



LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY



Digital Deconstruction

Transnational Innovation Hub

11/05/2023

Interreg 
North-West Europe
Digital Deconstruction

European Regional Development Fund

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Concept of the platform

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Decision support system



+ Environmental criteria



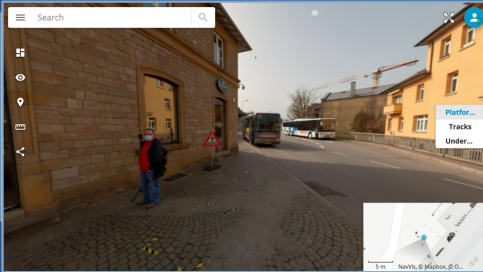
+ Economic criteria





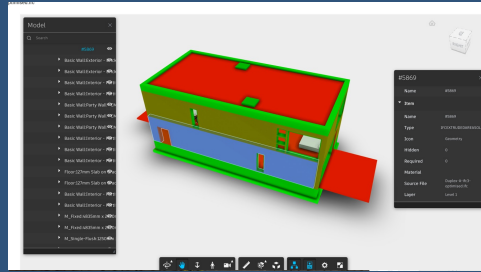
M1

3D SCAN & SCREENING



M2

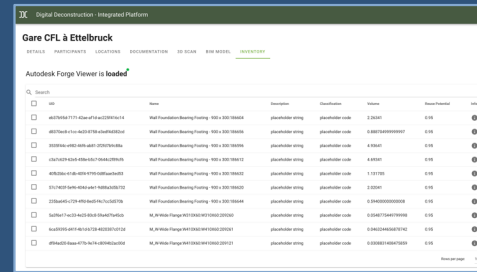
REVERSIBLE BIM



BLOCK MATERIALS

M3

MATERIALS INVENTORY



BLOCK MATERIALS

M4

MATERIAL PASSPORT /
BLOCKCHAIN



Digital Deconstruction Platform

Decision support interface for deconstruction & reuse strategies

- BIM visualization
- Economic indicators
- Material data
- Sustainable indicators
- Material passport
- Scenarios analysis

