# REVIT for Tertiary buildings CAD Forum #1

Yoann OBRY
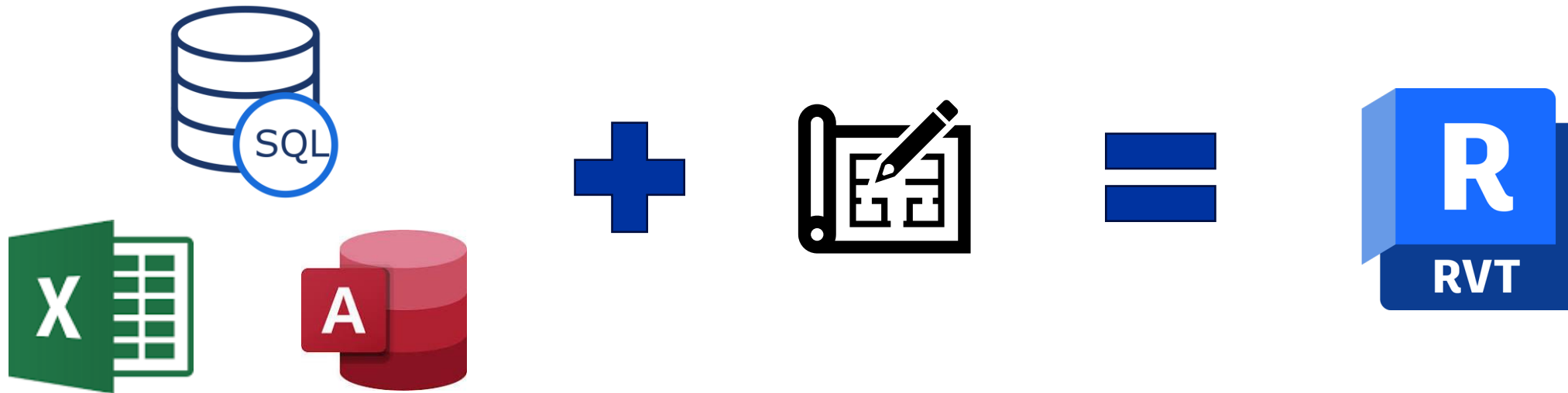
08/11/2023

# Introduction of Revit software

► **My job according to Revit**

► **Autodesk software created in 2000**

► **BIM : Building Information modeling**

► **Multitask construction software (Architecture, Structure, Electricity, HVAC…)**

