
egis
Pushing Infrastructures assessment with digital twins
with digital twins next level
IMAGINE
CREATE
ACHIEVE
a sustainable future

egis

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Civil engineer and developer

- French
- 9 years of experience in road infrastructures projects
- 3 years of experience in development

- Joined Egis Group in 2013
- Worked in major infrastructures projects in France
- Creation and maintenance of in-house software and plugins

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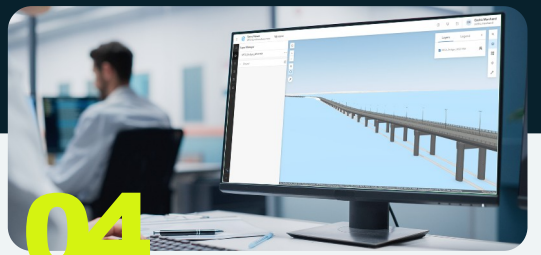
Agenda

01 About Egis

02 The project

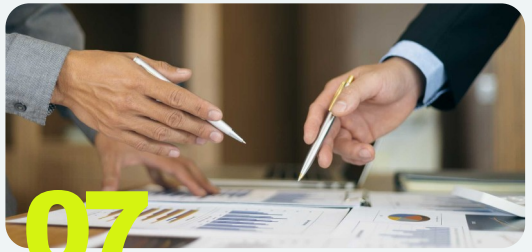
03 Create the 3D Model



04 Import into ArcGIS

05 Structure the data

06 Share the digital twin on a web platform



07 Our feedback on the process

About

Egis

01

egis

€2.2 bn
Revenue 2024

22,000
employees worldwide

+100 countries represented

Shared capital

40%
Tikehau Capital

34%
Caisse des Dépôts

26%
Partners, Executives, and employees

A global offer

- Architecture
- Consulting
- Programme & project management
- Engineering
- Operations & mobility services

An international leader

16th
engineering company

1st
French engineering company

7th
it the transportation sector

8th
in the building sector

ENR world ranking

The project

02

The Project

King Fahd Causeway Assessment

- 5 main bridges, 3 Flyovers and 7 Artificials embankment, 4 lanes
- This 26km crossing in the only land link between the Kingdom of Bahrain and Kingdom of Saudi
- Complete assessment of the bridge, including inspections and maintenance program

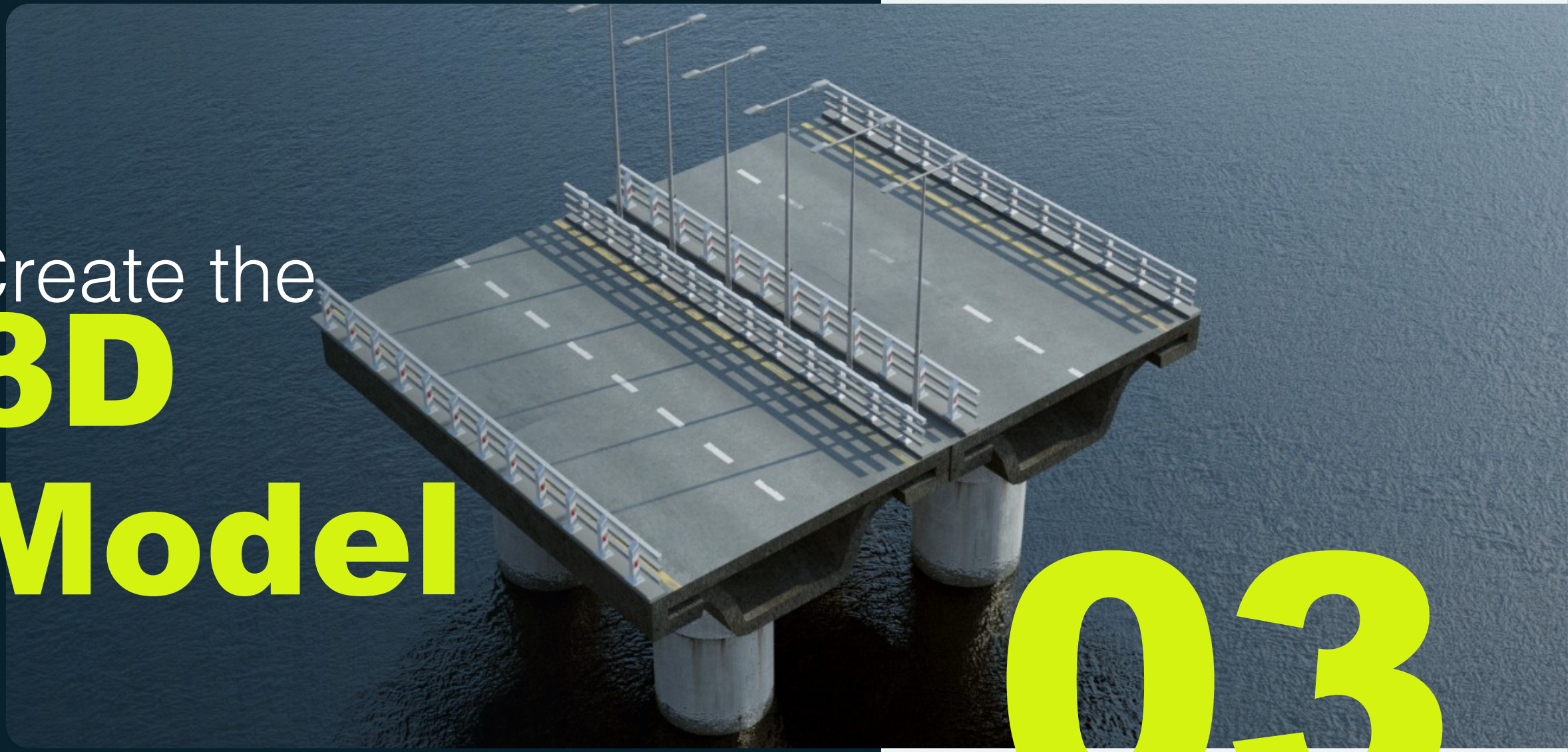
Our delivery_

A complete web platform

- Interact with the digital twin
- Usable even for non-expert
- User friendly website
- Live data, live dashboards