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Endusers

PUBLIC OR PRIVATE OWNER



DECONSTRUCTION EXPERT



3D SCAN EXPERT



ARCHITECT, ENGINEER
INVENTORY EXPERT

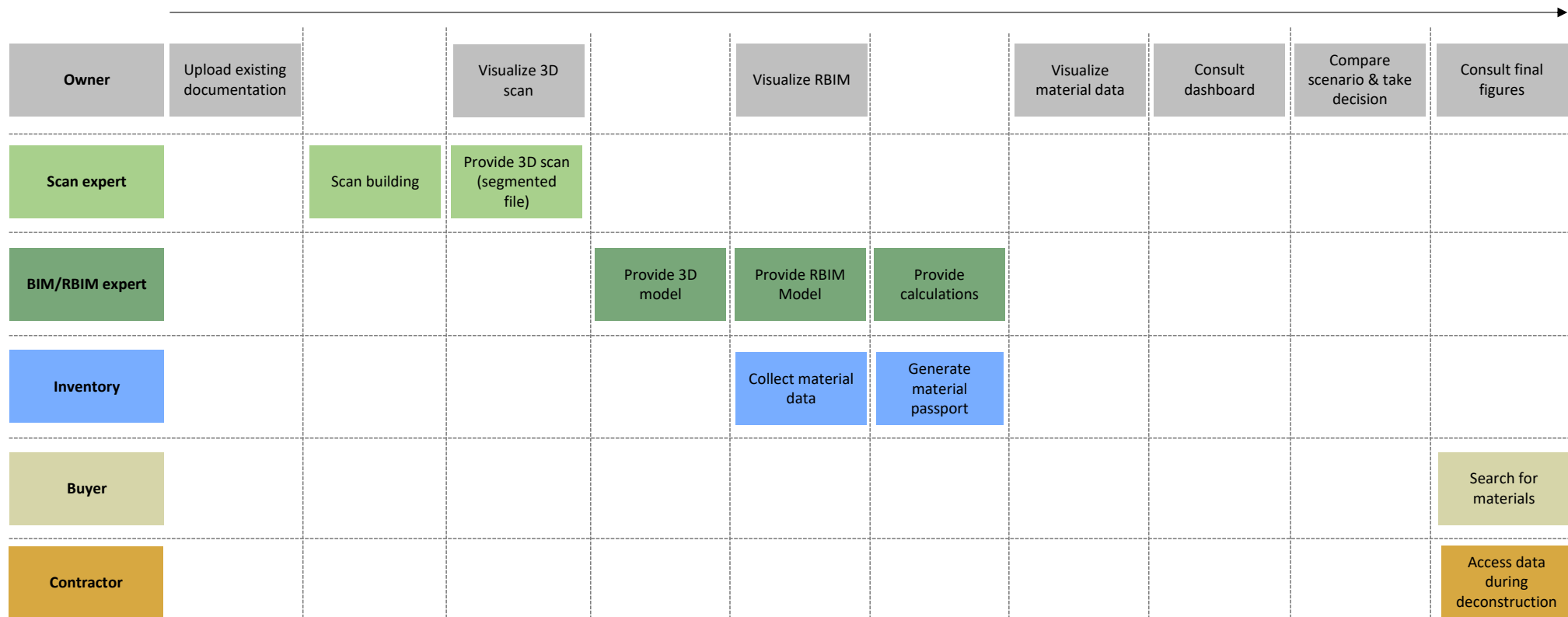


BUYERS



CONSTRUCTION FIRMS





DDC platform functionalities

Platform administration

Create a project

Add participants

Define roles

Define locations

Document management

Add document

Edit document

Download document

Delete document

3D scan

Configure 3D scan

Navigate into 3D scan

BIM

Visualize dynamic RBIM

Visualize BIM

Visualize BIM

Visualize RBIM

Navigate inside the BIM

Materials inventory

Add inventory

Filter inventory

Navigate into the BIM

Visualize / edit elements

Add element

Analysis

Visualize analysis

DDC platform functionalities

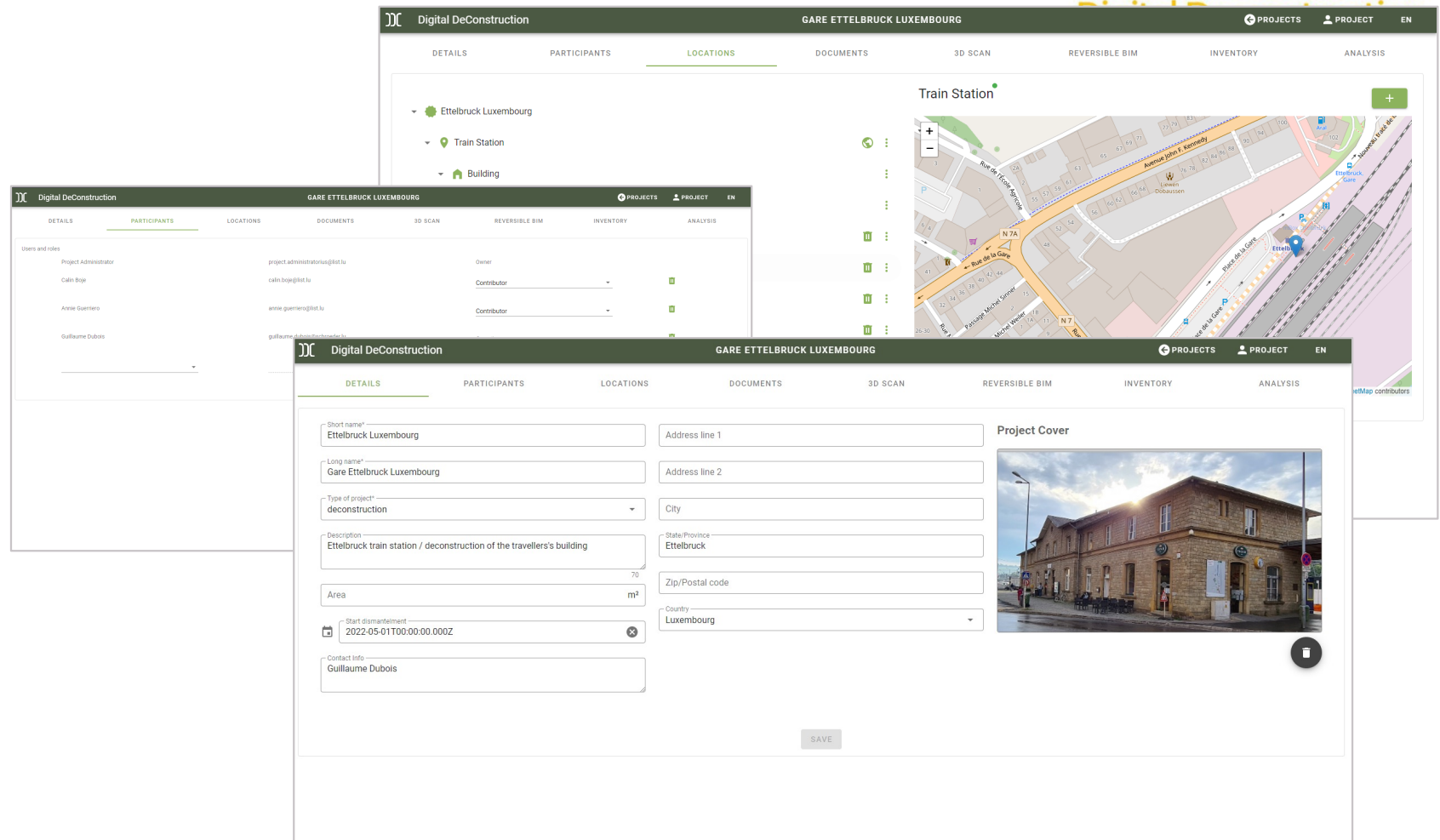
Platform administration

Create a project

Add participants

Define roles

Define locations



The screenshot displays the Digital DeConstruction platform interface for the project "GARE ETTELBRUCK LUXEMBOURG". The interface is divided into several sections:

- Top Navigation Bar:** Includes the platform logo, project name, and tabs for PROJECTS, PROJECT, and EN.
- Main Menu:** Features tabs for DETAILS, PARTICIPANTS, LOCATIONS, DOCUMENTS, 3D SCAN, REVERSIBLE BIM, INVENTORY, and ANALYSIS.
- Left Panel (Participants):** Lists users and roles, including Project Administrator, Cabin Bop, Anne Guerero, and Guillaume Dubois, with their respective email addresses and roles (Owner, Contributor).
- Right Panel (Locations):** Shows a map of the project location, labeled "Train Station", with a street view and a list of nearby locations.
- Form Fields:** Includes input fields for Short name, Long name, Type of project (deconstruction), Description (Ettelbruck train station / deconstruction of the travellers's building), Area (m²), Start dismantlement (2022-05-01T00:00:00.000Z), and Contact info (Guillaume Dubois).
- Address Fields:** Includes Address line 1, Address line 2, City, State/Province (Ettelbruck), Zip/Postal code, and Country (Luxembourg).
- Project Cover:** A section for uploading a project cover image, showing a photo of the train station building.
- Buttons:** Includes a "SAVE" button at the bottom right.

DDC platform functionalities

Document management

Add
document

Edit
document

Download
document

Delete
document

Digital DeConstruction **GARE ETTTELBRUCK LUXEMBOURG** **PROJECTS** **PROJECT** **EN**

DETAILS **PARTICIPANTS** **LOCATIONS** **DOCUMENTS** **3D SCAN** **REVERSIBLE BIM** **INVENTORY** **ANALYSIS**

Location none +

Ettelbruck Luxembourg

Train Station [2]

Building [1]

Ground Floor

- Entrance
- Main Hall
- Ticket shop
- First Floor
- Attic

Documents at current location

Title	File name	Author	Upload date	Size	
cover	Screenshot 2023-02-17 at 09.38.51.png		10/05/2023	534.38 KB	⋮
train station model	Ettelbruck_Station_14-04-2022-ifc3-Elements.json		10/05/2023	3.08 MB	⋮
outside picture	photot-ettelbruck.png		10/05/2023	534.38 KB	⋮
building project properties	Ettelbruck_Station_14-04-2022-ifc3-Properties.json		10/05/2023	16.61 KB	⋮

