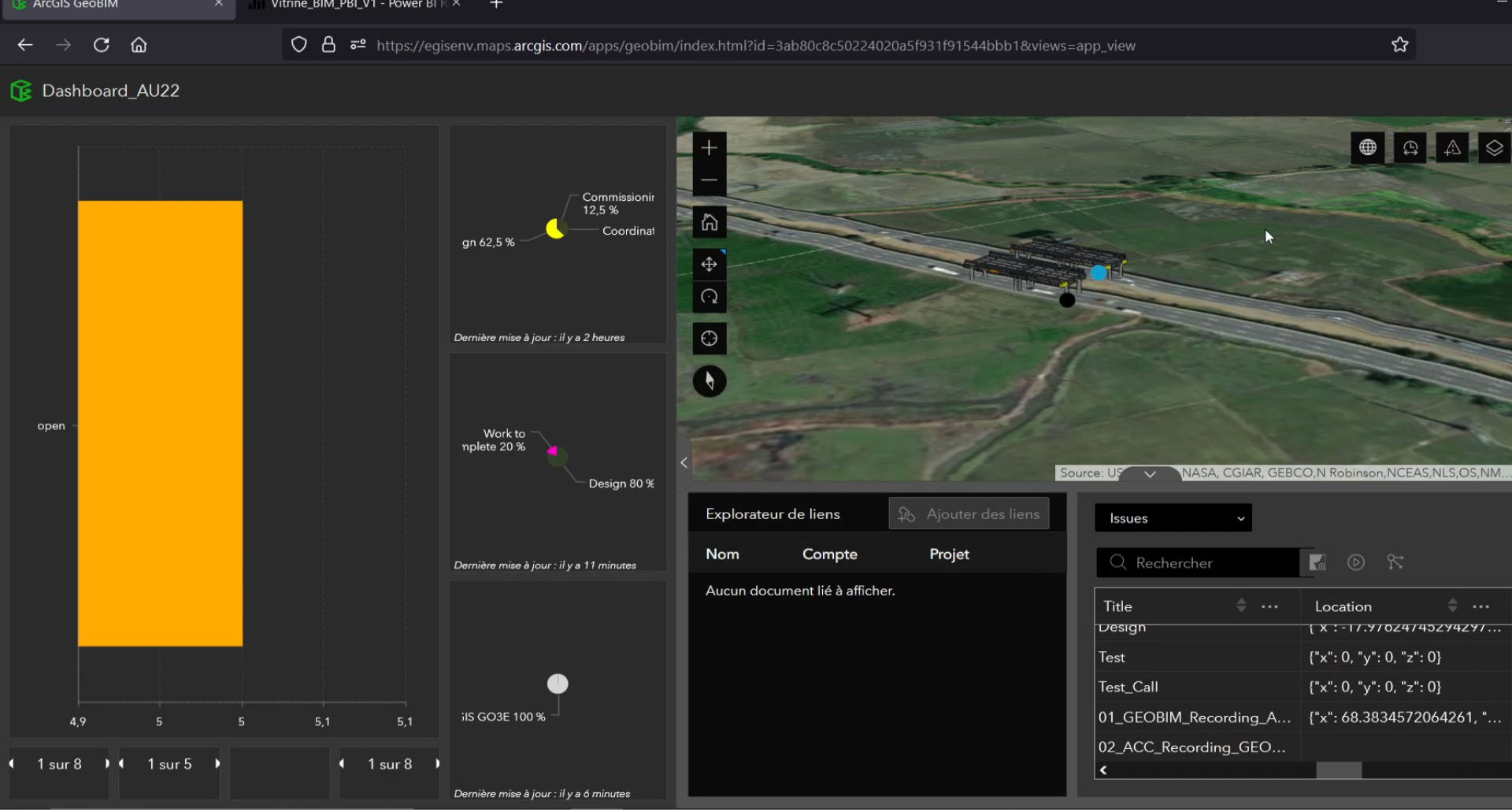


- Our ***understanding*** of GeoBIM from a user point of view



- ***Use cases*** of GeoBIM in the ***future*** for Egis ?