Create the

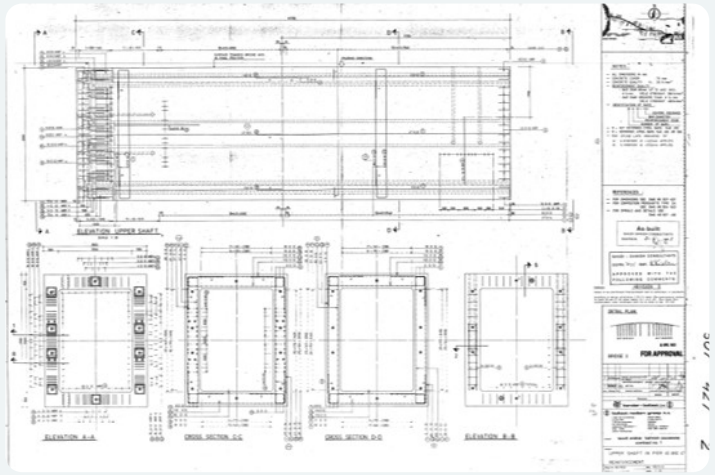
3D Model

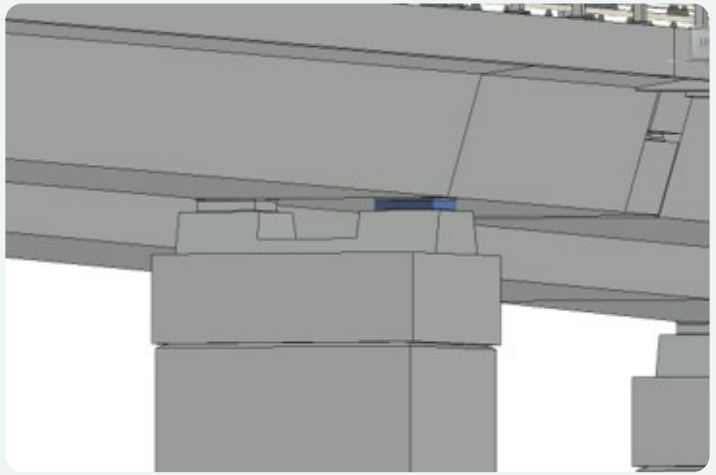


03

Created the 3D Model

Build the 3D Model_





AUTODESK CONSTRUCTION CLOUD™

AUTODESK Revit

From the as-built drawings

- Compile data
- Check history, updates

Define the level of details

- Must be relevant for the context (client, sensors)
- Find a good balance between the level of detail and the time required