# Introduction of Revit software
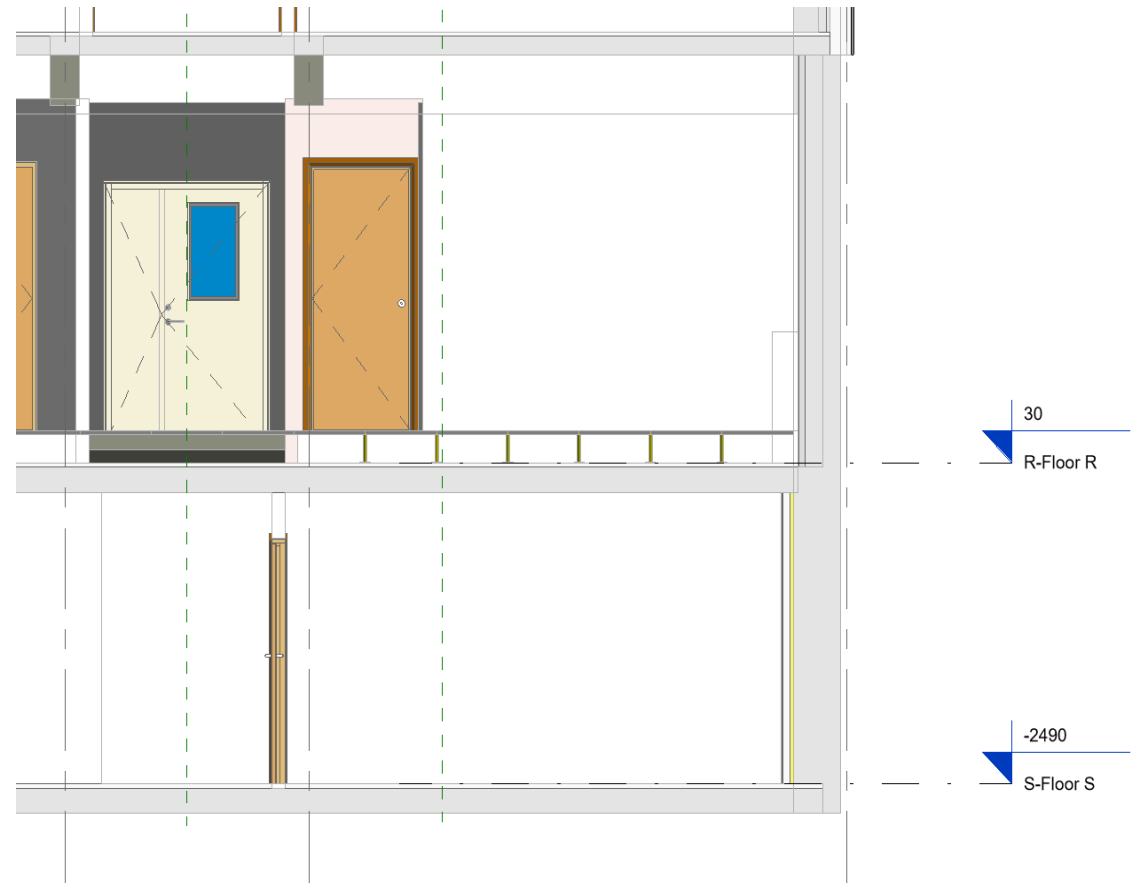
► **Database with 3D interface**

# 1/ Modeling concepts
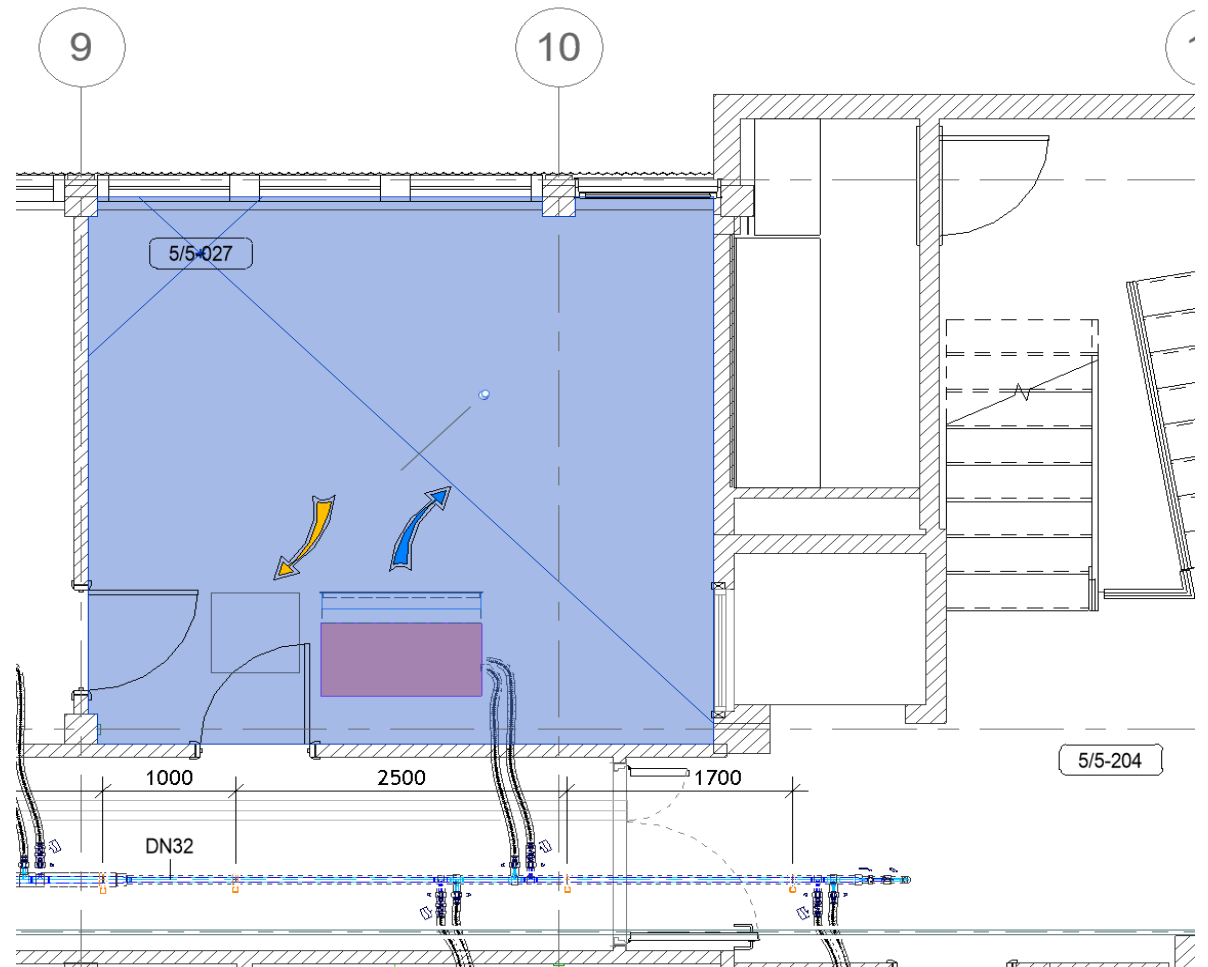# 2/ Engineering concepts
# 3/ Advanced concepts

# 1/ Modeling concepts

► **Each construction element is hosted by a unique level**

# 1/ Modeling concepts

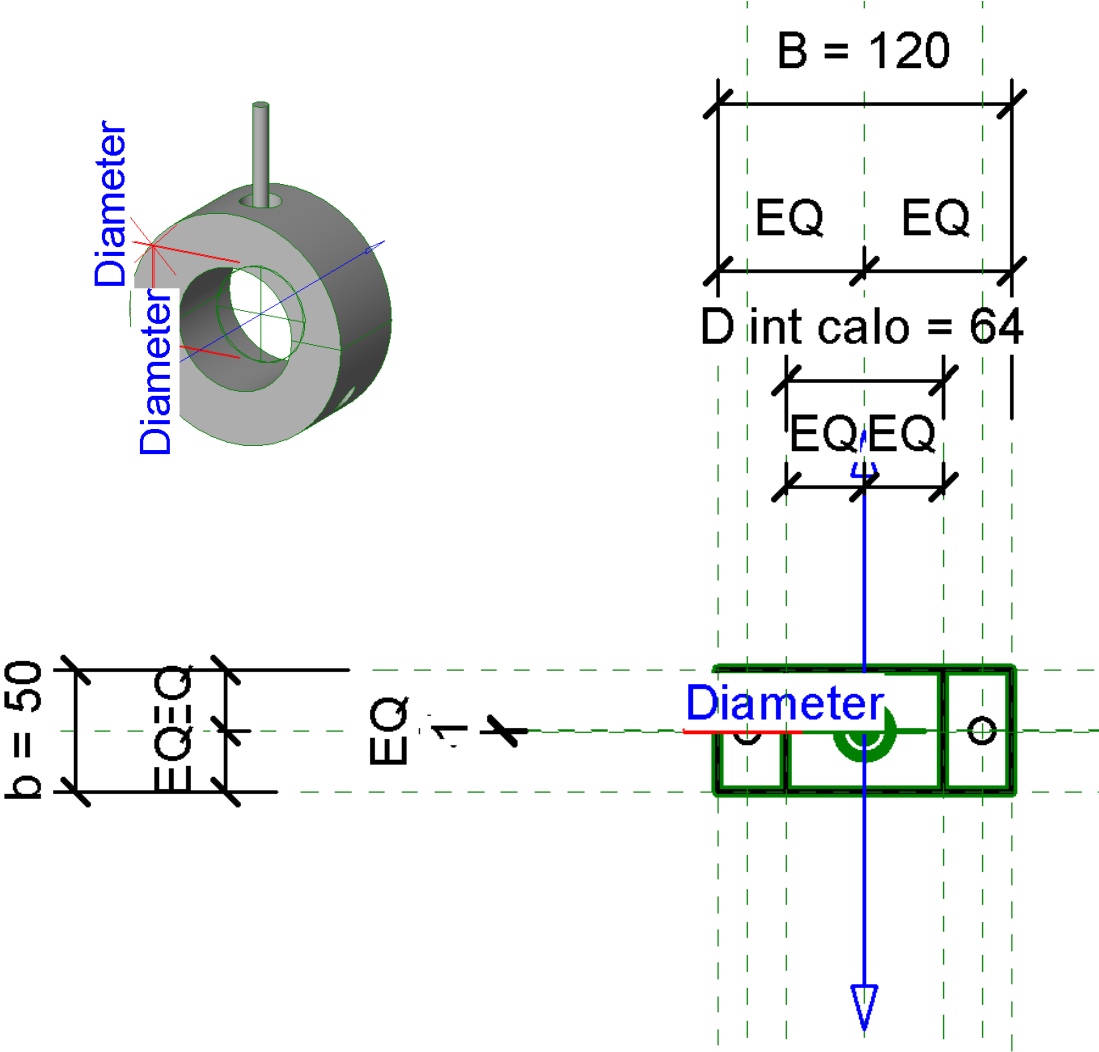► An element can also be hosted by a Room (Archi) or a Space (MEP)

# 1/ Modeling concepts

► Families : The equipment are modelized in some separate files with a different extension name .rfa

► This families can be parametric and contains some metadatas. For exemple by default there is the parameters "Manufacturer", "Model" and "Cost" in each family template

► You have to choose a category when you create a family : Pipe accessories, Mechanical equipment, Lighting device…



RFA

RFA

RVT

RFA

RFA
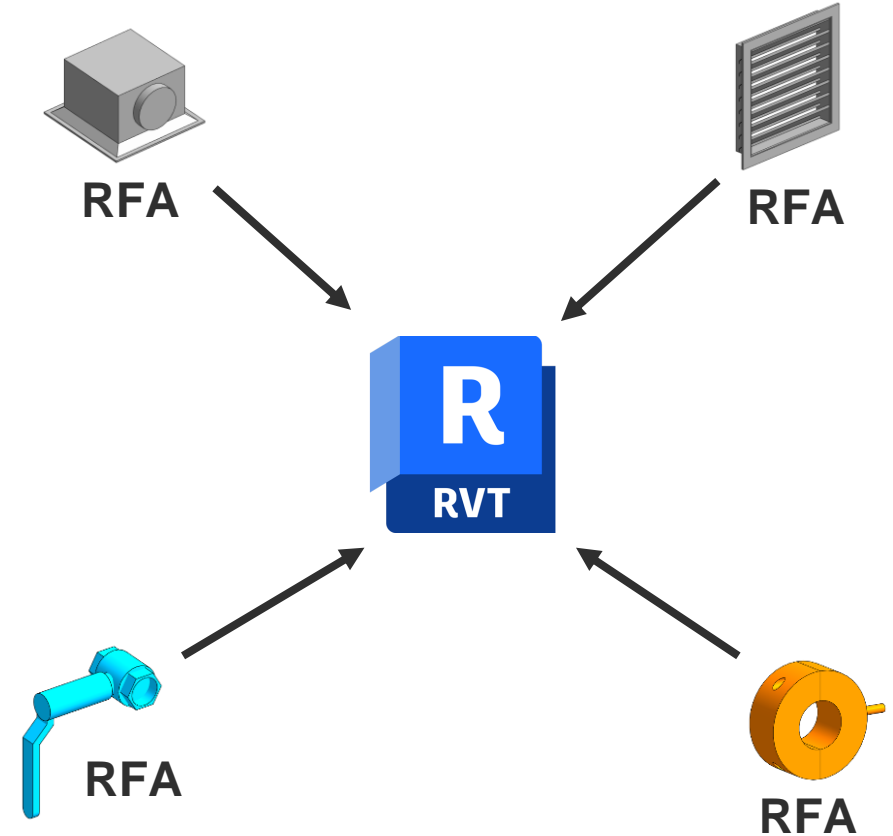
# 1/ Modeling concepts

**Analogy with human body**

► **Reference planes : skeleton**

► **Dimensions : muscles**

► **3D shapes : skin**

# 1/ Modeling concepts

► **Parameters interface**

► **Family type**

# 1/ Modeling concepts

► **Look up table with .csv format**

Dimensions / Poids BOA-H
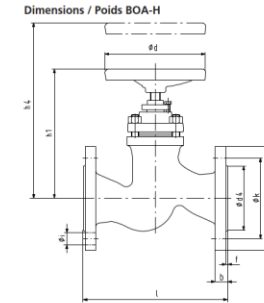
Ill. 4: Plan en coupe BOA-H