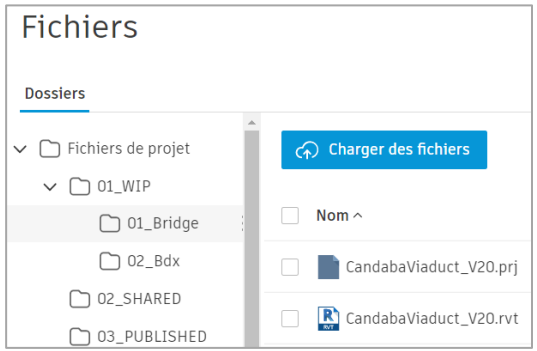

ArcGIS GeoBIM
Vitrine_BIM_PBI_V1 - Power BI
https://egisenv.maps.arcgis.com/apps/geobim/index.html?id=3ab80c8c50224020a5f931f91544bbb1&views=app_view
Dashboard_AU22
open
4,9
5
5
5,1
5,1
1 sur 8
1 sur 5
1 sur 8
Commissionir
12,5 %
Coordinat
gn 62,5 %
Dernière mise à jour : il y a 2 heures
Work to
nplete 20 %
Design 80 %
Dernière mise à jour : il y a 11 minutes
IS GO3E 100 %
Dernière mise à jour : il y a 6 minutes
Source: US
NASA, CGIAR, GEBCO,N Robinson,NCEAS,NLS,OS,NM...
Explorateur de liens
Ajouter des liens
Nom
Compte
Projet
Aucun document lié à afficher.
Issues
Rechercher
Title
Location
Design
Test
{"x": 0, "y": 0, "z": 0}
Test_Call
{"x": 0, "y": 0, "z": 0}
01_GEOBIM_Recording_A...
{"x": 68.3834572064261, "...
02_ACC_Recording_GEO...

GEOBIM process

Prerequisite

AUTODESK

- Access to Autodesk Construction Cloud / BIM360
- Files stored in an accessible folder
  - 3D model
  - Images
  - PDF



- Optional : a list of issues on ACC

esri

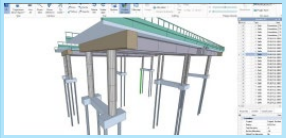
- Access to ARCGIS PRO (licence + user account)
- Access to ARCGIS ONLINE (licence user)
- Access to GEOBIM App

NOTA : it doesn't need to be the same person that has access to all these platforms

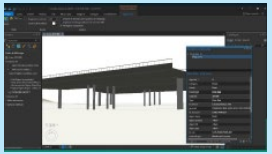
GIS expert can share his web scene from ArcGIS PRO to the BIM Manager