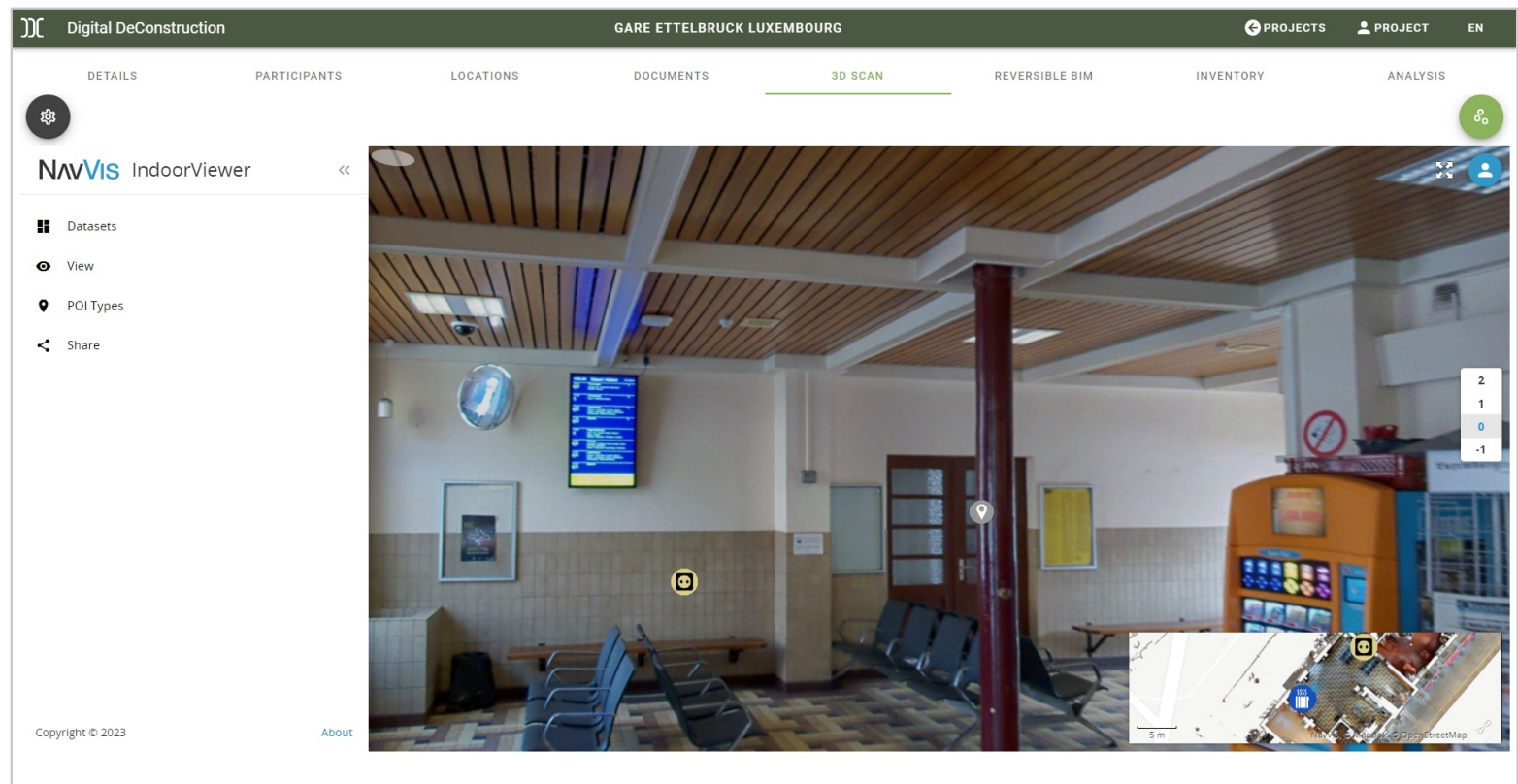
Rows per page: 10 1-4 of 4 < >

DDC platform functionalities

3D scan

Configure
3D scan

Navigate
into 3D
scan



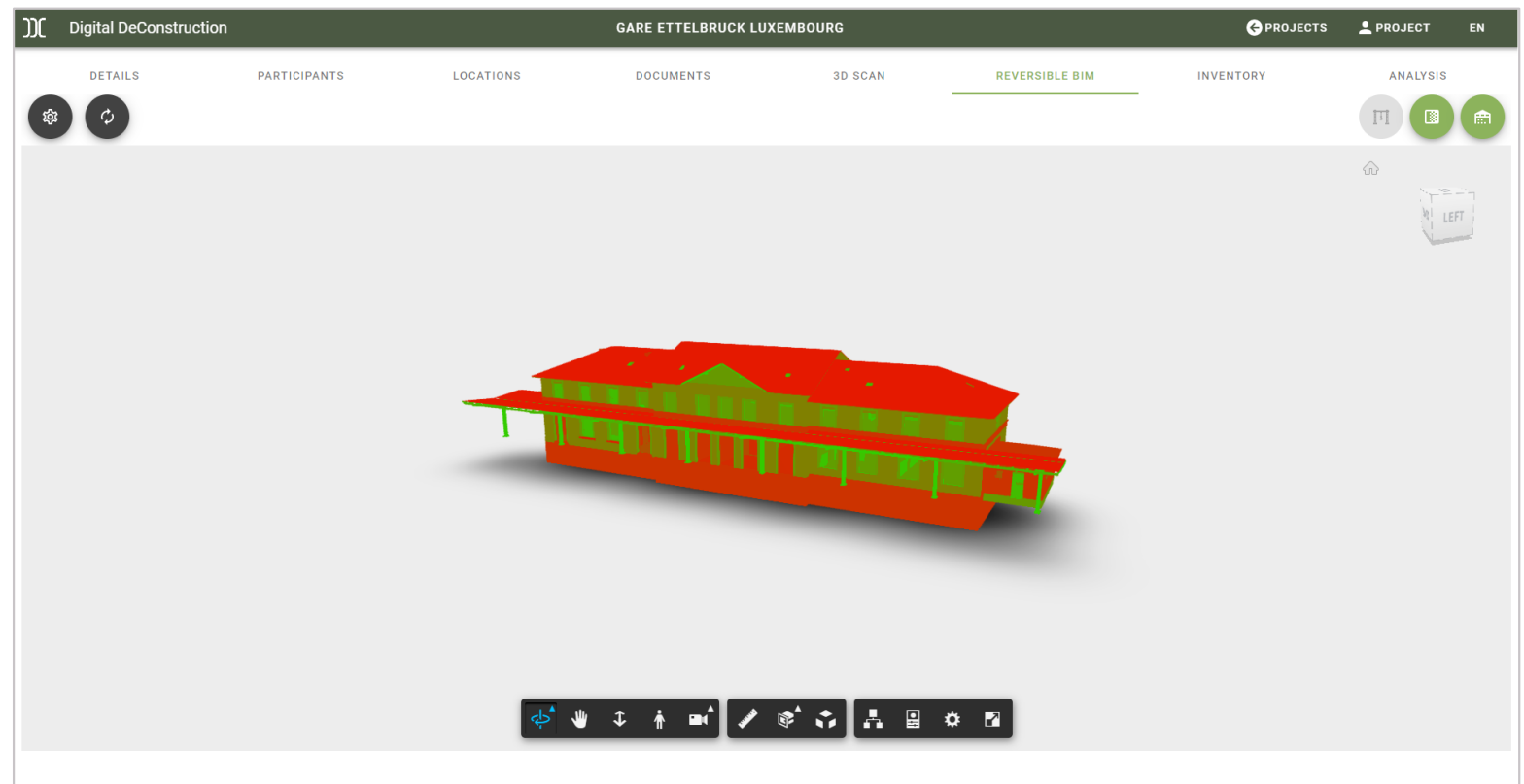
DDC platform functionalities

BIM

Visualize BIM

Visualize RBIM

Navigate inside the BIM



DDC platform functionalities

Materials inventory

Add
inventory

Filter
inventory

Navigate
into the
BIM

Visualize /
edit
elements

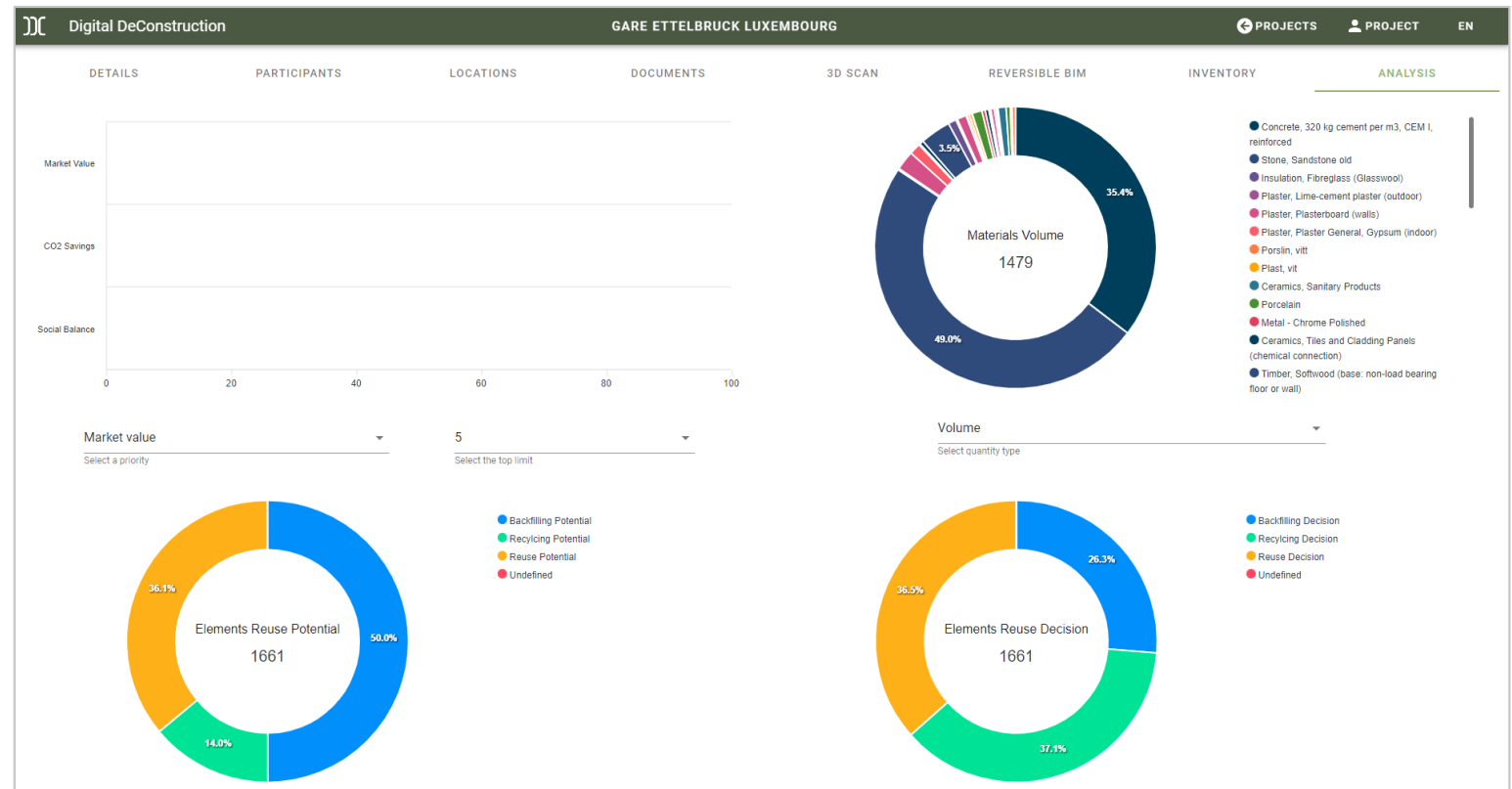
Add
element

Digital DeConstruction									
GARE ETTTELBRUCK LUXEMBOURG									
PROJECTS PROJECT EN									
DETAILS PARTICIPANTS LOCATIONS DOCUMENTS 3D SCAN REVERSIBLE BIM INVENTORY ANALYSIS									
↑									
FILTERS OFF									
ELEMENTS									
BIM loadedstatic									
Info 3D view Actions									
<input type="checkbox"/>	Name	Description	Surface Damage	Reuse Potential	Reuse Decision	Hazard Assessment	Hazard Assessment Status	Info	3D view