Geolocalize your project

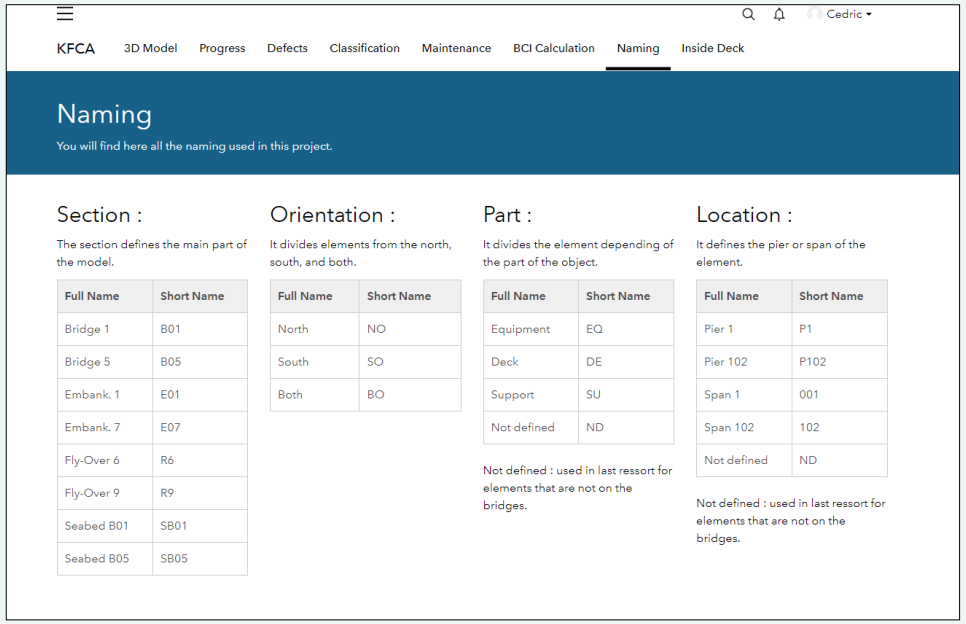
The tools we used

- Autodesk Cloud Construction for collaborative work
- Autodesk Revit

Prepare the model to become a digital twin_

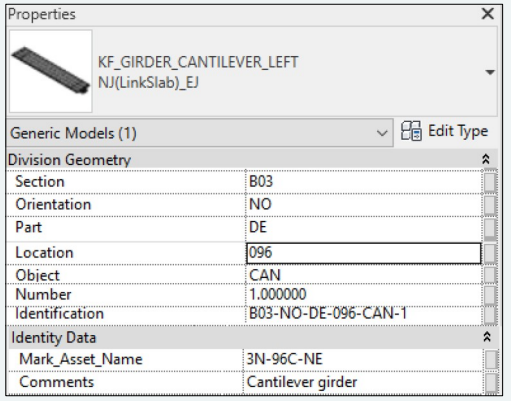
Define naming rules

- Each object must have a unique name
- Each name must be clear and precise



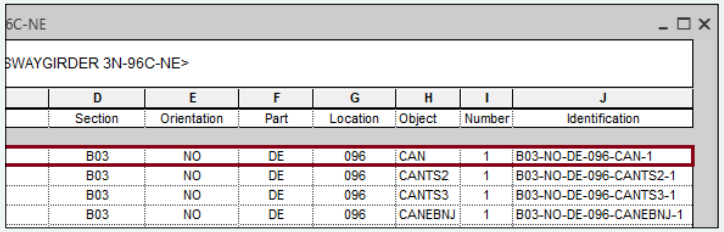
Exemple : One object on Bridge 3

- Properties of the object



Later, to be imported into ArcGis, attributes must be under Identity Data

- Use of schedules in Revit to fill in rapidly the attributes



	D	E	F	G	H	I	J
	Section	Orientation	Part	Location	Object	Number	Identification
	B03	NO	DE	096	CAN	1	B03-NO-DE-096-CAN-1
	B03	NO	DE	096	CANTS2	1	B03-NO-DE-096-CANTS2-1
	B03	NO	DE	096	CANTS3	1	B03-NO-DE-096-CANTS3-1
	B03	NO	DE	096	CANEBNJ	1	B03-NO-DE-096-CANEBNJ-1

Import into

ArcGIS

04

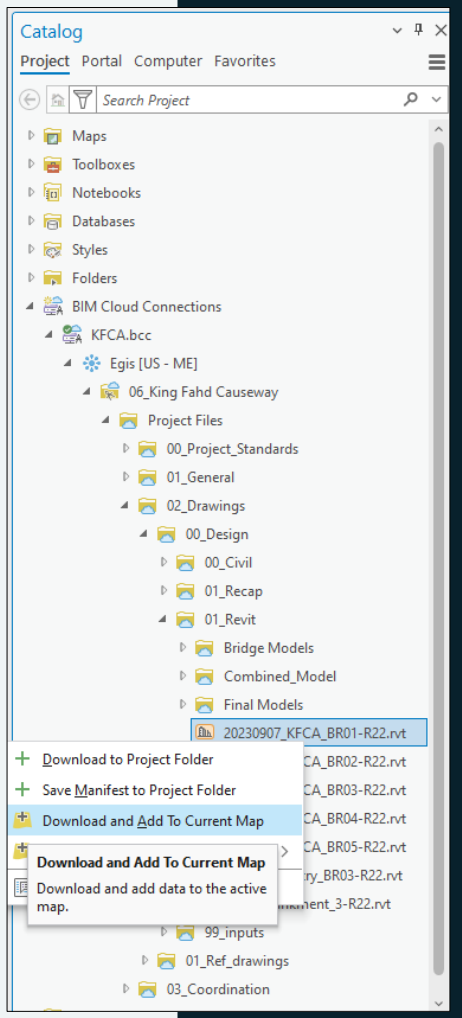
Import into ArcGIS

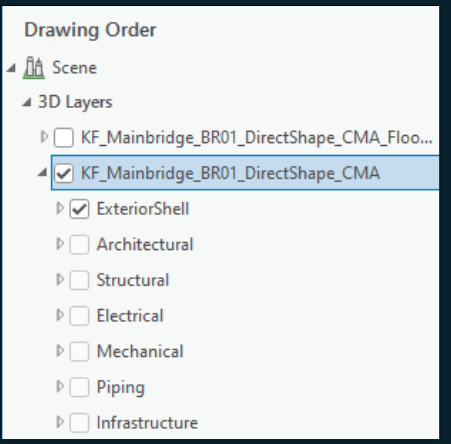
From ACC to ArcGIS_

Seemless integration

- ArcGis can directly import from ACC
- Support .PRJ files (data positioning), manage the coordinate systems of your model

The model is downloaded locally so the link is static. If your ACC Model is updated, you need to update your layer.





Import into ArcGIS

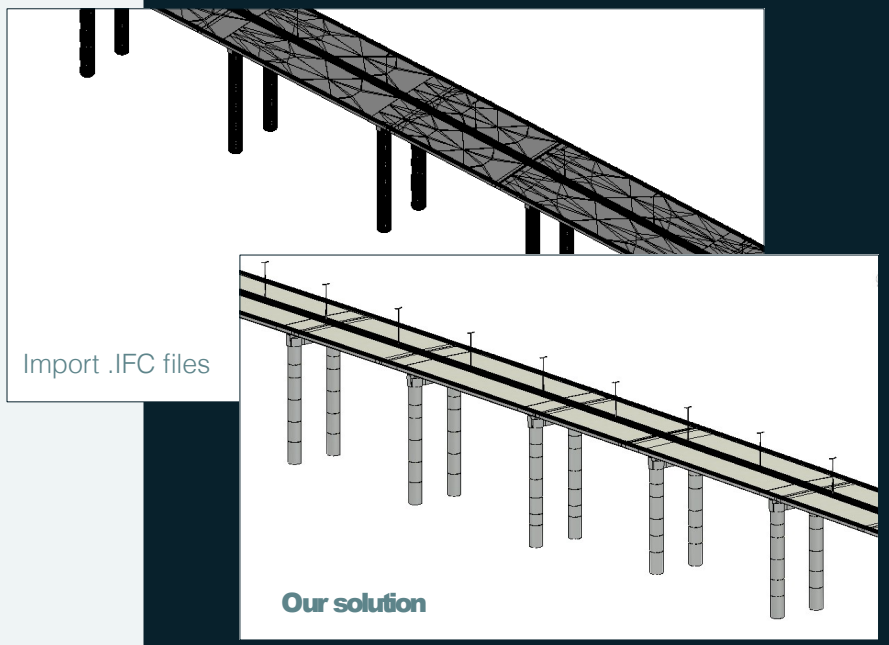
Details that matter

Nested Families

- Import the .RVT will only take the ‘main’ family -> loss of data
- Import the .IFC will divide objects in visible polygons and with default material -> loss of data

