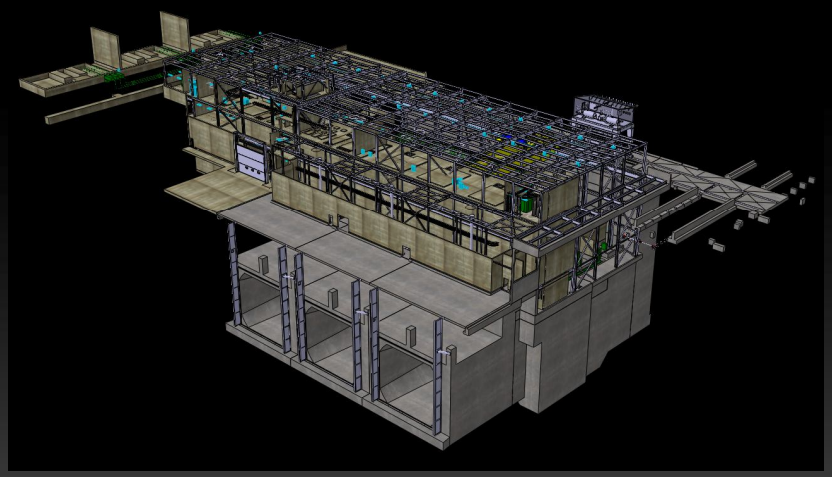
LIVE!

Multi-discipline Integration for Dam Modeling



The Hydro-Québec Story

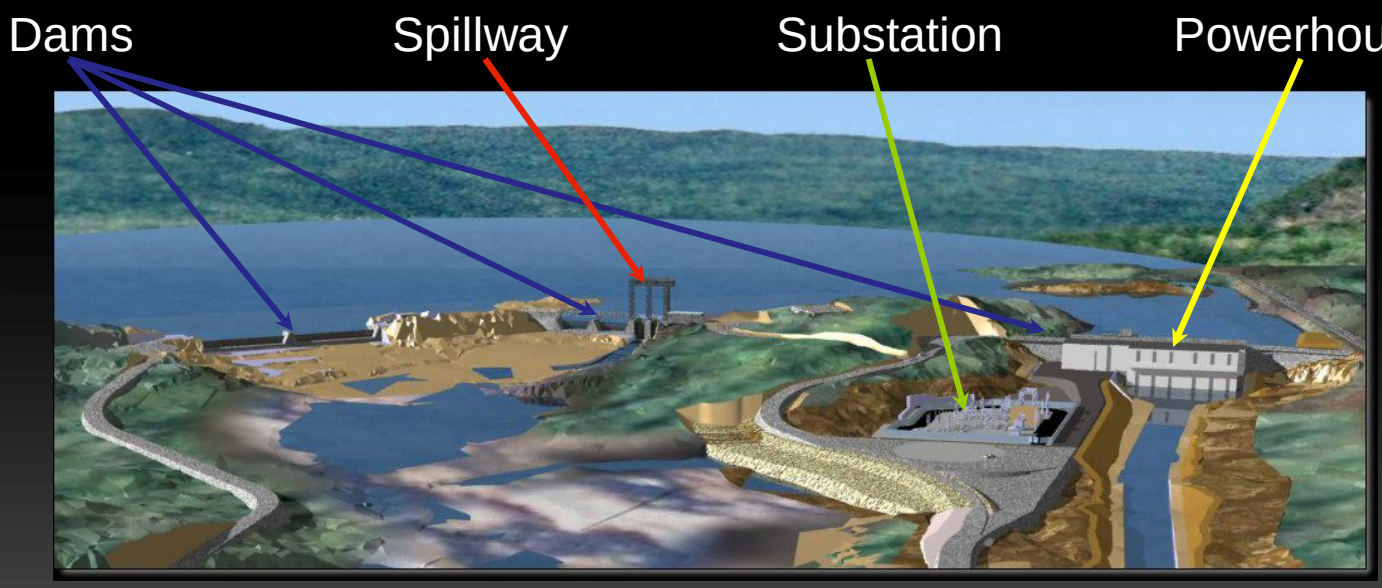
Hydro Québec

presented in conjunction with

IBM

LIVE!

Project Overview – What is a …



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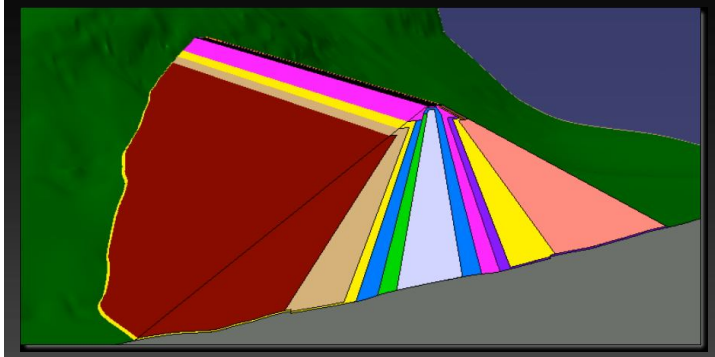
Highlights of the Disciplines Covered by the 3D Mock-up Project at Hydro-Québec

CATIA and SMARTEAM are now playing a major role in all new and ongoing projects.