GEOBIM process

ARCGIS PRO - WEBSCENE



Revit



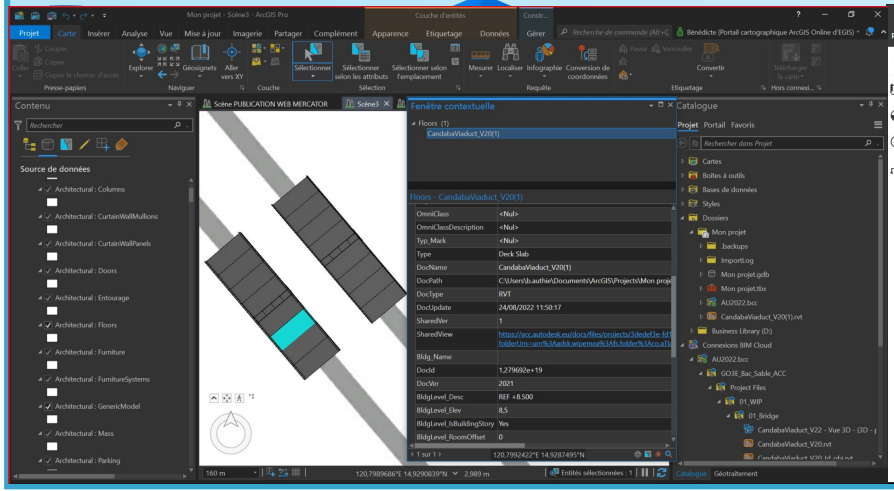
ArcGIS PRO

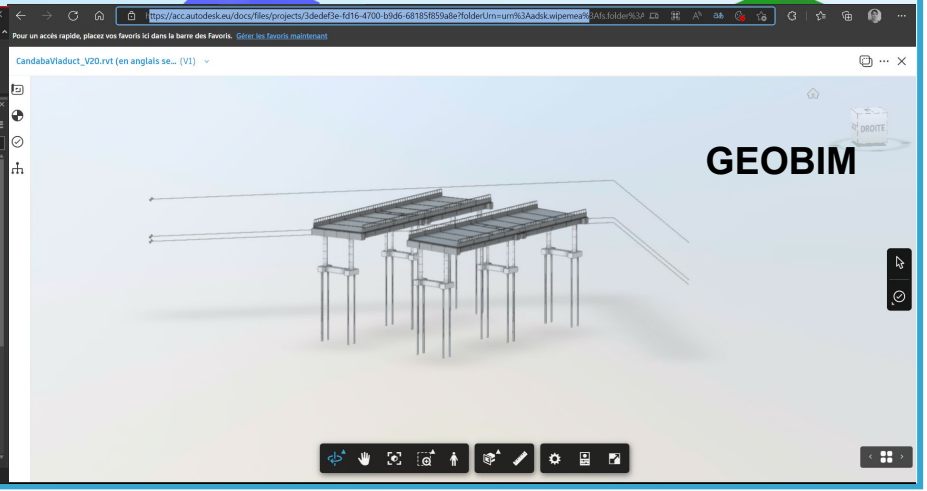
.SLPK

Webservice

Scene Layer

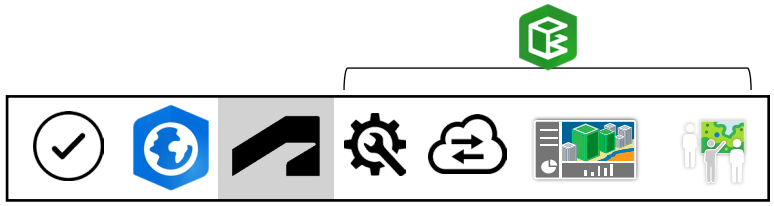
3d object





GEOBIM process

Getting the 3D model ready

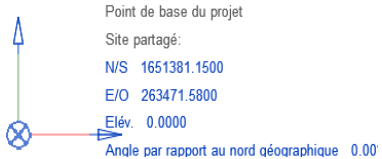


AUTODESK

- Georeferencing the Revit model → esri THE SCIENCE OF WHERE

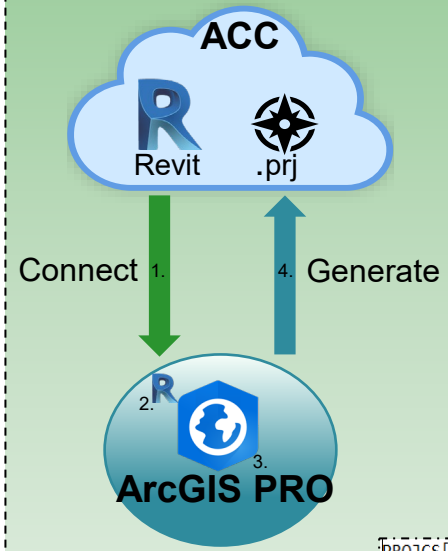
Various methods :

- *Revit project location*
- *Civil 3D shared coordinates*
- ★ ***ArcGIS PRO .prj file***



Nota *: GEOBIM guides recommend to keep Revit's survey and project points close to each other (GEOBIM documentation)*

The method we used :

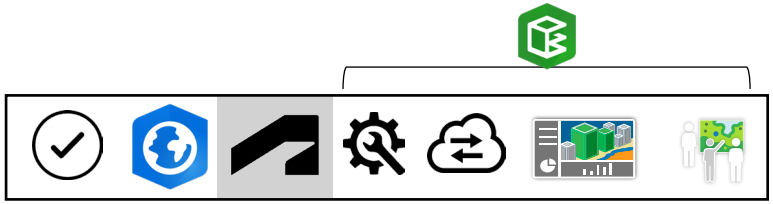


1. **Connect** ACC to ArcGIS PRO
2. **Import** RVT model from ACC to ArcGIS PRO
3. **Set** the spatial reference in ArcGIS PRO
4. **Generate** .prj file, stored in ACC

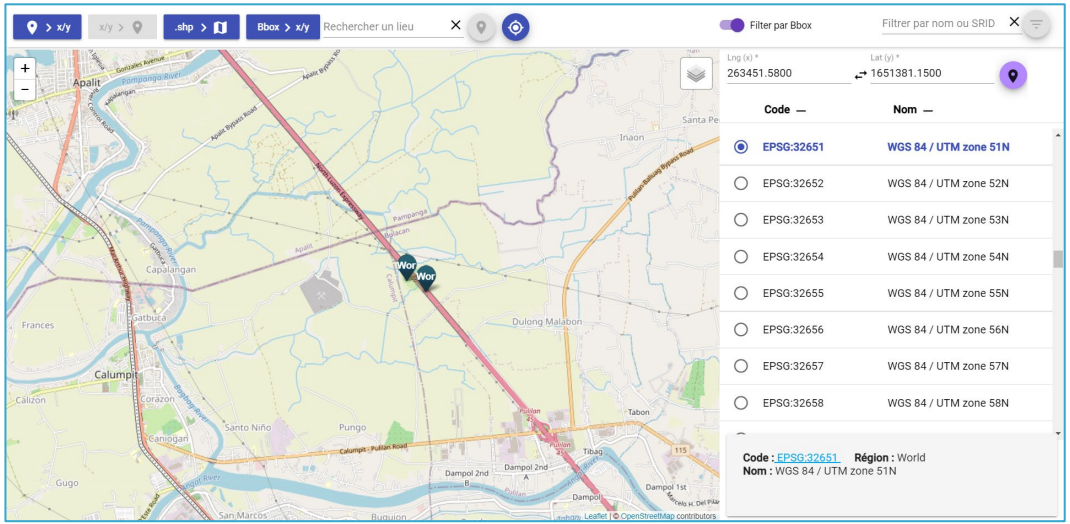
Extract from the .prj file :

```
PROJCS["WGS_1984_UTM_Zone_51N",GEOGCS["GCS_WGS_1984",DATUM
["D_WGS_1984",SPHEROID["WGS_1984",6378137.0,298.257223563]]
["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJEC
```