Solution

- Custom function to transform all elements in Direct Shape : all data is preserved and imported

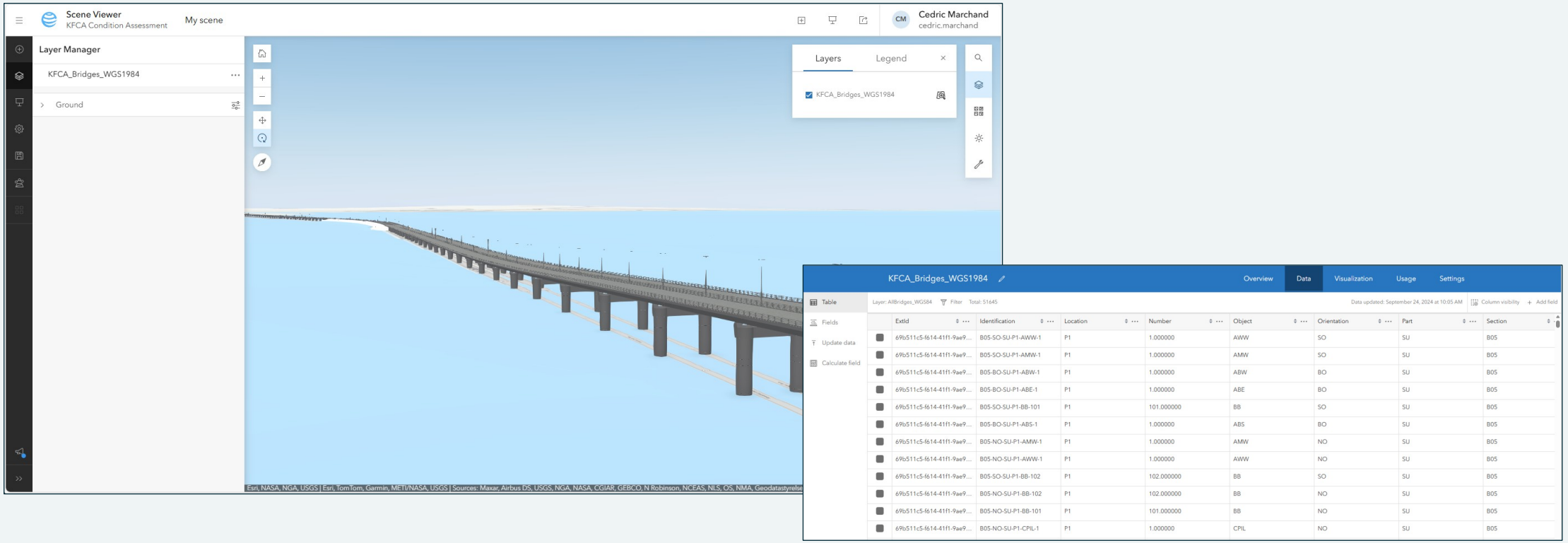


Import into ArcGIS

Export to ArcGis Online_

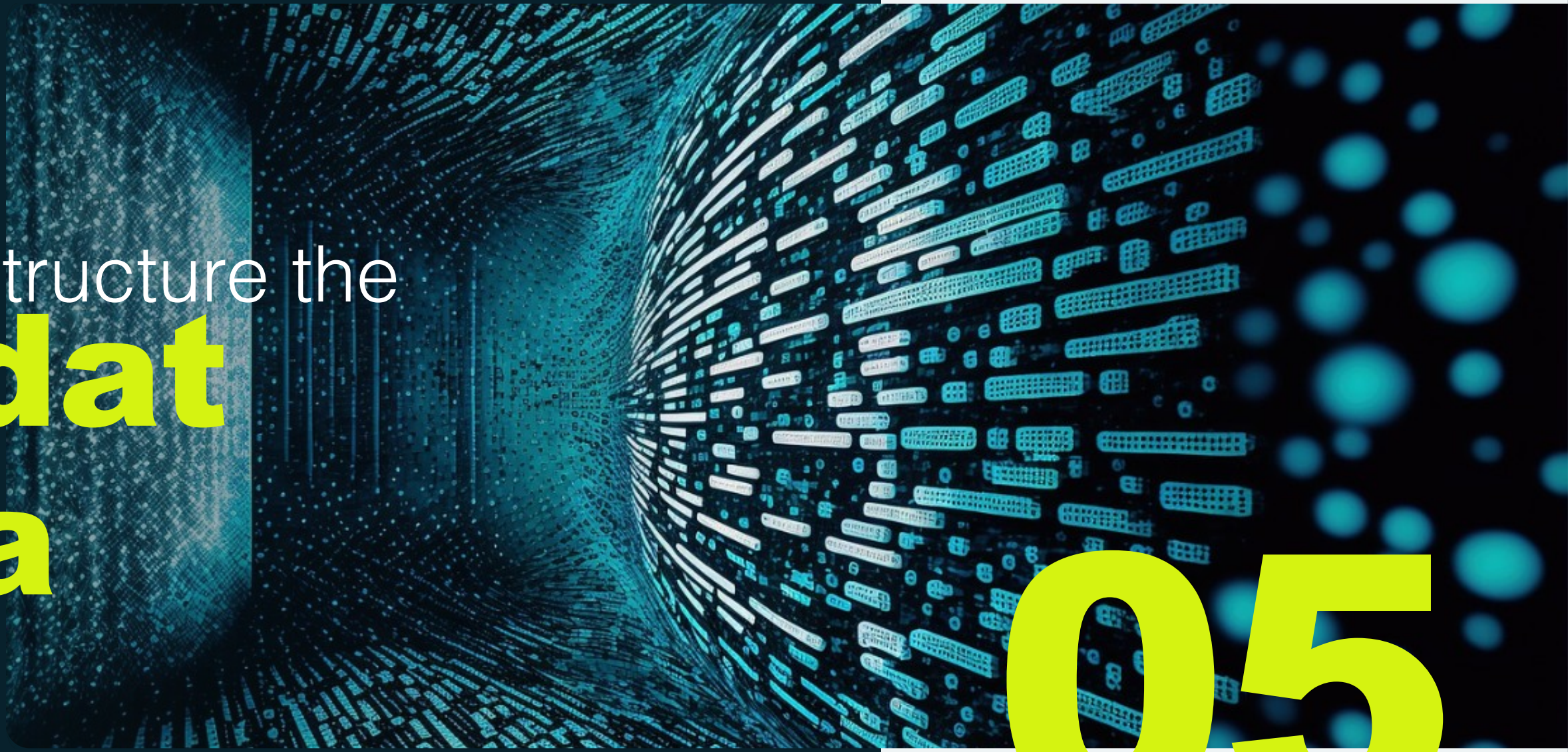
Publish your layer (web scene)

- The model is now a complete layer
- Create your relationship with other layers using the naming convention of your objects



Structure the

data



05

Structure your data

Our aim_

Our digital twin have to be a representation of the state of the bridge

- We have the 3D Model