Cotes / poids

| PN | DN | l | ø D | ø k | Nombre de trous Z | Trou ø i | ø d₄ × f | b | h₁⁶⁾ | h₄⁷⁾ | Course | ø d | [kg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | [mm] | [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | [mm] | |
| 25/40 | 10 | 130 | 90 | 60 | 4 | 14 | 40 × 2 | 16 | 140 | 210 | 4,0 | 125 | 3,8 |
| | 15 | 130 | 95 | 65 | 4 | 14 | 45 × 2 | 16 | 140 | 210 | 4,0 | 125 | 3,3 |
| | 20 | 150 | 105 | 75 | 4 | 14 | 58 × 2 | 18 | 165 | 260 | 6,5 | 125 | 4,8 |
| | 25 | 160 | 115 | 85 | 4 | 14 | 68 × 2 | 18 | 165 | 260 | 6,5 | 125 | 5,4 |
| | 32 | 180 | 140 | 100 | 4 | 18 | 78 × 2 | 18 | 190 | 290 | 8,0 | 160 | 9,1 |
| | 40 | 200 | 150 | 110 | 4 | 18 | 88 × 3 | 18 | 200 | 300 | 10,0 | 160 | 10,2 |
| | 50 | 230 | 165 | 125 | 4 | 18 | 102 × 3 | 20 | 220 | 330 | 12,5 | 160 | 13,2 |
| | 65 | 290 | 185 | 145 | 8 | 18 | 122 × 3 | 22 | 270 | 420 | 16,5 | 200 | 19,8 |
| | 80 | 310 | 200 | 160 | 8 | 18 | 138 × 3 | 24 | 305 | 480 | 20,0 | 200 | 27 |
| | 100 | 350 | 235 | 190 | 8 | 22 | 162 × 3 | 24 | 345 | 550 | 25,0 | 250 | 41,7 |
| | 125 | 400 | 270 | 220 | 8 | 26 | 188 × 3 | 26 | 395 | 580 | 31,5 | 315 | 66 |
| | 150 | 480 | 300 | 250 | 8 | 26 | 218 × 3 | 28 | 430 | 620 | 37,5 | 315 | 88 |
| 25 | 200 | 600 | 360 | 310 | 12 | 26 | 278 × 3 | 30 | 500 | 760 | 47,5 | 400 | 144,6 |
| 40 | 200 | 600 | 375 | 320 | 12 | 30 | 285 × 3 | 34 | 500 | 760 | 47,5 | 400 | 175 |
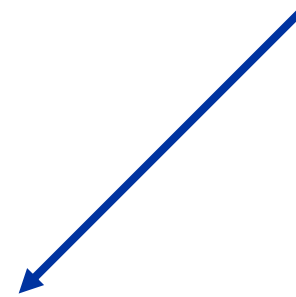
SUP_Collier eau glacée.csv

| | A | B — DN##pipe_size##millimeters | C — D ext tube##length##millimeters | D — B##length##millimeters | E — b##length##millimeters | F — Model##other## | G — Charge maximale##other## | H — Espacement supports##length##millimeters |
|---|---|---|---|---|---|---|---|---|
| 2 | DN15 | 15 | 21.3 | 87 | 40 | MRP-KF 21 | 260 | 1800 |
| 3 | DN20 | 20 | 26.9 | 87 | 40 | MRP-KF 27 | 320 | 1800 |
| 4 | DN25 | 25 | 33.7 | 98 | 40 | MRP-KF 33 | 400 | 2400 |
| 5 | DN32 | 32 | 42.4 | 103 | 40 | MRP-KF 42 | 510 | 2400 |
| 6 | DN40 | 40 | 48.3 | 108 | 40 | MRP-KF 48 | 580 | 2700 |
| 7 | DN50 | 50 | 60.3 | 120 | 50 | MRP-KF 60 | 720 | 2700 |
| 8 | DN65 | 65 | 76.1 | 136 | 50 | MRP-KF 76 | 1370 | 3000 |
| 9 | DN80 | 80 | 88.9 | 149 | 50 | MRP-KF 89 | 1600 | 3000 |
| 10 | DN100 | 100 | 114.3 | 200 | 60 | MRP-KF 114 | 2740 | 3000 |
| 11 | DN125 | 125 | 139.7 | 219 | 60 | MRP-KF 139 | 3350 | 3600 |
| 12 | DN150 | 150 | 168.3 | 248 | 60 | MRP-KF 168 | 4040 | 4000 |
| 13 | DN200 | 200 | 219.1 | 340 | 100 | MRP-KF 219 | 5260 | 4000 |

# 1/ Modeling concepts

► **Phases**

► **Existing in grey**

► **New in colors**

► **Number of phases illimited**



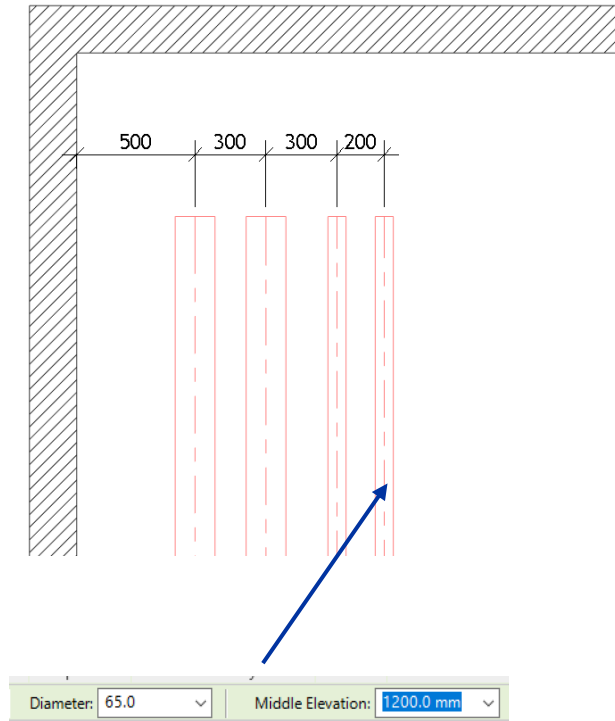| Phasing | |
|---|---|
| Phase planning | |
| Phase Created | New |
| Phase Demolished | None |
| Energy Analysis | Existing |
| FMF_Débit eau | New |
| Puissance Thermique F... | None |
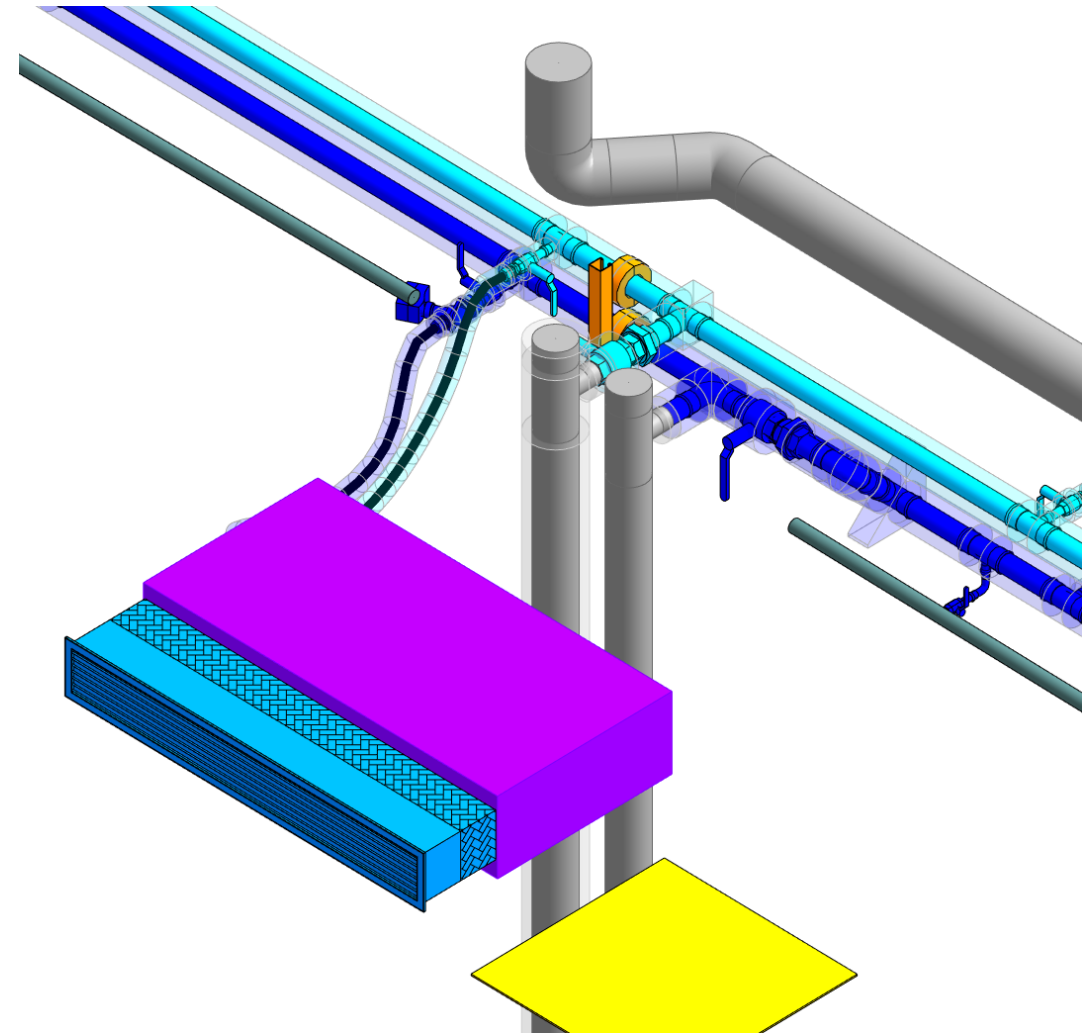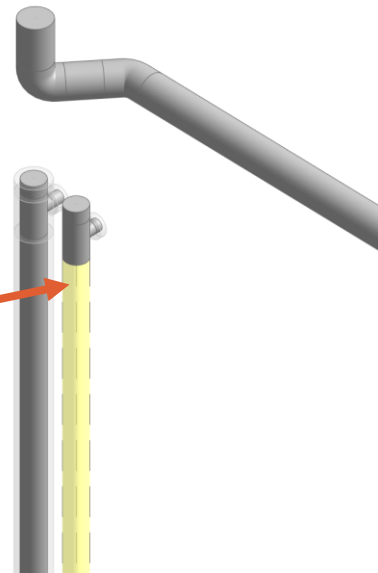
# 1/ Modeling concepts