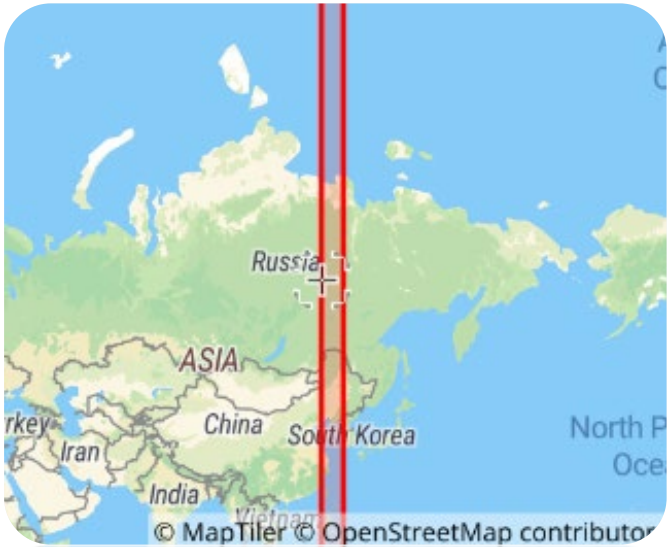
Focus on georeferencing



Revit project and survey points used to find the WGS 84 / UTM Zone 51N to set the prj file



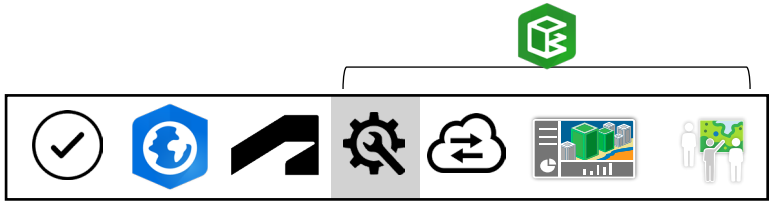
https://app.dogeo.fr/Projection/#/point-to-coords



Nota** : You can have a .PRJ file for all the Revit models in your ACC folder by naming it : **esri_cad.prj

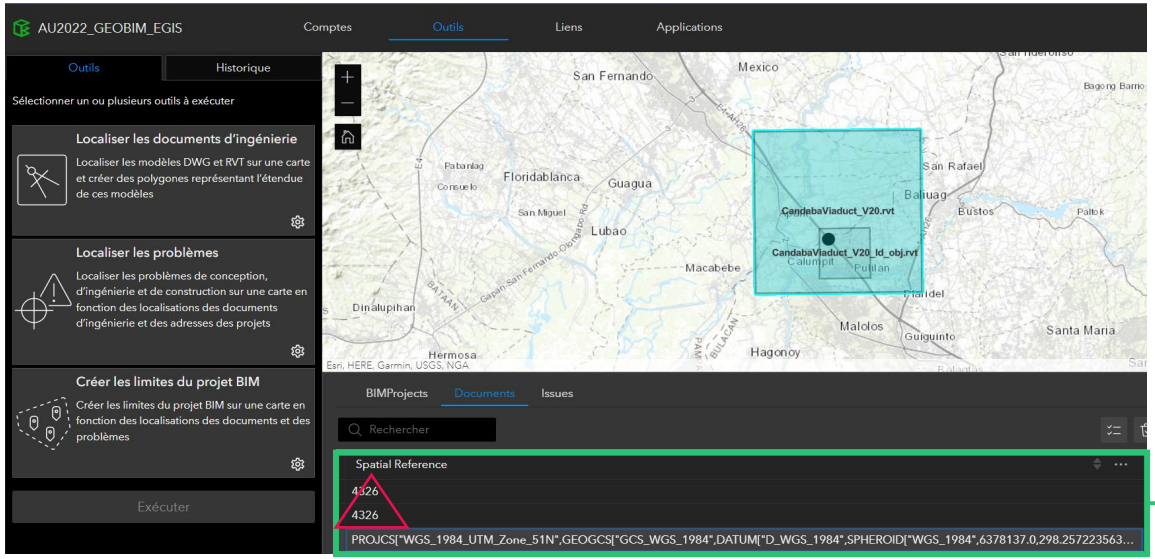
GeoBIM

GeoBIM tools



- **Account** : Link to Autodesk Construction Cloud account and access to projects and folders

- **Tools** : Synchronize projects and issues from ACC to GEOBIM
  - This step is key to visualize and check if a project is correctly georeferenced