- We need to add all the defects of the bridges
- We need to be able to update the state of those defects

Complement

- They will be campaigns to fix specific types of defect
- It will be part of a maintenance program
- We need to be able to plan and follow the progress of the campaigns

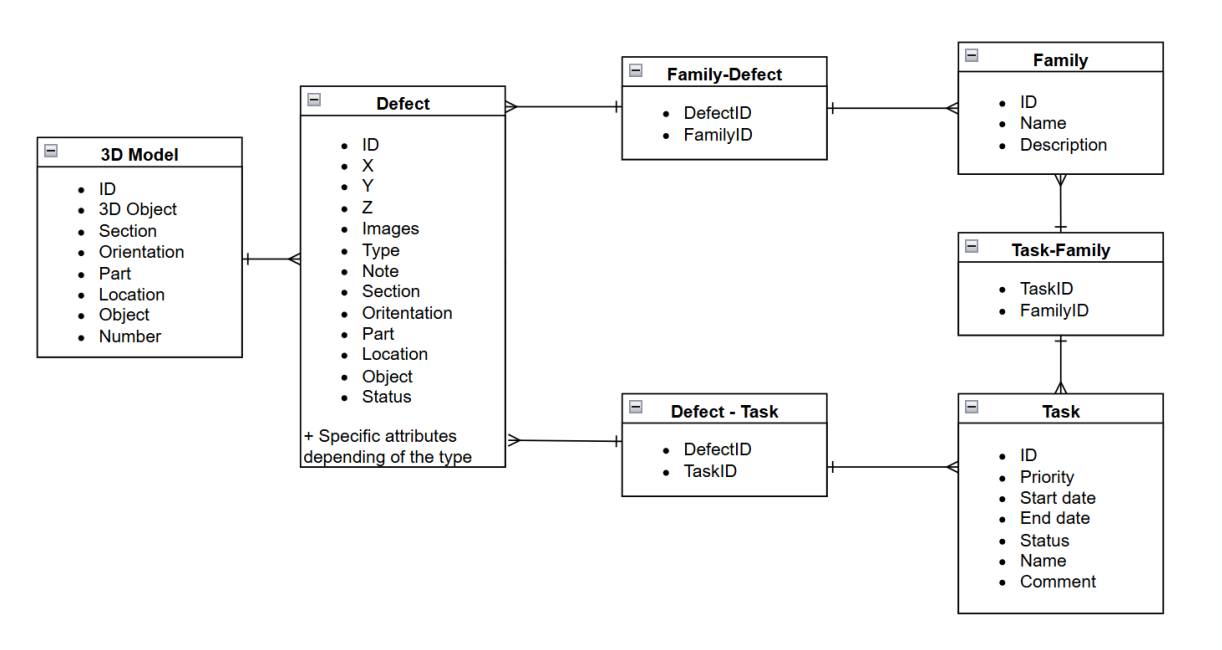
Structure your data

The structure_

Links defects to the 3D Model to create a Digital twin

- One to many relationship, using the naming rule
- Defects can have any numbers of attributes
- Defects are geolocalized