<input type="checkbox"/>	Load-bearing - Timber Wood:Load-bearing - Beam 100x80 Wood:2176203		Low	0.8	Reuse	None	Requested	i	3D
<input type="checkbox"/>	Finish - Int. Wall Plaster 15 Gypsum_74:Finish - Int. Wall Plaster 15 Gypsum_74:2309850		High	0.2	Backfilling	None	Requested	i	3D
<input type="checkbox"/>	Finish - Int. Wall Plaster 15 Gypsum_45:Finish - Int. Wall Plaster 15 Gypsum_45:2495442		High	0.2	Backfilling	None	Requested	i	3D
<input type="checkbox"/>	Finish - Wall Plaster Gypsum:Finish - Wall Plaster Gypsum:2420689		High	0.2	Backfilling	None	Requested	i	3D
<input type="checkbox"/>	Finish - Wall Plaster Gypsum:Finish - Wall Plaster Gypsum:2385468		High	0.2	Backfilling	None	Requested	i	3D
<input type="checkbox"/>	Load-bearing - Timber Wood:Load-bearing - Beam 150x150 Wood:3066526		Low	0.79	Reuse	None	Requested	i	3D
<input type="checkbox"/>	Enclosure - Facade Decorative Element Stone_6:Enclosure - Facade Decorative Element Stone_6:2536001		High	0.2	Backfilling	None	Requested	i	3D