**► Modeling**

**► 2D view rather than 3D view ?**

**► Click element to move it by modify the dimension**

**Floor drawing**



**3D view**



**Properties**



**Project Browser**

# 1/ Modeling concepts

► **Fast modeling**

1        2        3        4        5

# 1/ Modeling concepts

► **Fast modeling**

1            2            3
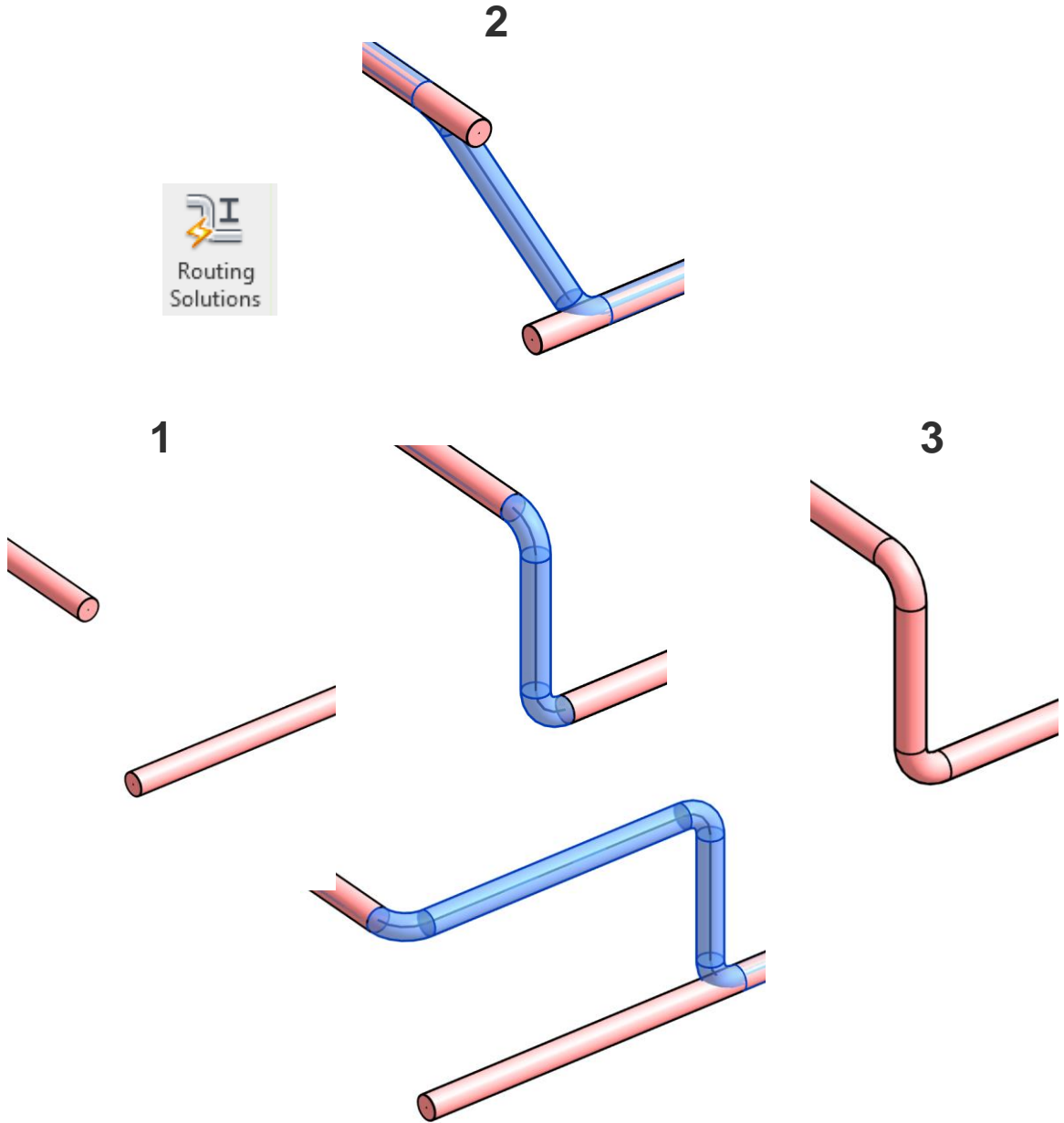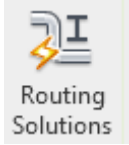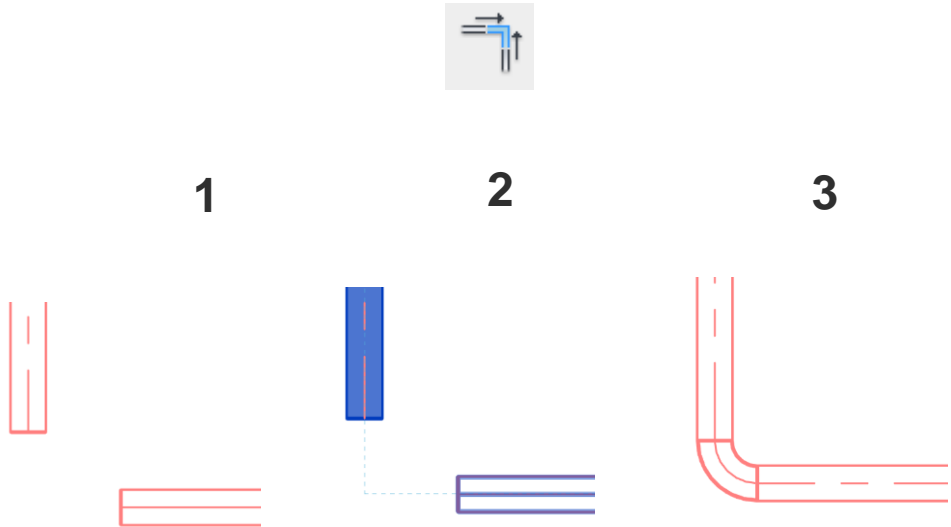
# 1/ Modeling concepts

► **Displace elements tool**

► **Ability of displace the elements in a view without move them in the real model**