Final structure of our database



Share the
digital
on a web platform
twin

06

Digital twin on the web

ArcGIS Online ecosystem_

ArcGis Hub

- Web platform
- Can integrate all the other tools

Experience builder

- Display and interact with data
- Launch python scripts

Dashboard

- Display data

Survey 123

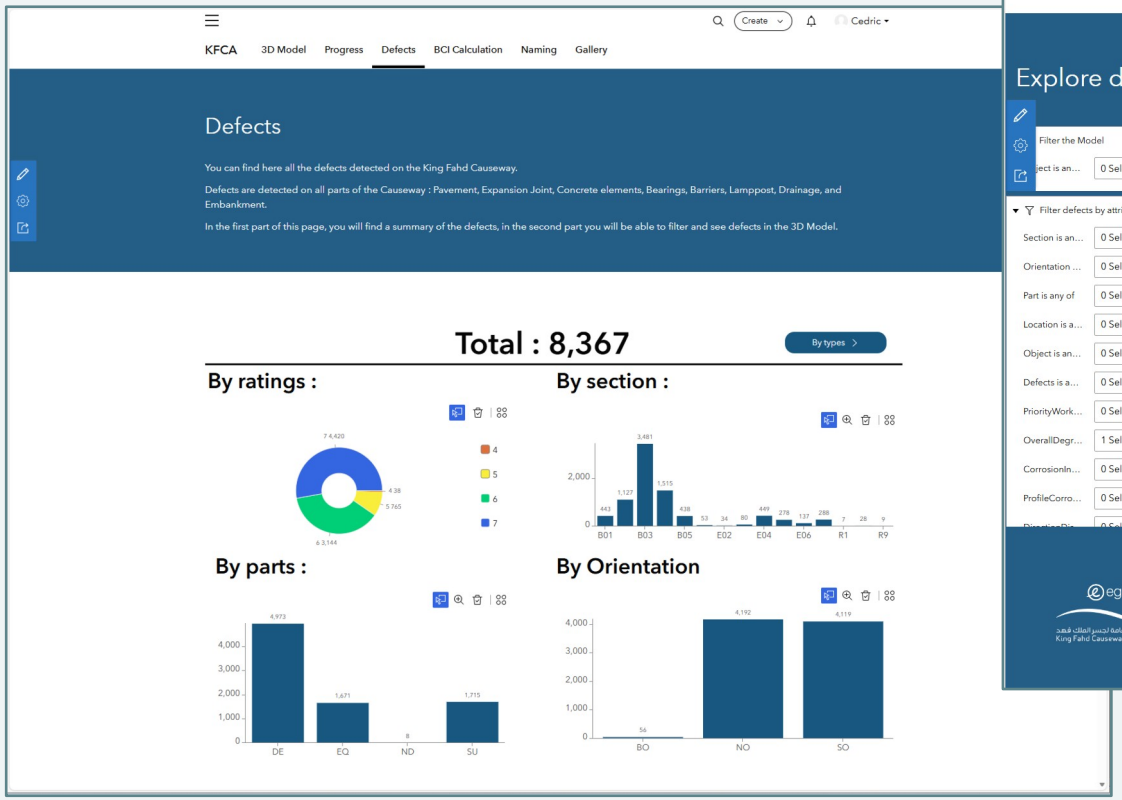
- Modify data with forms
- Available on site (tablet, android)