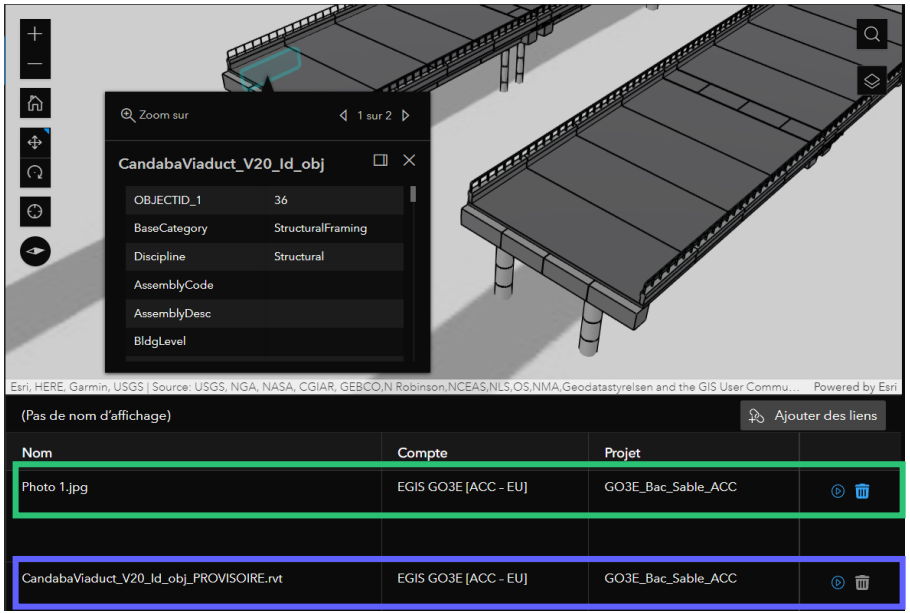
- *Spatial Reference column identifies the .prj and its spatial system (WGS 1984 UTM ZONE 51N here)*

- *It will locate the project and create limits that can be modified*

GeoBIM

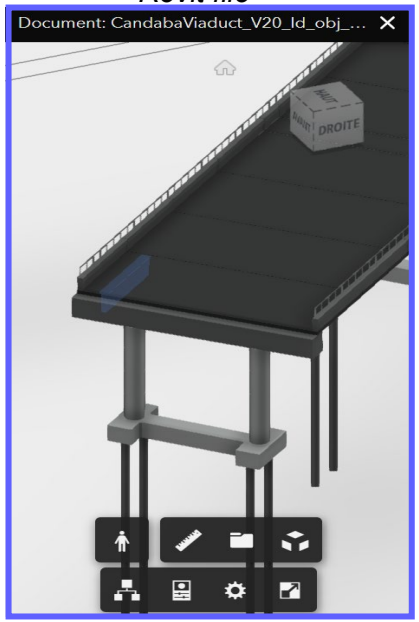
GeoBIM manual links

- **Links** : Links an ArcGIS Web Scene to an Autodesk Construction Cloud project/image/files
  - *It's possible to **manually link** an element from your scene to multiples files from your ACC folder (link to a Revit model, an image, a document etc)*



Image

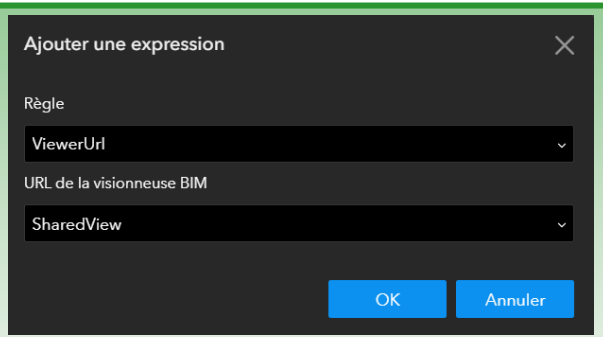
Revit file



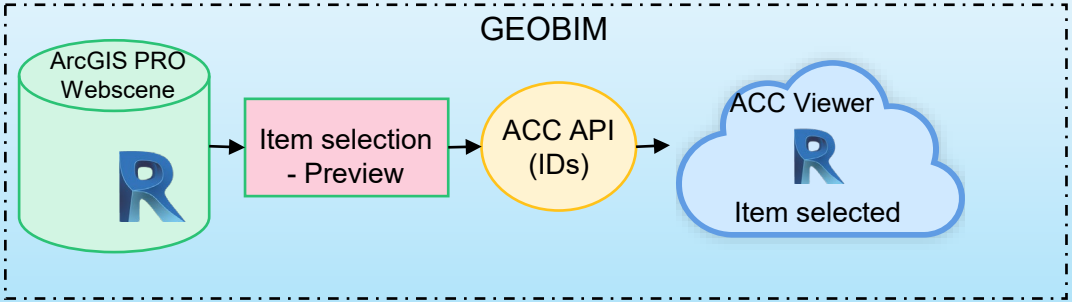
GeoBIM

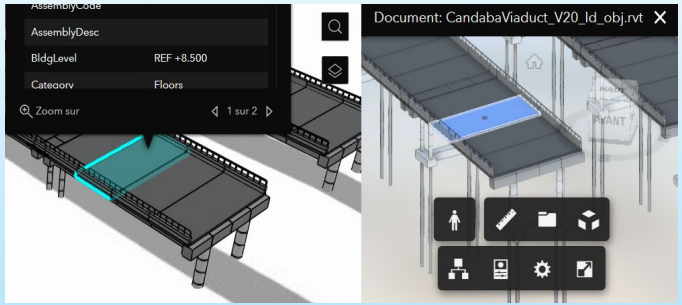
GeoBIM automatic links

- **Links rules :** during the web scene creation in ArcGIS PRO, a shared view URL parameter has been created (ACC file URL)
  - *This **parameter** can be used to create a **rule** to **automatically** link **all elements** in the webscene model to your ACC model :*