►**Useful for showing assemblies**



Détail panoplies à visser

Détail raccordement TVC
1 : 20
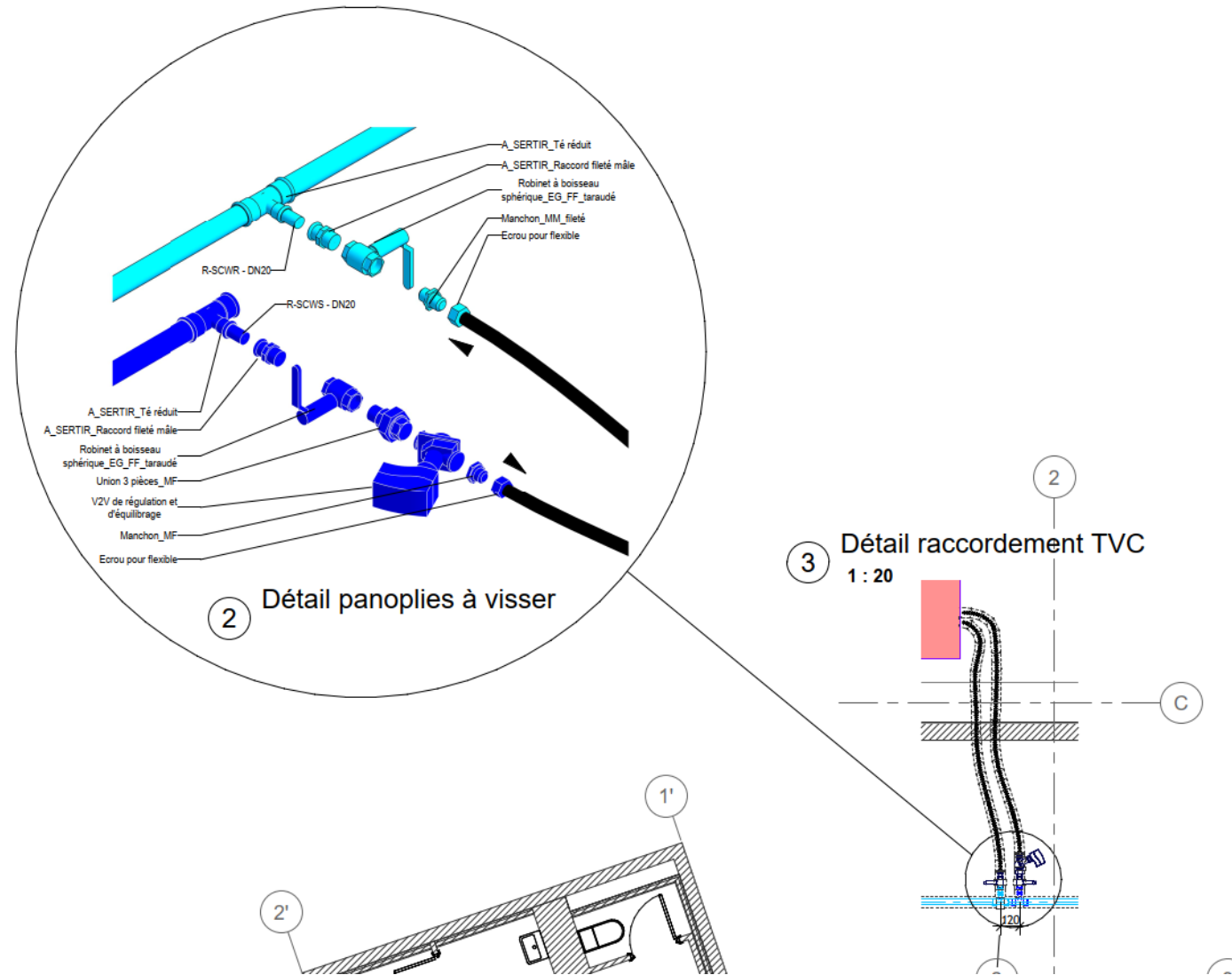
# 1/ Modeling concepts

► **Collaborate**

► **Several designers / engineers can work on the same project simultaneously**

► **Synchronization button for updating the files**
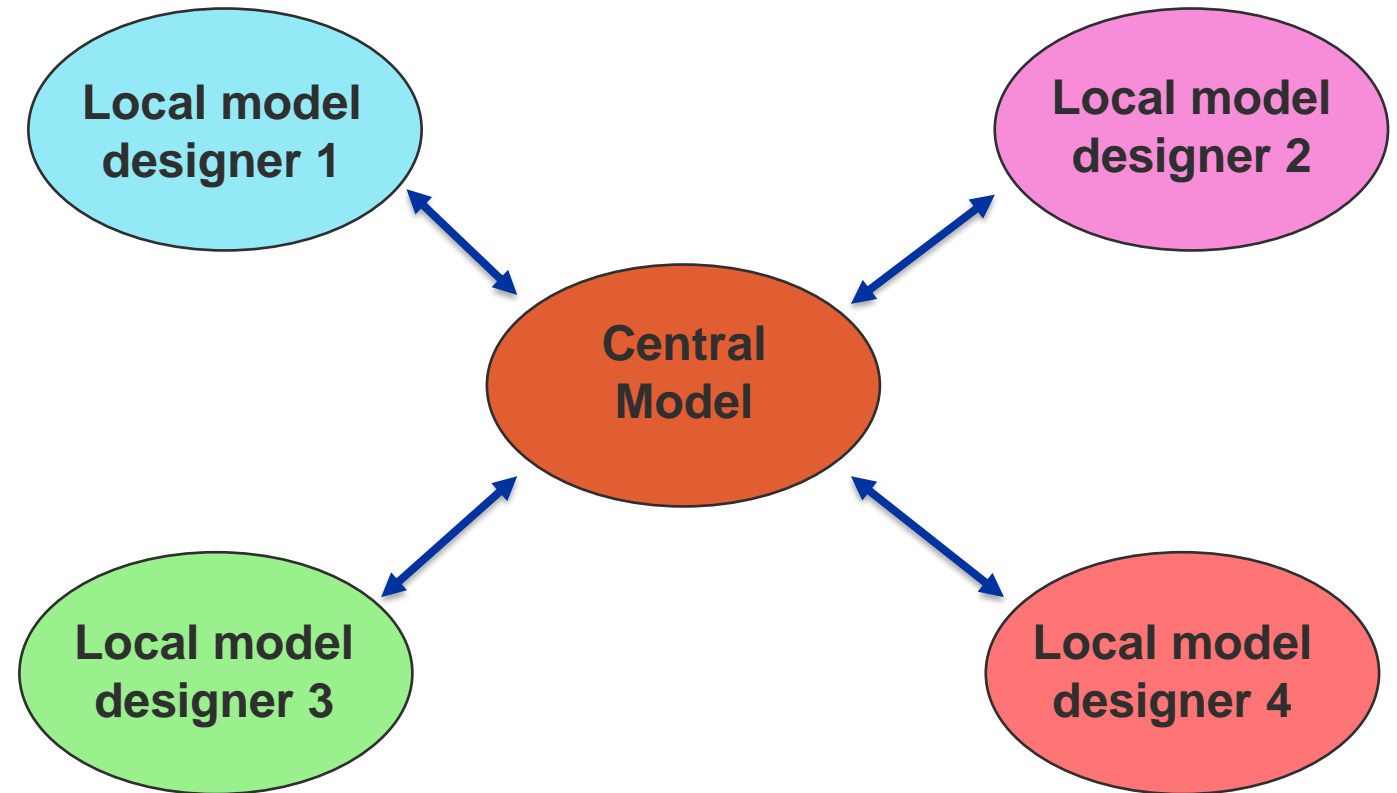
# 1/ Modeling concepts