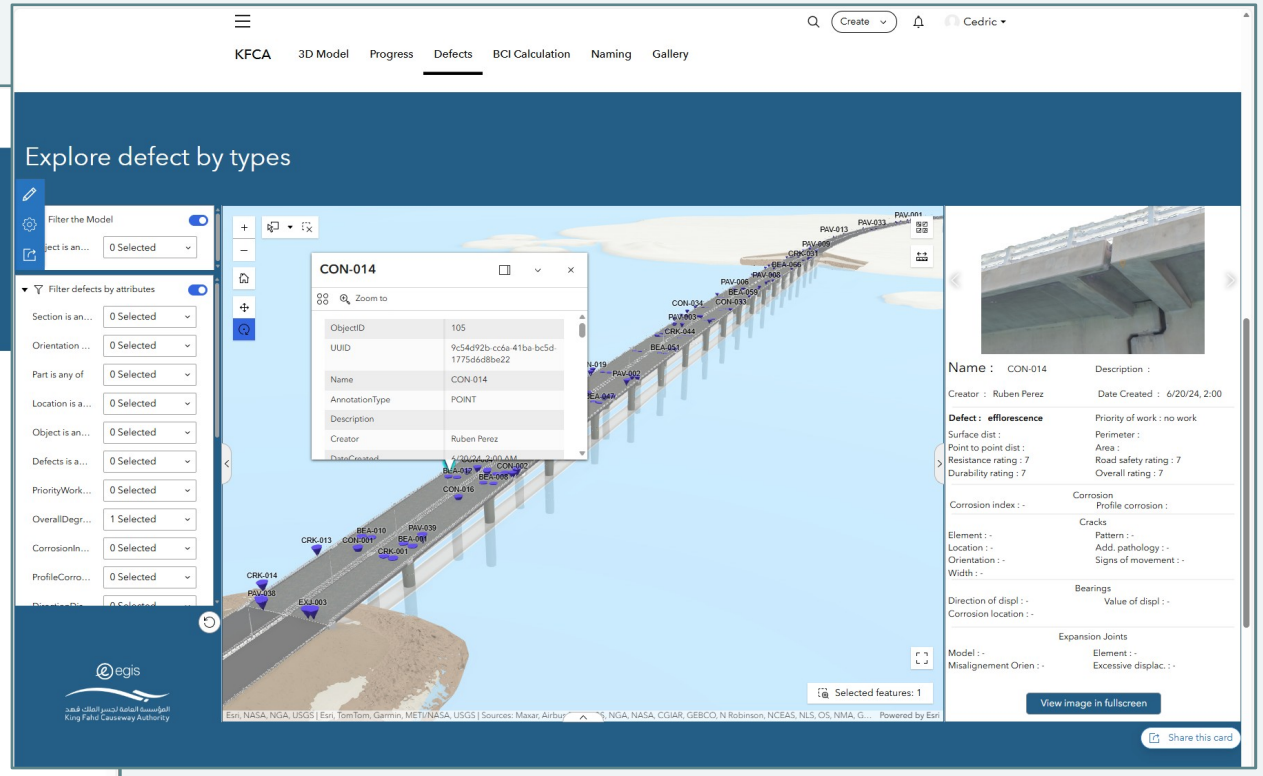
ArcPy

- ArcGis scripting module based on Python

The result_

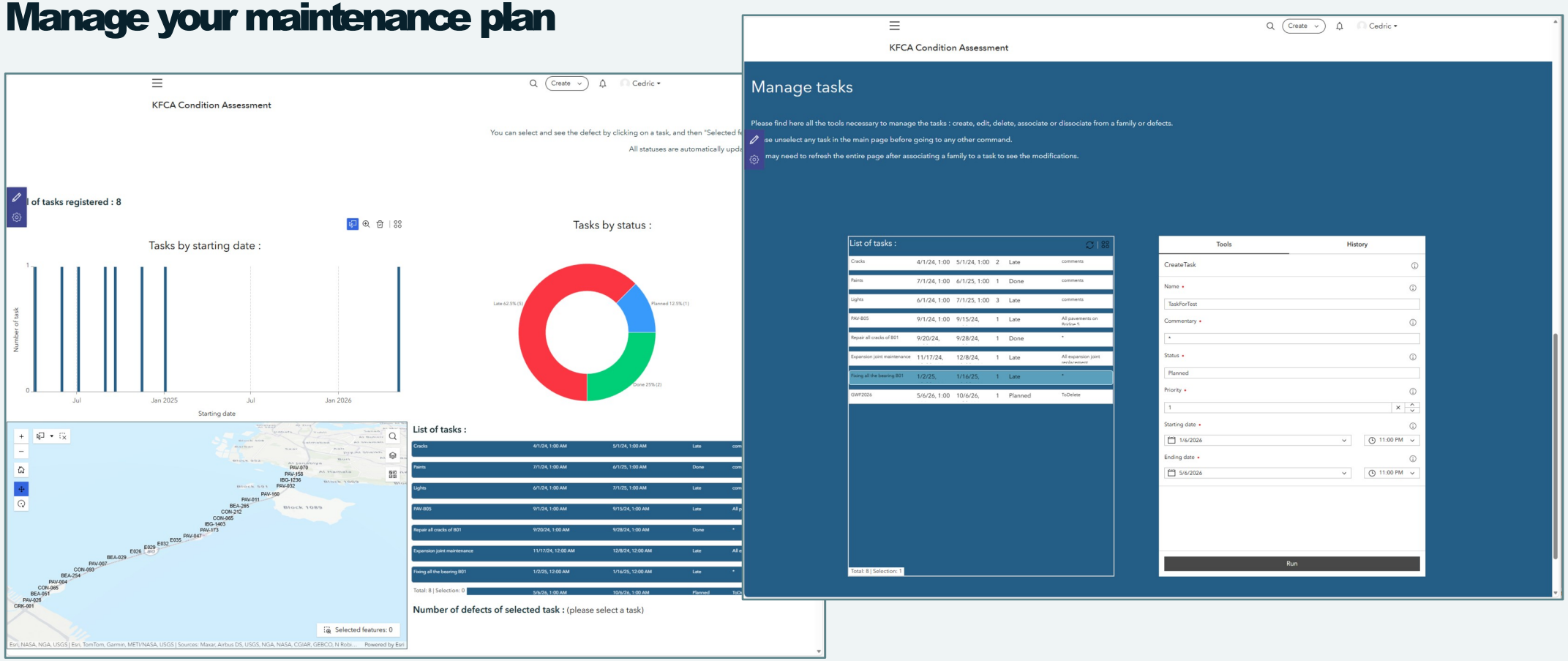
Explore all the defects into the platform