***GeoBIM** is also using **ACC API** to **link** webscene element to RVT file element :*

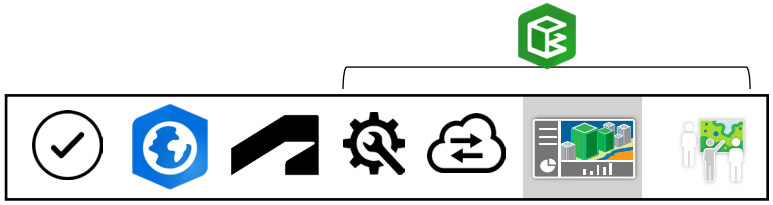




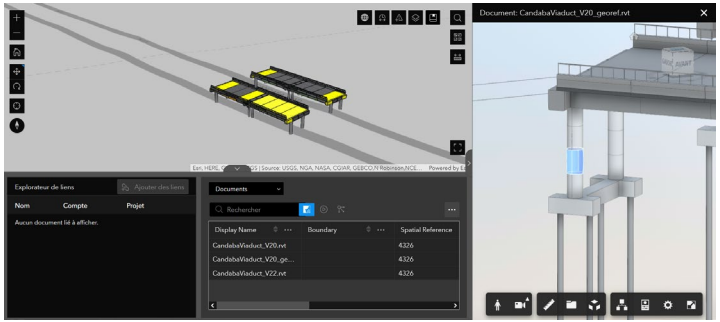
Webscene → **ACC viewer**

GeoBIM

Apps creation

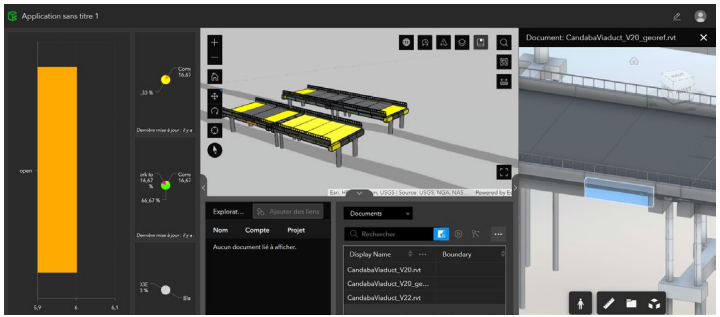


- **Viewer :** This viewer combine ArcGIS PRO webscene viewer and ACC viewer on the same page :



- Provides different levels of information
  - ArcGIS Viewer for the geographical and webscene layers data
  - ACC viewer for the details, 2D view, element's parameters

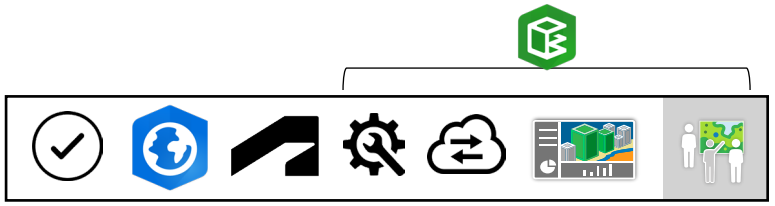
- **Dashboard :** This dashboard is « issues » oriented and provide useful indicators about your newly created issues, or ACC synchronised one :



- *Dashboards are not fully customizable*
  - *they showcase only issues*
  - *you cant access other parameters at the moment (materials, etc)*
  - *Works with issues from ACC and ArcGIS*