► **Worksets**
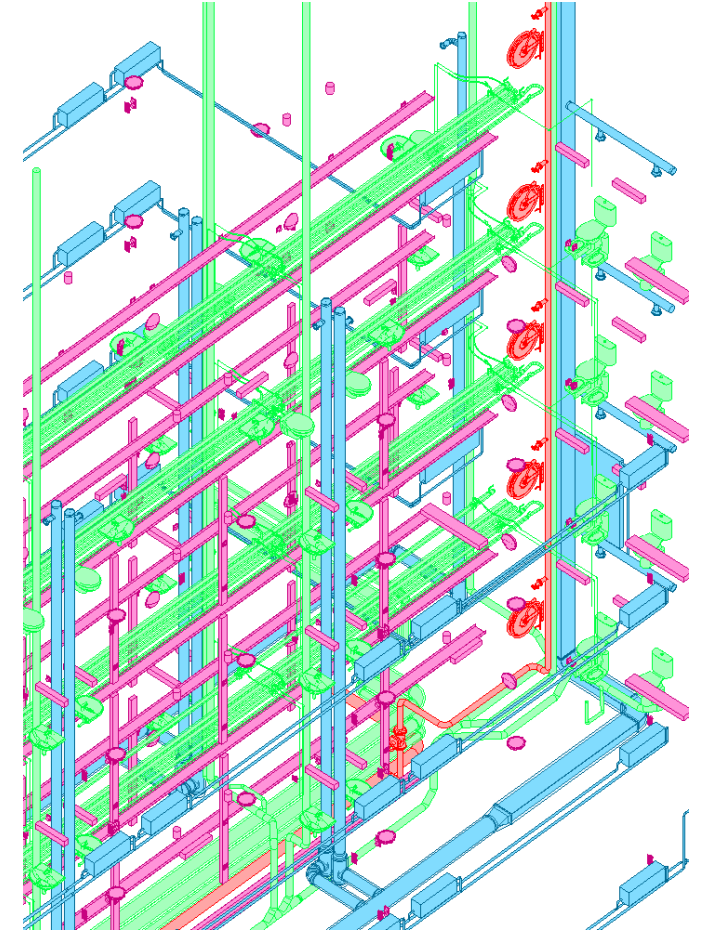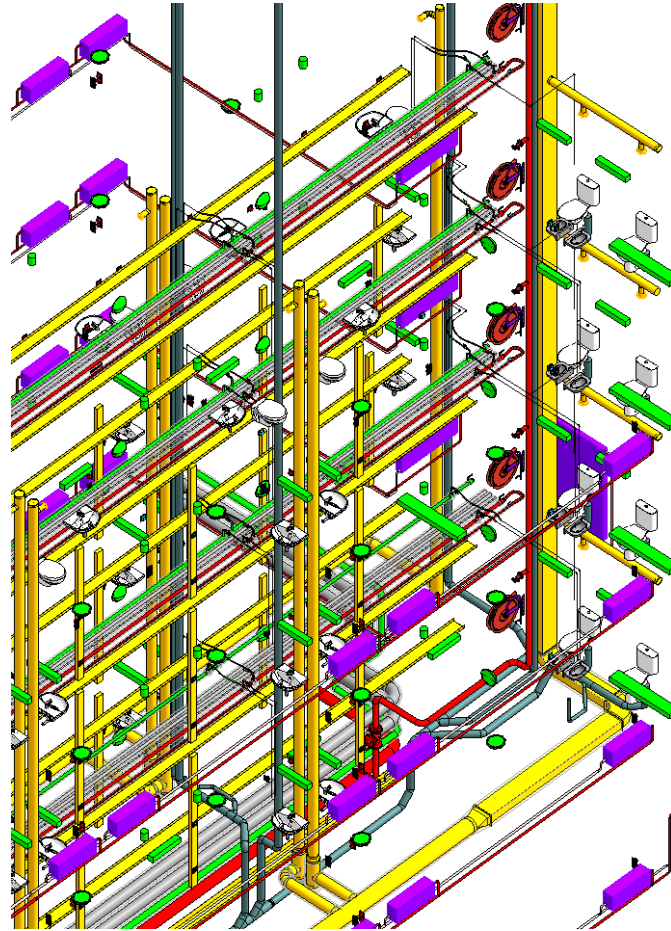
# 1/ Modeling concepts

► **File history**

# 1/ Modeling concepts

► **Conversion from Revit to Catia**

► **Loss of the metadatas**



**AutoCAD Mechanical or BricsCAD**

RVT → DWG™ → STP → CATIA

SCE
Site and Civil Engineering
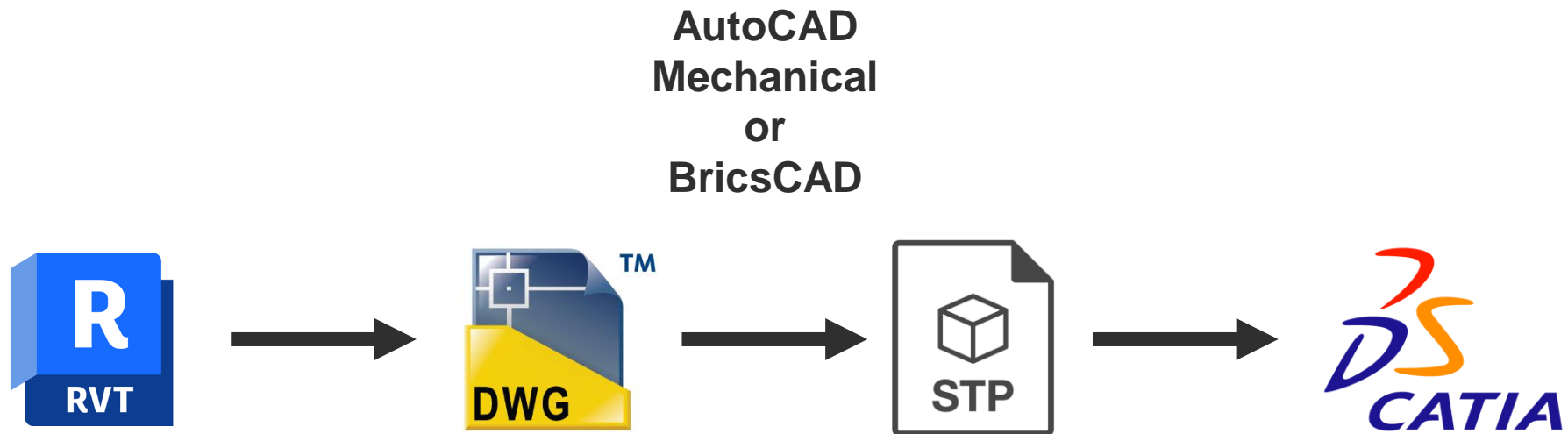
# 1/ Modeling concepts

► **Conversion from Catia to Revit**

► **IFC import allow better visualization than DWG import**

► **This process create some unclassified object in Revit**

► **You can resolve this by using the open-source software Blender BIM which allows you to classify the elements (one step again)**

**BricsCAD**
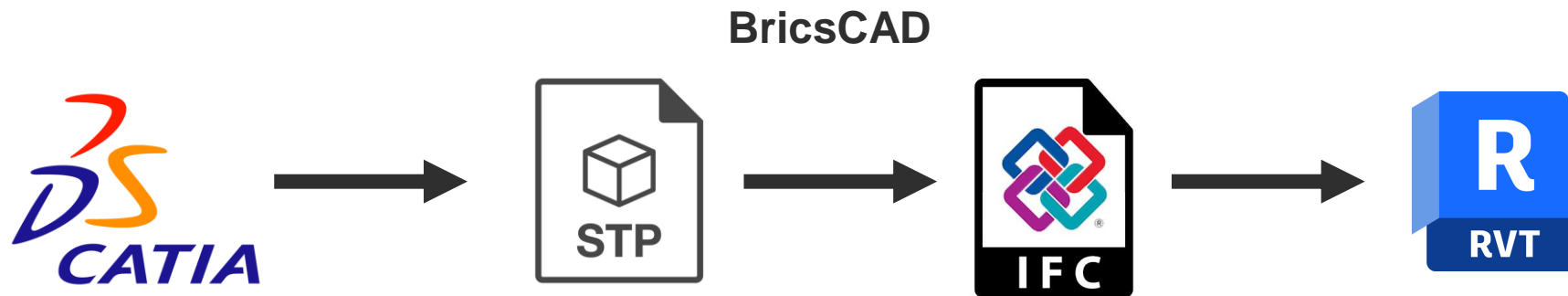
# 2/ Engineering concepts

► **Schedules**

► **Real time database linked to 3D equipment**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Bouches de soufflage par espaces | | | |
| | Space data | | | Airflow data | | |
| Number | Name | | Specified Supply Airflow | Actual Supply Airflow | Marge d'erreur | |
| Size | System Abbreviation | | Count | FMF_Débit air | | |
| 184/1-003 | Common Room | | 749 m³/h | 760 m³/h | 1% | |
| Ø160 | V-SUP | | 1 | 190 m³/h | | |
| Ø160 | V-SUP | | 1 | 190 m³/h | | |
| Ø160 | V-SUP | | 1 | 190 m³/h | | |
| Ø160 | V-SUP | | 1 | 190 m³/h | | |
| 184/1-005 | Operational Supervisors | | 216 m³/h | 216 m³/h | 0% | |
| Ø125 | V-SUP | | 1 | 72 m³/h | | |
| Ø125 | V-SUP | | 1 | 72 m³/h | | |
| Ø125 | V-SUP | | 1 | 72 m³/h | | |
| 184/1-106 | WC | | 0 m³/h | 0 m³/h | | |
| 184/1-107 | WC | | 0 m³/h | 0 m³/h | | |
| 184/1-208 | Couloir | | 40 m³/h | 40 m³/h | 0% | |
| Ø125 | V-SUP | | 1 | 40 m³/h | | |
| 184/1-209 | Couloir | | 32 m³/h | 32 m³/h | 0% | |
| Ø125 | V-SUP | | 1 | 16 m³/h | | |
| Ø125 | V-SUP | | 1 | 16 m³/h | | |

# 2/ Engineering concepts

► **If the ducts are well connected they will distribute and calculate the flow in the network**