<input type="checkbox"/>	Finish - Int. Wall Plaster 15 Gypsum_23:Finish - Int. Wall Plaster 15 Gypsum_23:2479680		High	0.2	Backfilling	None	Requested	i	3D
<input type="checkbox"/>	Load-bearing - Beam Ext. 120x100 Steel:Load-bearing - Beam Ext. 120x100/800 Steel:2198880		None	0.88	Reuse	None	Requested	i	3D
<input type="checkbox"/>	Vertical Communication - Stairs Landing Int. Wood_3:Vertical Communication - Stairs Landing Int. Wood_3:2260624		Low	0.79	Reuse	None	Requested	i	3D
Rows per page: 10 1-10 of 1661 < >									

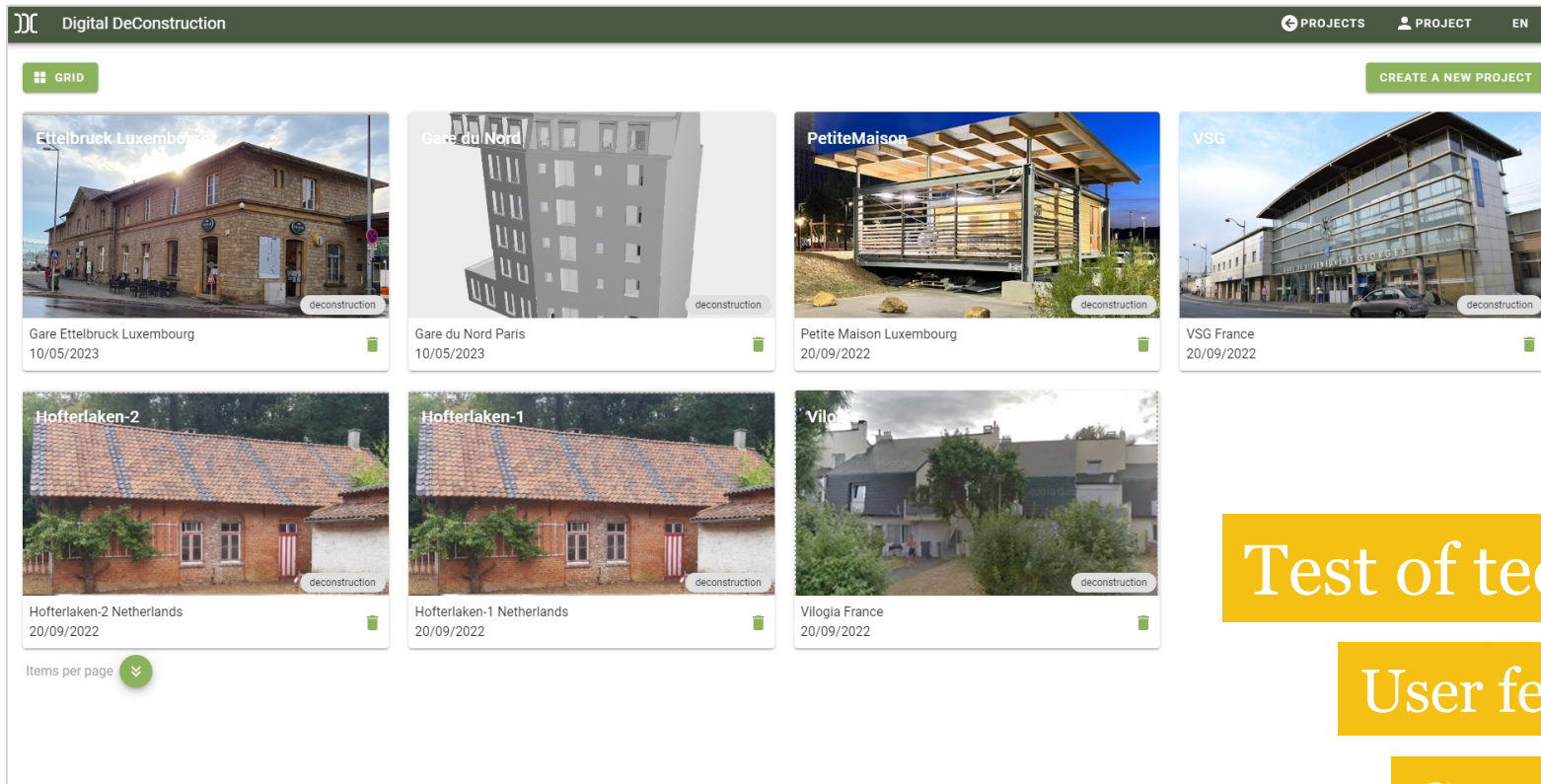
DDC platform functionalities

Visualize
analysis

Analysis



Several Pilots



Test of technologies

User feedback

Cost/benefit analysis

At the end of the project

- Prototype **TRL 7**.
- The platform will be available under an **opensource** licence.
- The business model is under progress.