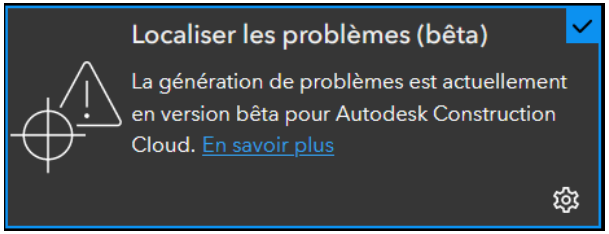
GeoBIM

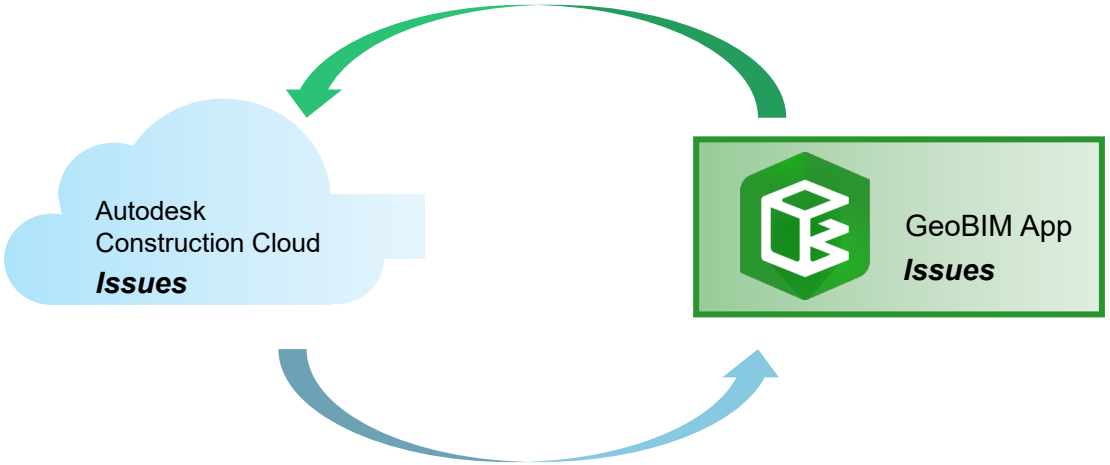
Apps creation – focus on Issues



- **Issues :** an efficient way to collaborate between platforms
  - issues from ACC can be synchronized in ArcGIS Webscene
  - Issues created in ArcGIS Webscene can be synchronized in ACC

This process can be used as question/answer sheets at the moment





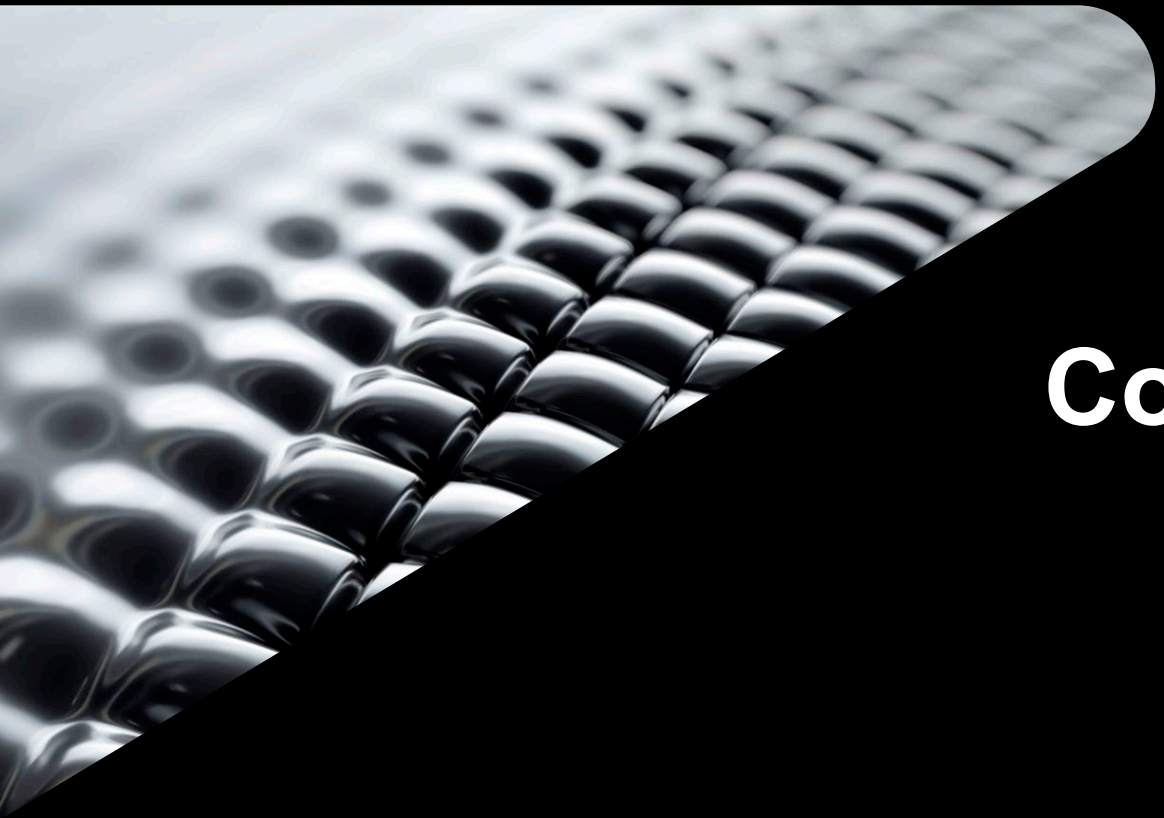
Issues localization is still in beta mode :

- We've experienced some troubles to localize issues from ACC in GeoBIM (local coordinate in ACC, global in Webscene)
- When synchronizing issues from ACC, they tend to appear far away from their origin point