► **Same for pressure loss**
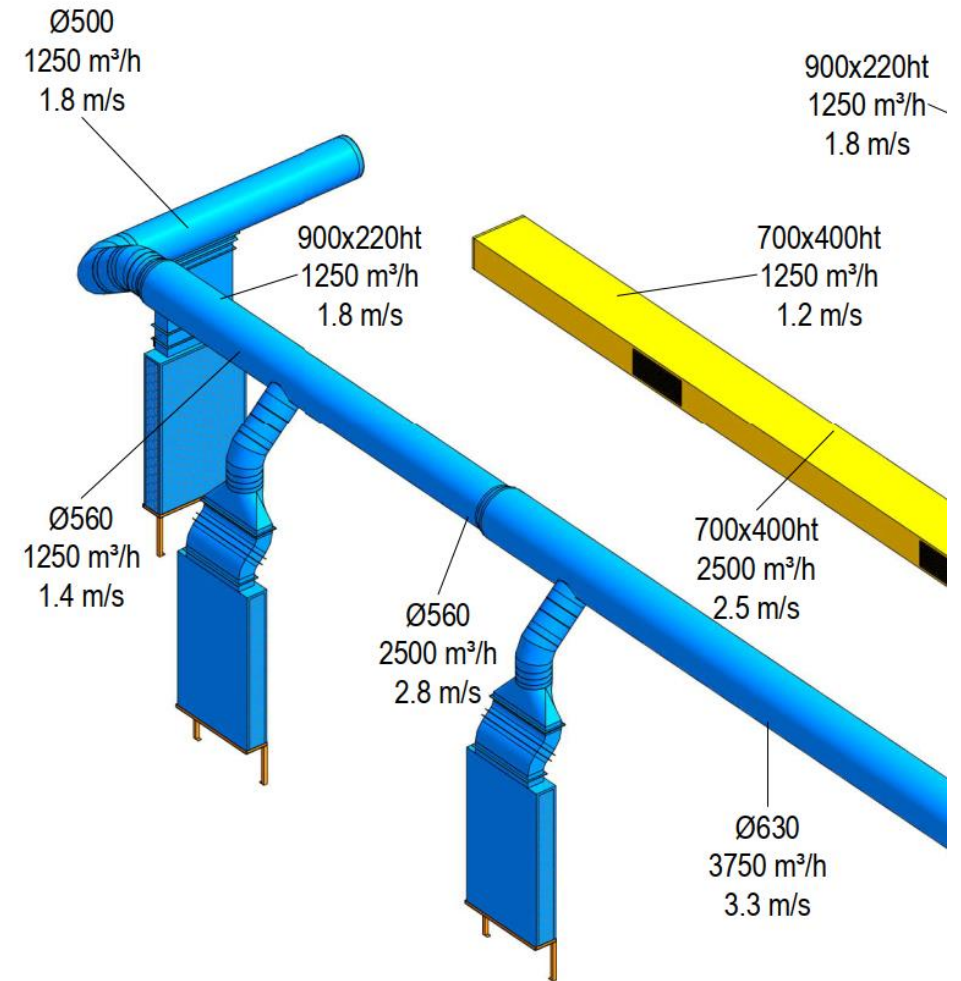
# 2/ Engineering concepts

► **Energy analysis**

► **We deployed the SIA 2024 Swiss standard into Revit**

# 2/ Engineering concepts

► **Network dimensioning**

► **Select equipment and add the flow or power**
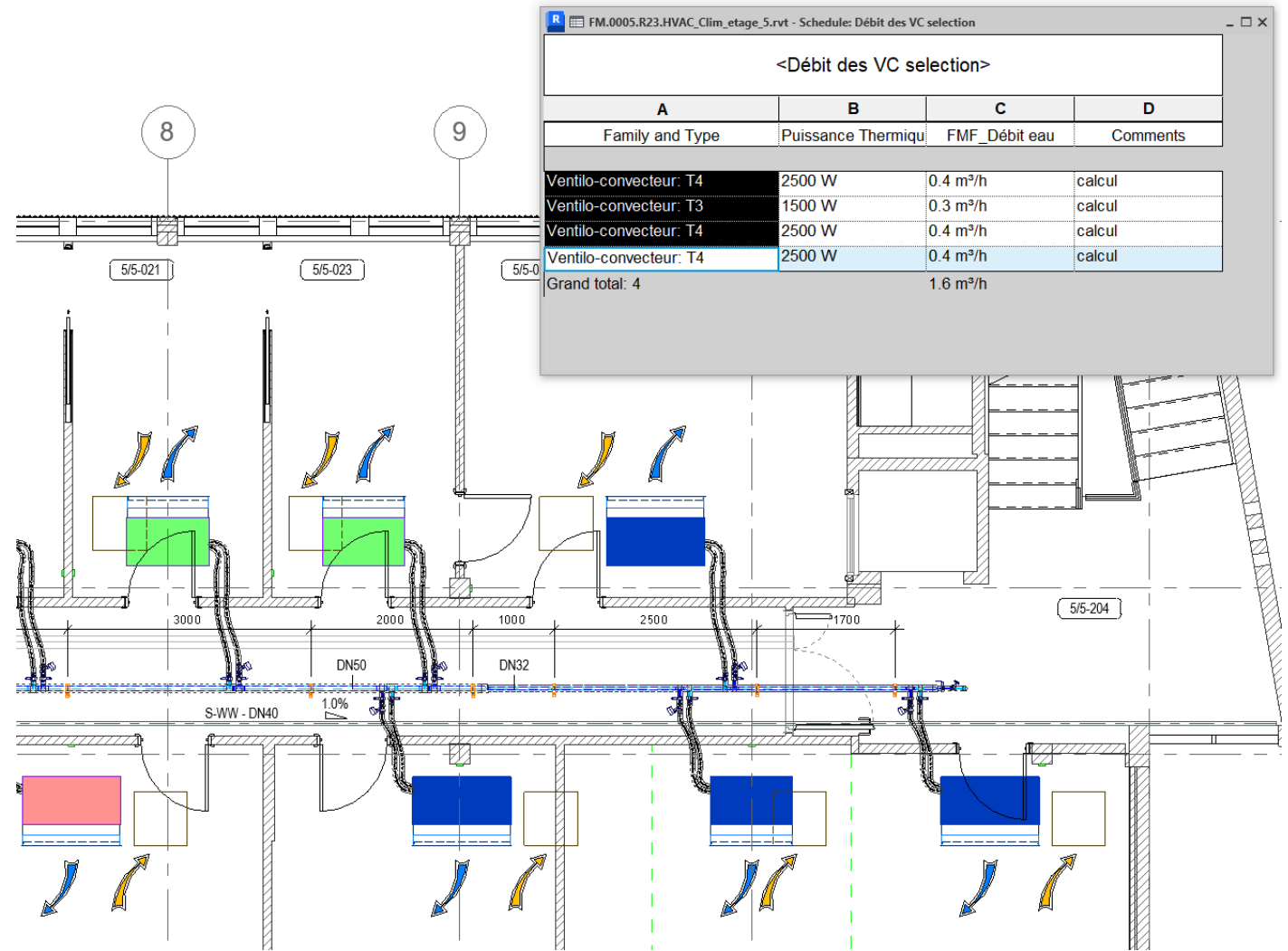
# 2/ Engineering concepts

► **Export IFC**

► **Standard AEC exchange format**

► **Many software can import IFC files (Energy calculation, Structure calculation…)**