TRL 1 –basic principles observed

TRL 2 –technology concept formulated

TRL 3 –experimental proof of concept

TRL 4 –technology validated in lab

TRL 5 –technology validated in relevant environment


TRL 6 –technology demonstrated in relevant environment

TRL 7 –system prototype demonstration in operational environment

TRL 8 –system complete and qualified


TRL 9 –actual system proven in operational environment

HORIZON 2020 - Technology readiness levels (TRL)



Digital DeConstruction

PROJECTS
PROJECT
EN


GRID
CREATE A NEW PROJECT




Ettelbruck Luxembourg
Gare Ettelbruck Luxembourg
10/05/2023




Gare du Nord
Gare du Nord Paris
10/05/2023




Petite Maison
Petite Maison Luxembourg
20/09/2022




VSG
VSG France
20/09/2022



Hofterlaken-2
Hofterlaken-2 Netherlands
20/09/2022



Hofterlaken-1
Hofterlaken-1 Netherlands
20/09/2022



Villogia
Villogia France
20/09/2022

Items per page

Page 1 of 1

Live demo

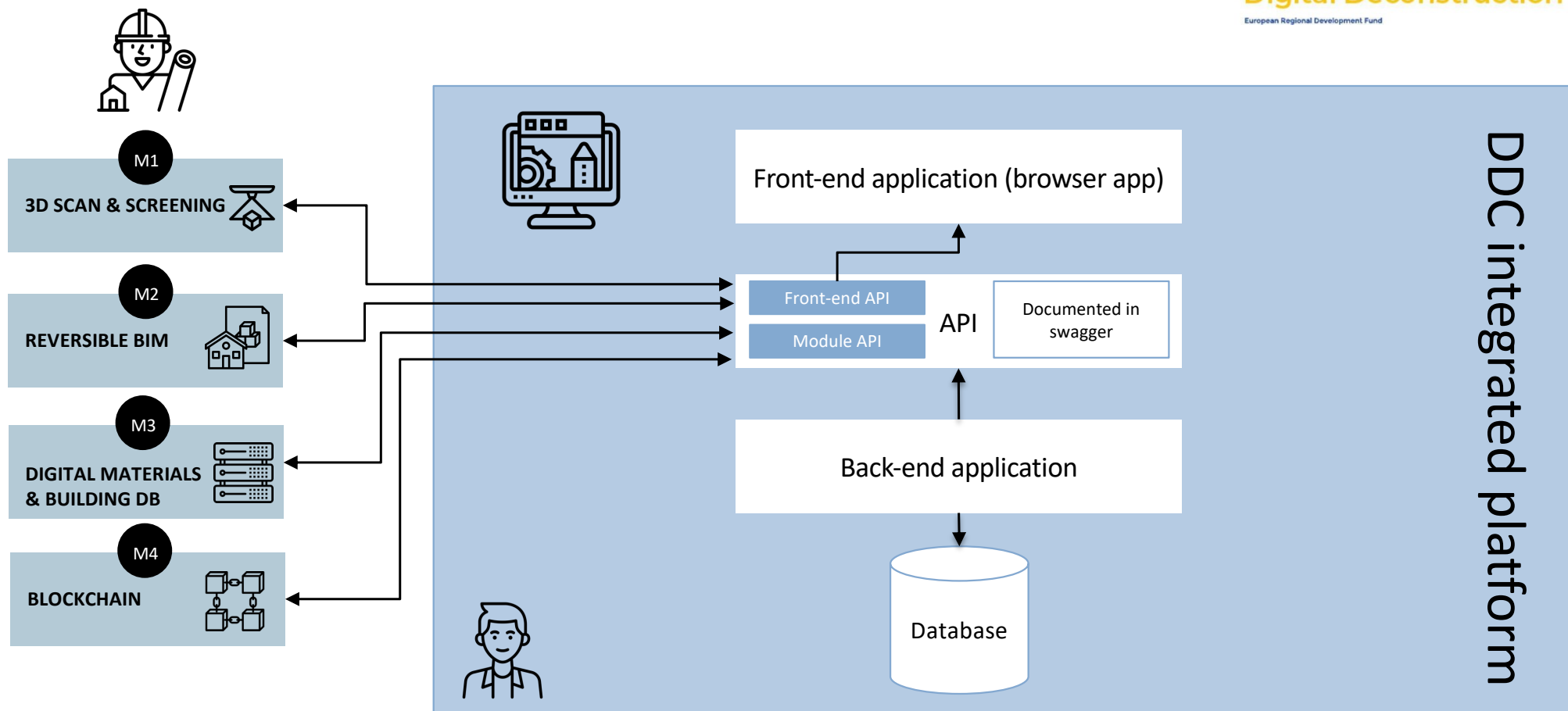


2

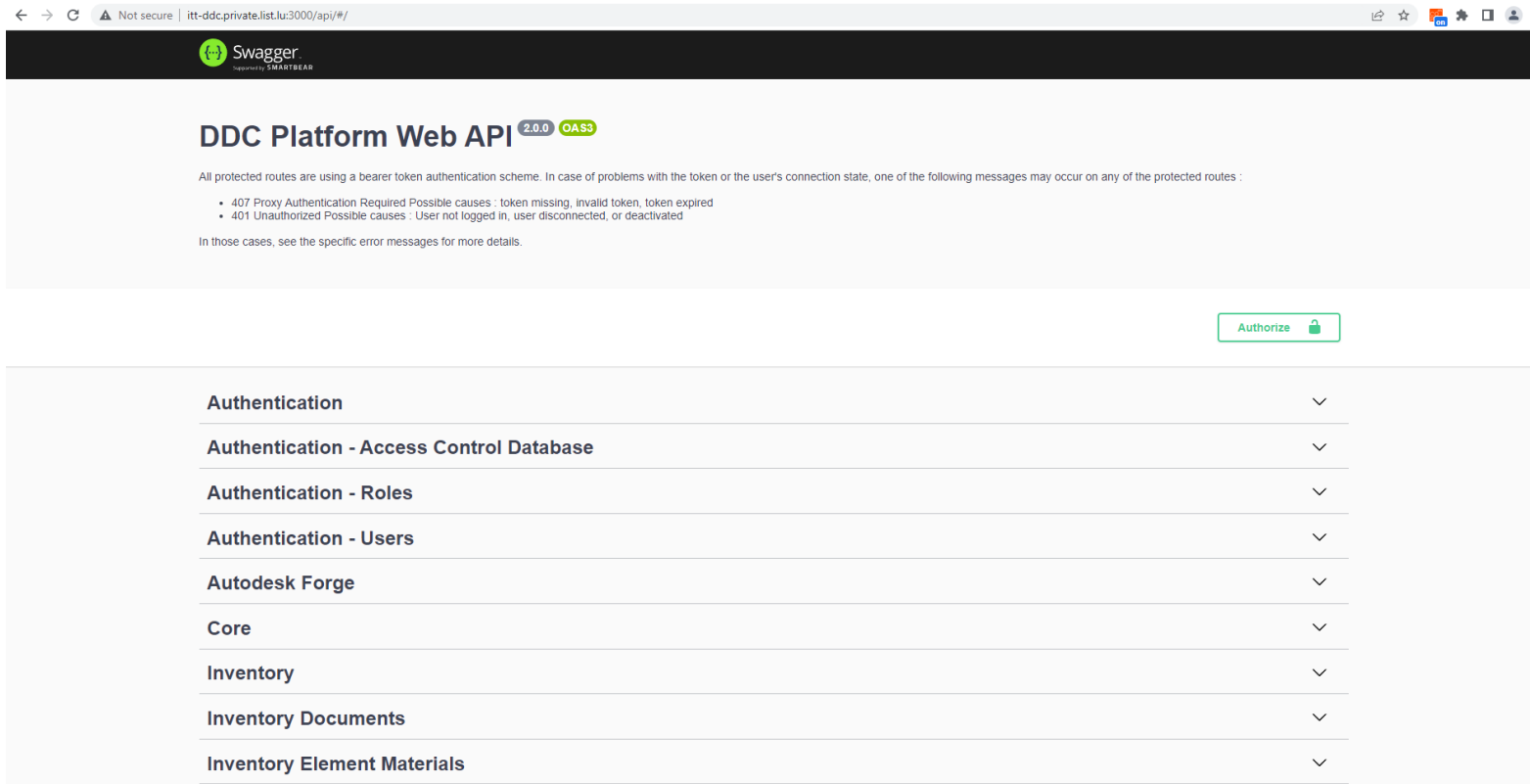
Technical implementation

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DDC integrated platform



Module API



The screenshot shows a web browser displaying the Swagger API documentation for the "DDC Platform Web API". The browser's address bar shows the URL "itt-ddc.private.list.lu:3000/api/#/". The Swagger interface includes a "Swagger" logo, a "2.0.0 OAS3" version indicator, and a note about bearer token authentication. Below the note, there is a list of error codes and their possible causes. A table of API endpoints is visible, with each row having a dropdown arrow on the right. An "Authorize" button is located in the top right corner of the API list area.