The result_

Manage your maintenance plan

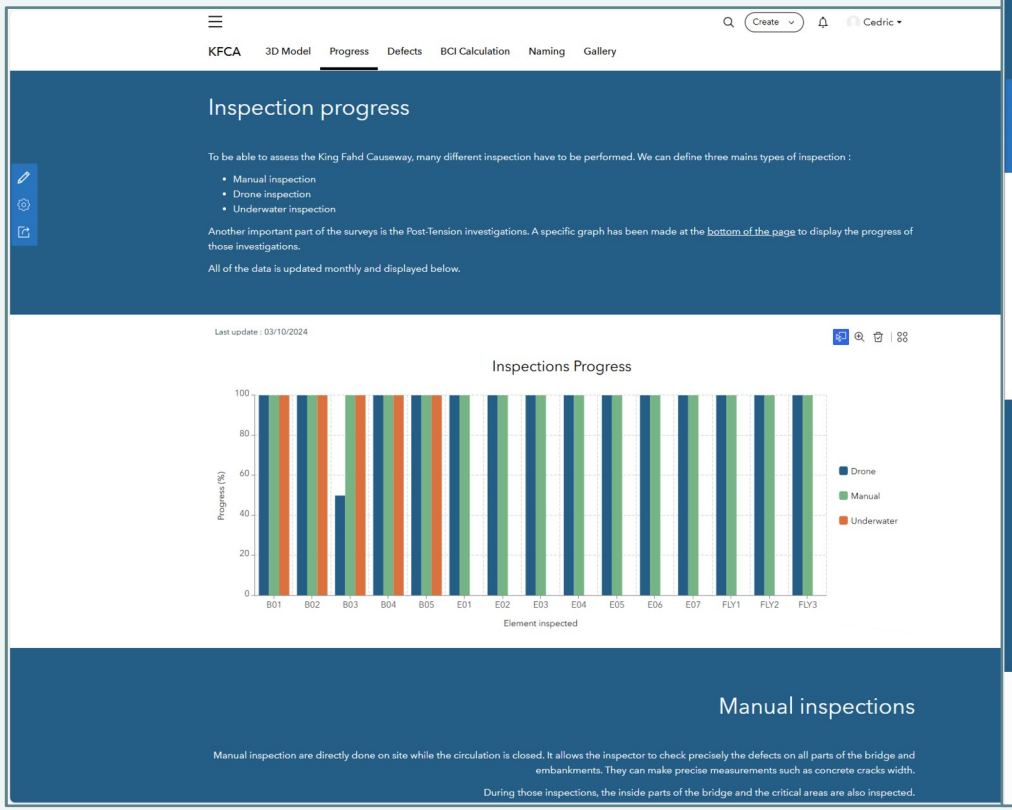


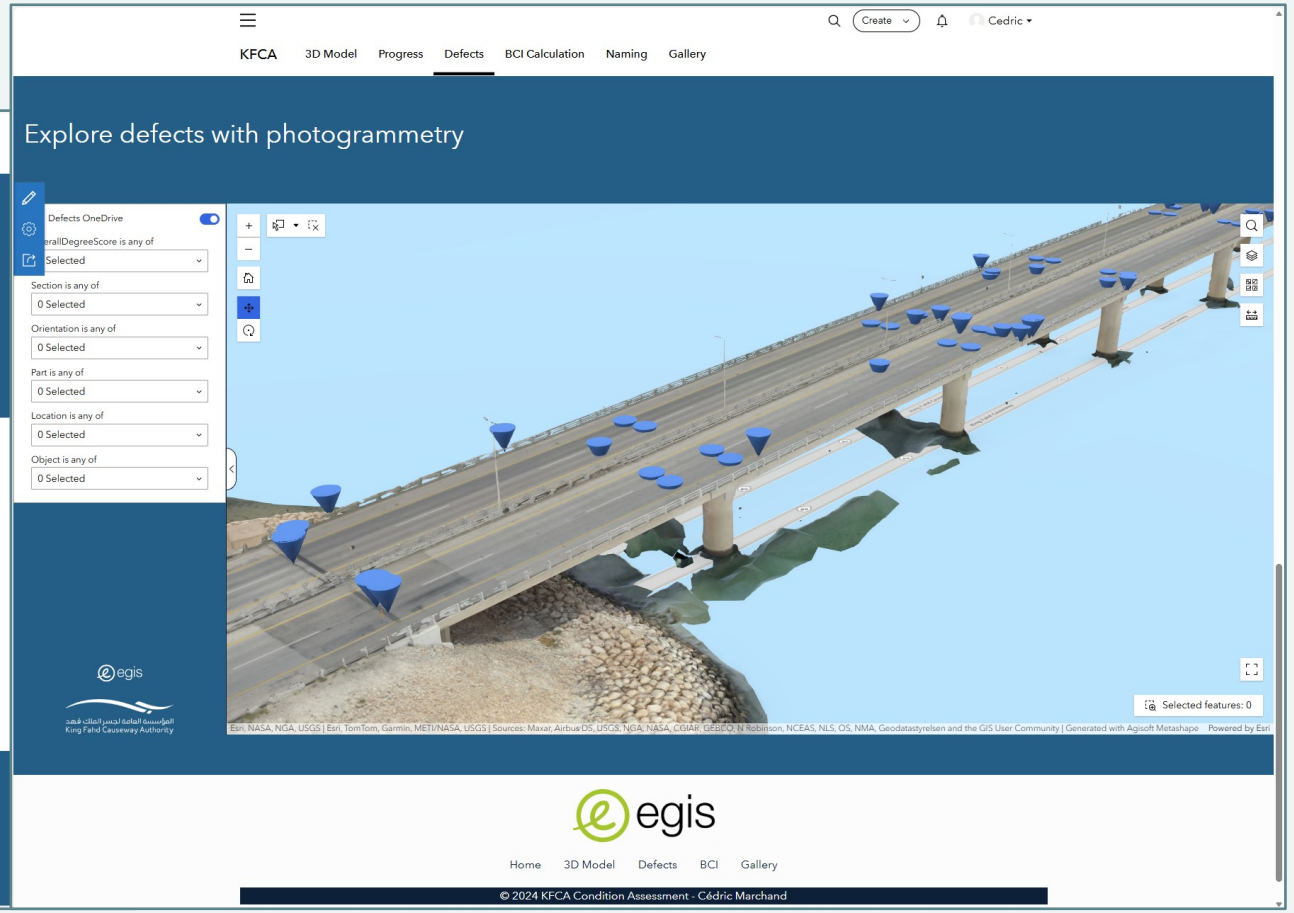
Pushing Infrastructures assessment and maintenance to the next level with digital twins

Digital twin on the web

The result_

And more (dashboard, automatic calculation, gallery, photogrammetry…)





Our feedback on the process

07

Our feedback on the process

Conclusion_

From static inspections to digital twin

- Live status of all the defects in the 3D model
- Each object can be modified using surveys on the field
- You can keep track of changes

Improve the performance of your analysis and maintenance plan

- All in one platform to analyze the defects :
  20% time gained by structural engineers
- Preview in your bridge the different maintenance task :
  30% time gained on clash analysis
- Focus your next inspections on sensible points :
  25% less on the cost of future inspection

egis

Contact

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