# 2/ Engineering concepts

► **IFC from Revit to Gis Portal Infrastructure**

► **Maintenance codification linked to EAM**
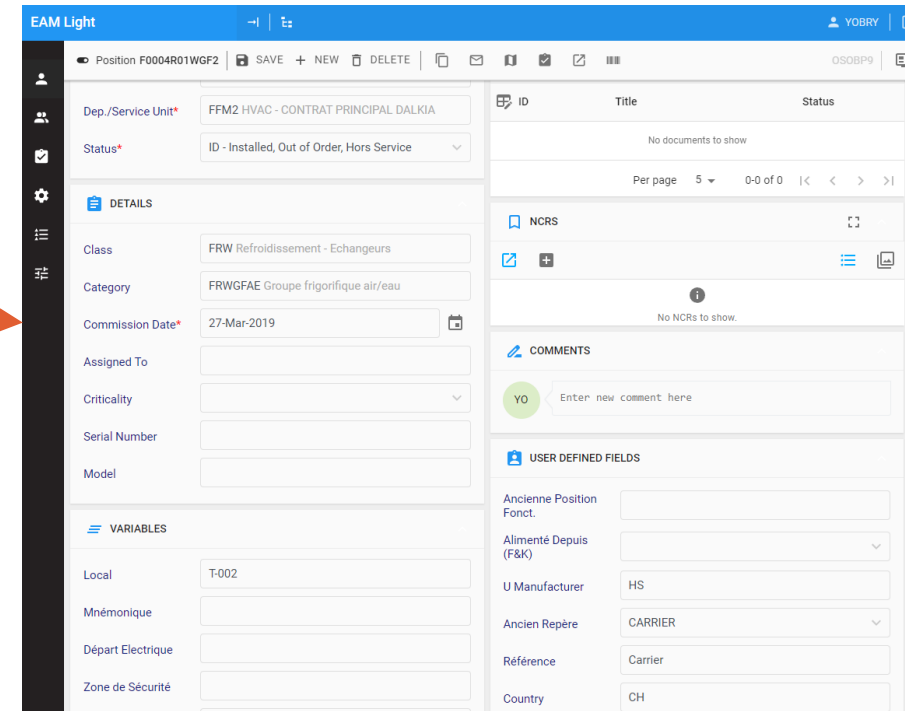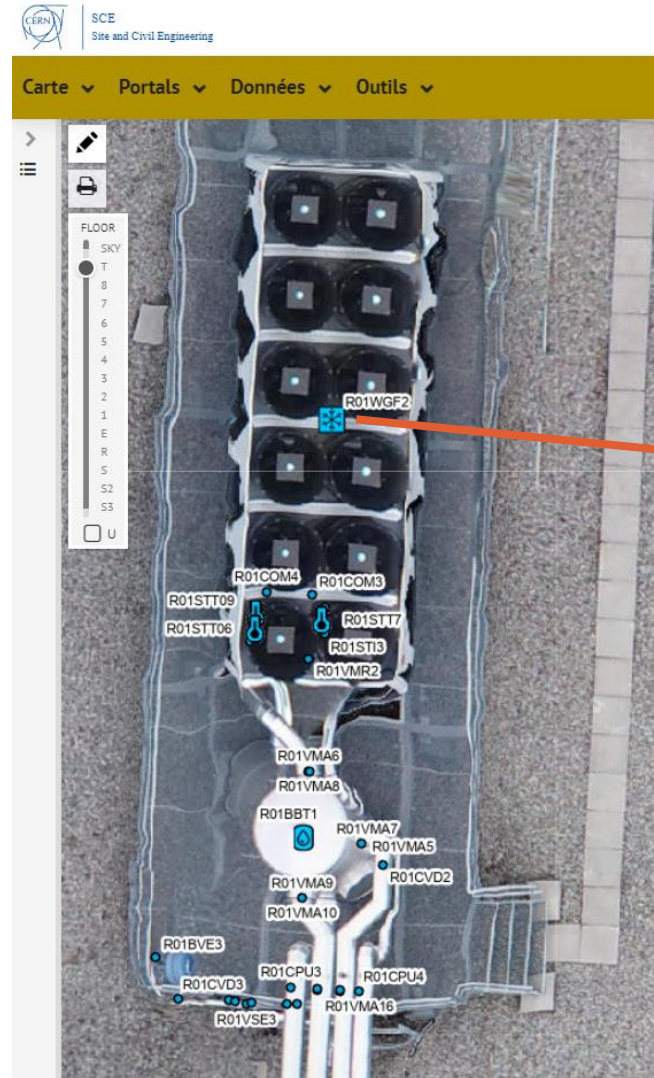
# 3/ Advanced concepts

► **Dynamo : Visual programming**

► **Accessible for non-programmer**
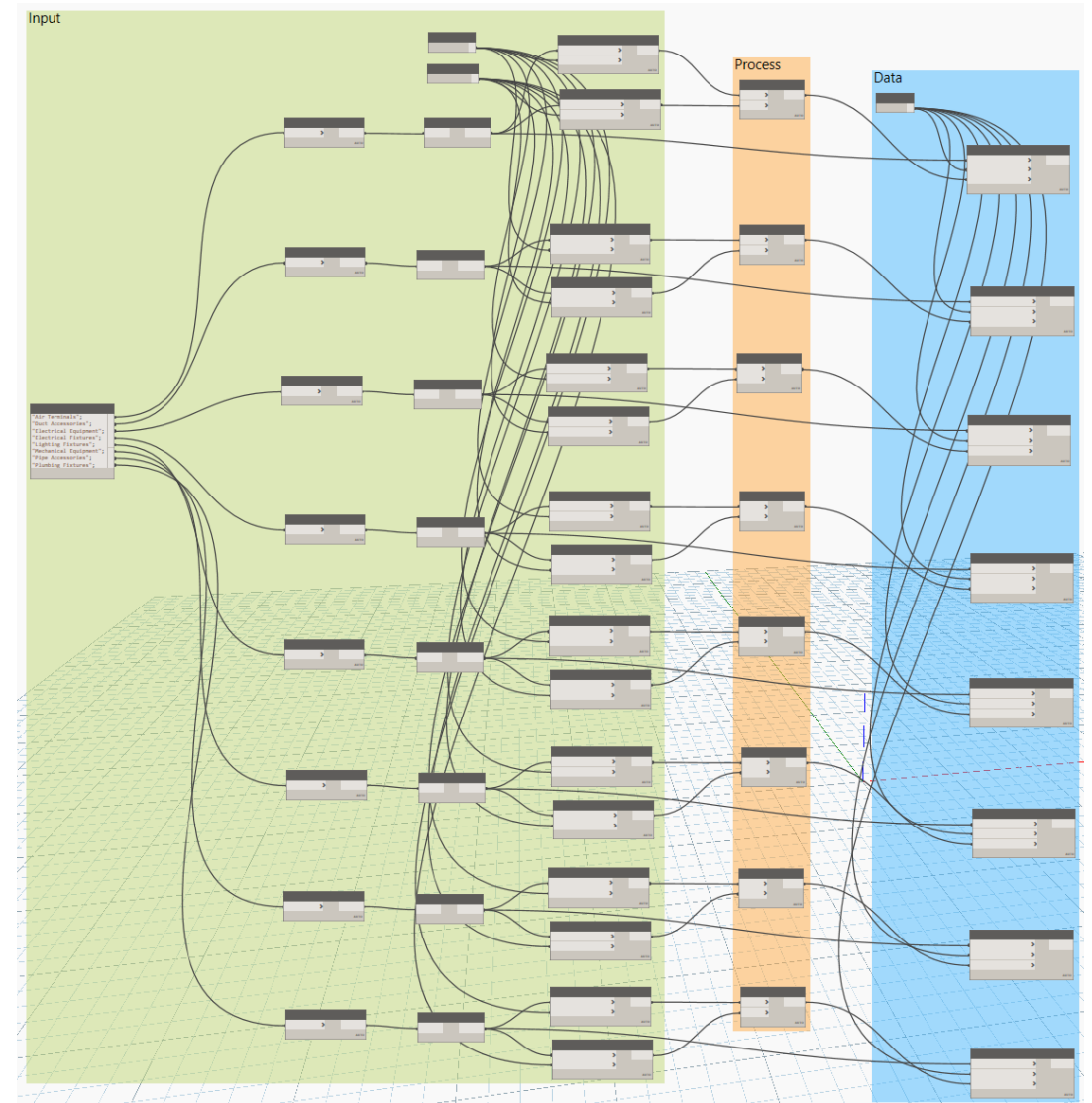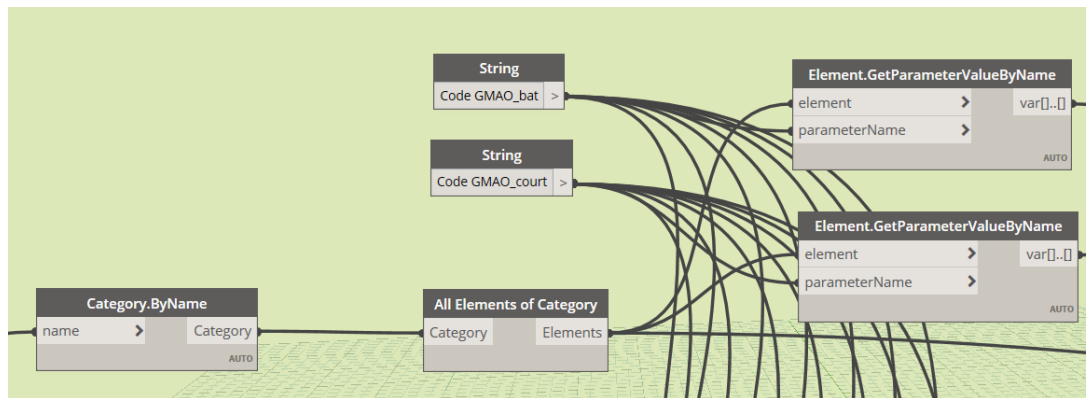
# 3/ Advanced concepts



► **PyRevit** 

► **Access API Revit (C#) using Python**

► **Tab custom tool for SAM-IN CAD Team**

► **Faster process and shortcut**

► **BOM to Excel tool instead of having several schedules by category**

# 3/ Advanced concepts

► "That Open Company" website

► IFC custom web software

► Open source

► If you know web languages you can create your own application with an IFC viewer and some data you want to display (real time sensor, coloring element by type, experiment process…)

home.cern