Swagger
powered by SMARTBEAR

DDC Platform Web API 2.0.0 OAS3

All protected routes are using a bearer token authentication scheme. In case of problems with the token or the user's connection state, one of the following messages may occur on any of the protected routes :

- 407 Proxy Authentication Required Possible causes : token missing, invalid token, token expired
- 401 Unauthorized Possible causes : User not logged in, user disconnected, or deactivated

In those cases, see the specific error messages for more details.

Authorize 

Authentication	▼
Authentication - Access Control Database	▼
Authentication - Roles	▼
Authentication - Users	▼
Autodesk Forge	▼
Core	▼
Inventory	▼
Inventory Documents	▼
Inventory Element Materials	▼

Example: Uploading an inventory (as a file)

Inventory

POST `/projects/{projectId}/inventory` Create or update a project inventory

Create or update a project inventory by uploading a well-formatted json file.
Example:

```
[{
  "Name": "Stair:Residential - 200mm Max Riser 250mm Tread:198878",
  "IfcId": "21ldoMpbP4Vfs30XGY_34d",
  "RevitId": "198878",
  "IfcType": "IfcStair",
  "Description": "placeholder string",
  "ClassificationCode": "placeholder code",
  "Location": "Level 1",
  "ReusePotential": "0,55",
  "Volume": 0.0,
  "MaterialVolumes": [{
    "Material": {
      "Name": "Wood - Flooring",
      "TotalVolume": 0.0
    },
    "Volume": 0.0
  }]
}, {
  "another object..."
}]
```

Parameters Try it out

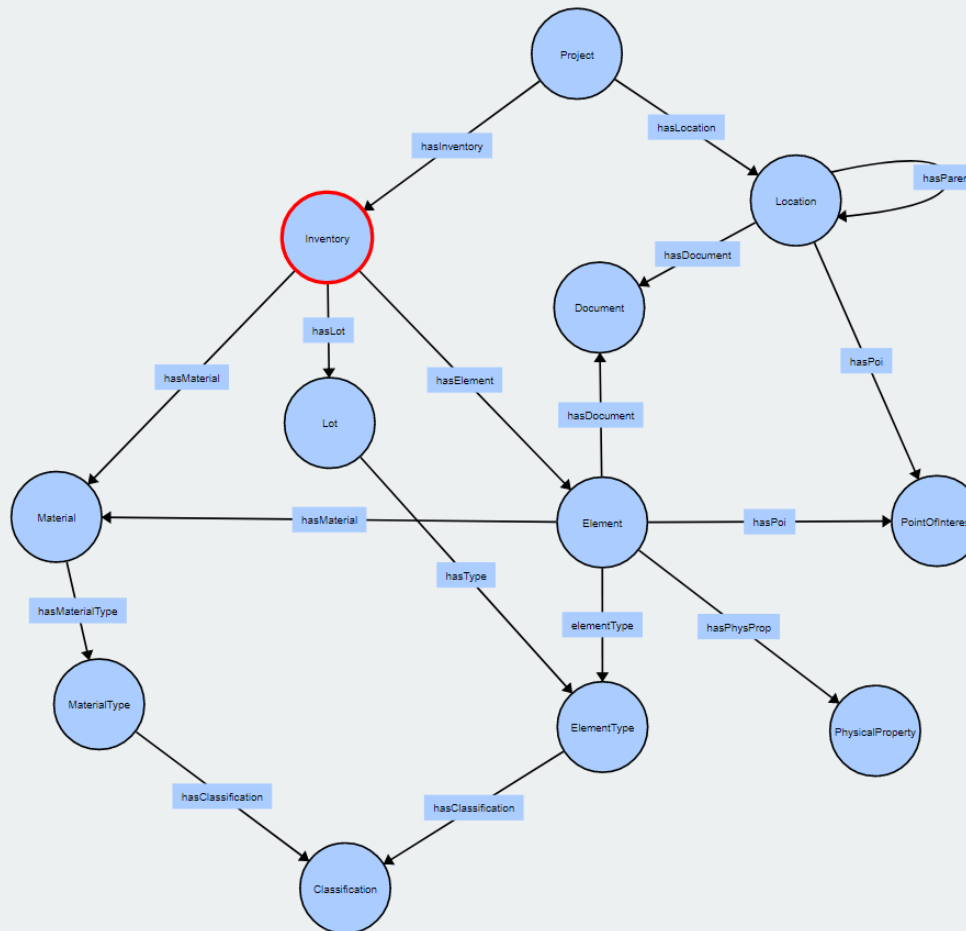
Name	Description
projectId * required number (path)	The project internal ID
<input type="text" value="projectId"/>	