➢ ***This problem is a top priority for GeoBIM's dev team and is currently looked into***

GEOBIM platform summary

- **Platform** is **easy to implement** for BIM Manager
- **Requires** a **GIS Expert** to set an interesting webscene with insightful data
- **Automatic link** rules and easy access to ACC folders
- Dashboards are not customizable at the moment
- Great **collaboration** tool with issues **synchronization** between platforms
- Still needs some improvement with the **localization** of synchronized issues (beta - early version)



Conclusion and perspective

Conclusion

Harnessing the Power of Platform through BIM and GIS

- **First version of GeoBIM** – already looks really promising and usable (some minor adjustments are looked into by the dev team)
- **User friendly** and relatively **easy** to configure

The future

- An even stronger **relationship** between **BIM** and **GIS**, using both of their strength
- We hope in the long term to have **more tools integrated** in GeoBIM : fully integrated and customizable dashboard, more tools

how can we monitor and manage

all our data

related to the structural pathologies of the structure

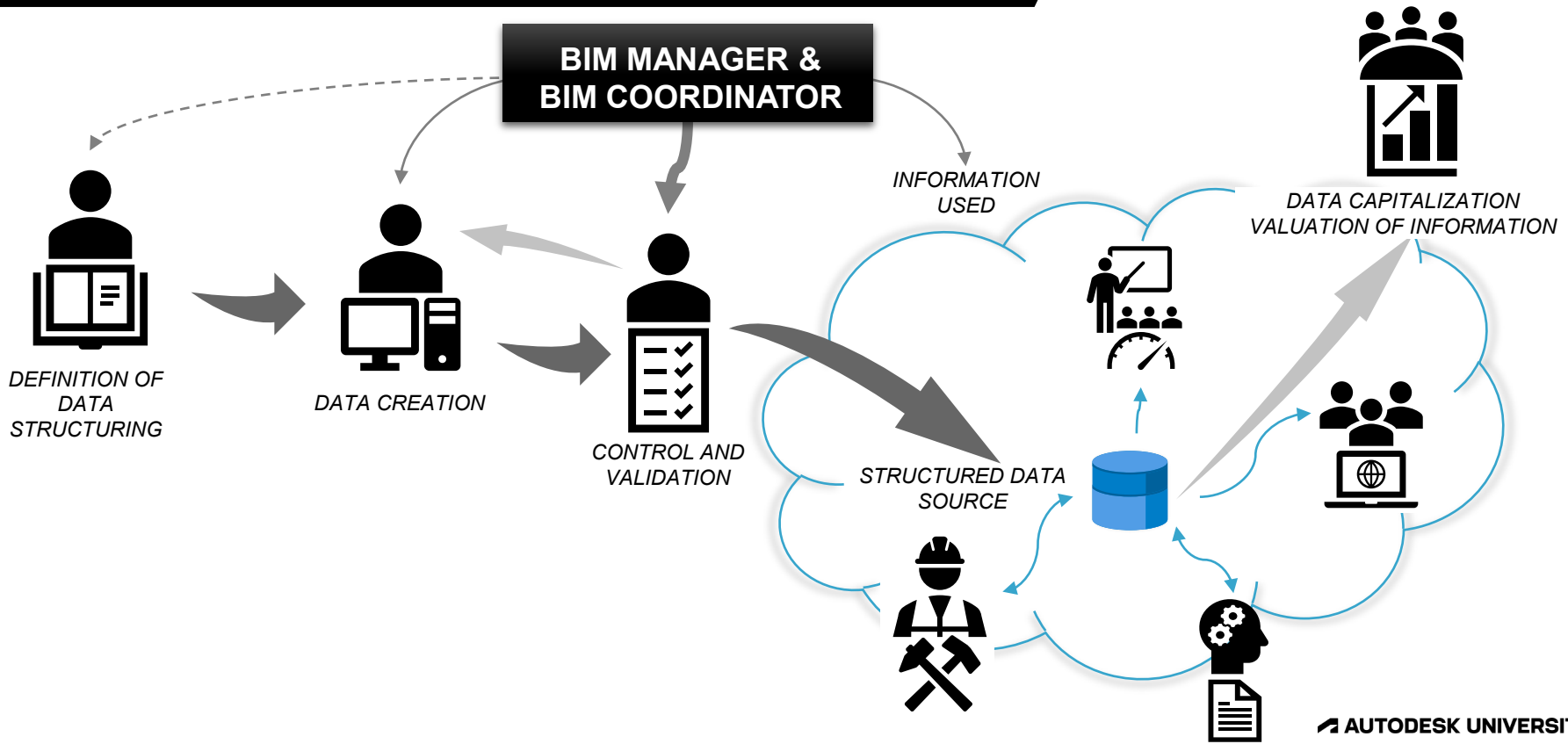
in a unique system

shareable and secure system

with the possibility of regular updates by the teams and on which we can carry out detailed analyzes

Keys to making sense of data

The essentials



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