Request body * required multipart/form-data

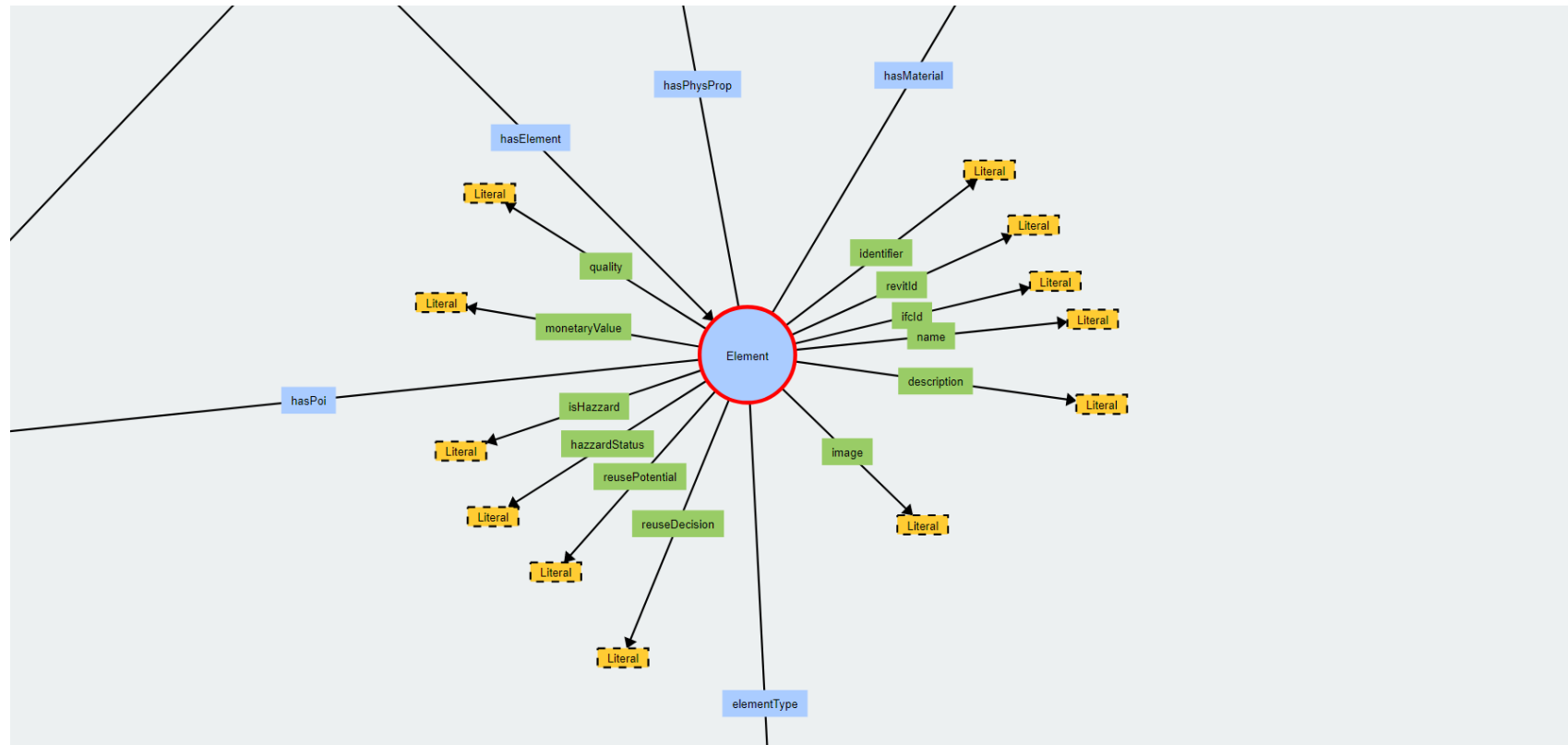
Example: managing pois

Point of Interests			^
POST	/projects/{projectId}/scan/points-of-interest	Create a point of interest	✓ 🔒
GET	/projects/{projectId}/scan/points-of-interest	List the points of interest of a project	✓ 🔒
POST	/projects/{projectId}/scan/points-of-interest/{pointOfInterestUid}	Update a point of interest	✓ 🔒
DELETE	/projects/{projectId}/scan/points-of-interest/{pointOfInterestUid}	Delete a point of interest	✓ 🔒
POST	/projects/{projectId}/scan/points-of-interest/import		✓ 🔒
Projects			✓

DDC Data model



Example: Element data model



Deconstruction Element

Field	Type	Example	Provider	Manual
Identifier	string	5202A90A-FD83-4840-8A50-663F083C7B	Platform	
IfcIdentifier	string	3vLLsYoGj5dAFIE0JP4Rqb	GTBLab	
RevitIdentifier	string/int	7787597	GTBLab	
ReusePotential	float	0,2 / 0.2	GTBLab	
Quality	Enum<string>	"High", "Low", "Medium"	Platform/GTBLab(auto)	
ElementCost	{obj}	5 (EUR)?	?	×
Image(s)	List<[obj]>	"Image1.png" (reference)	?	×
HazzardStatus	Enum<string>	"Requested", "In progress", "Done"	GTBLab(auto) – client docs	
IsHazzard?	Boolean	true/false ("Yes/No")	GTBLab(auto)	
ReuseDecision	Enum<string>	"Reuse", "Recycling", "Landfill", etc.	? – GTBLab has a recommendation info	×
Name	string	"Door205.1"	?	
Description	string	"Door of the second floor. Scratched"	?	×

Thank you for your attention

Annie Guerriero, annie.guerriero@list.lu
Calin Boje, calin.boje@list.lu

www.nweurope.eu/digitaldeconstruction