Here are some of the highlights for each Discipline

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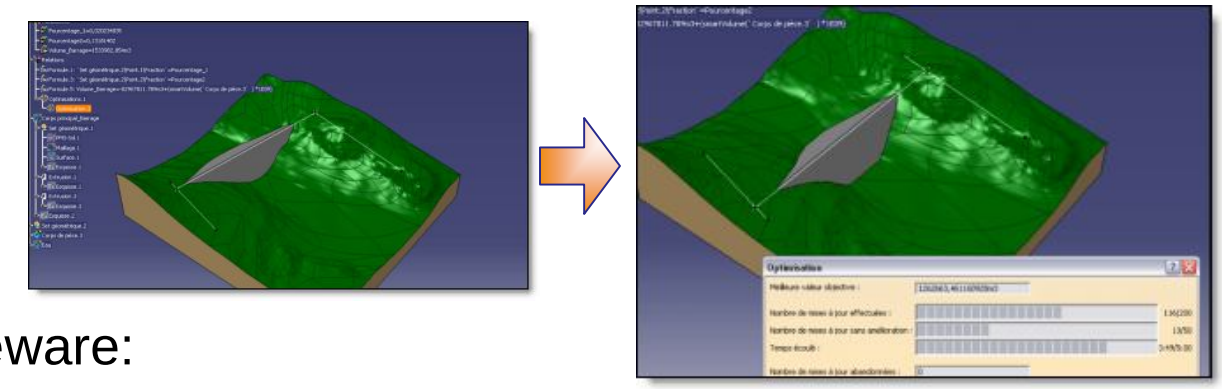
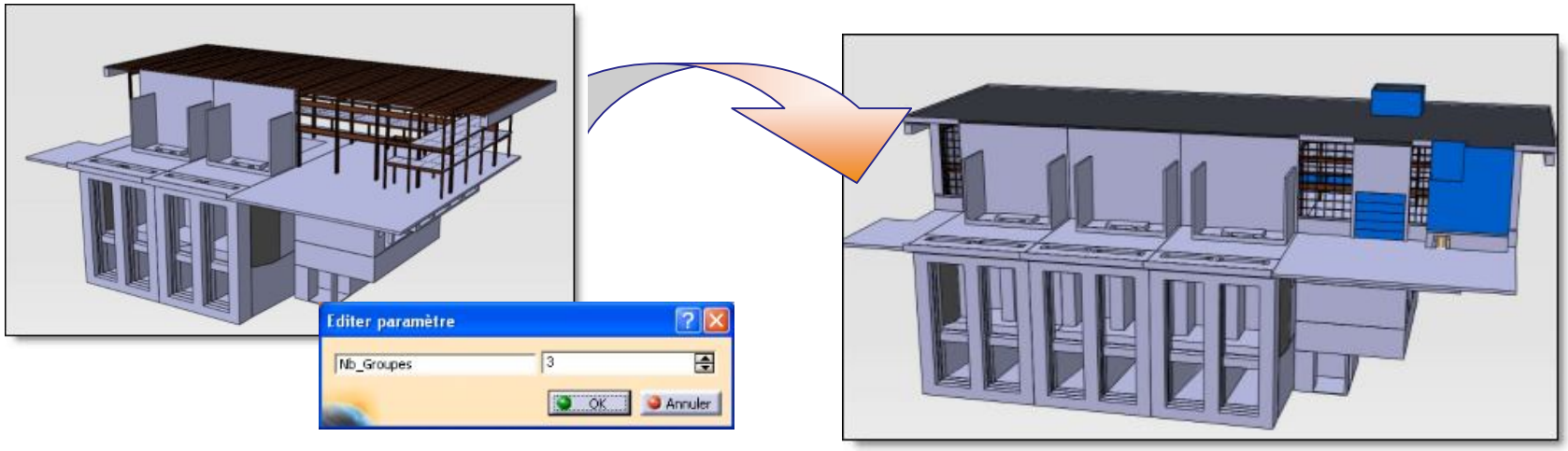
- **In Pre-study analysis:**
  - Optimizer:



  - Knowledgeware:



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- **Civil Engineering:**
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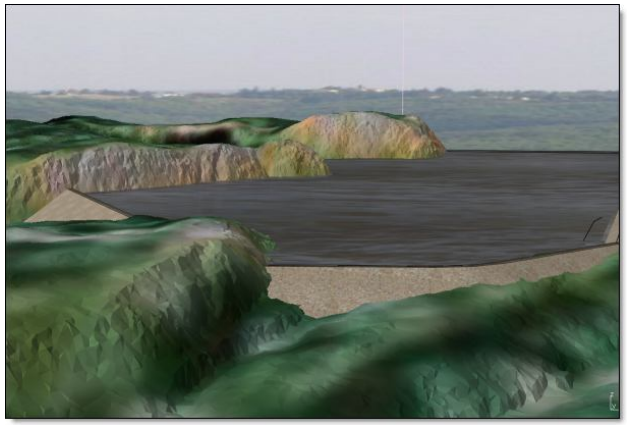
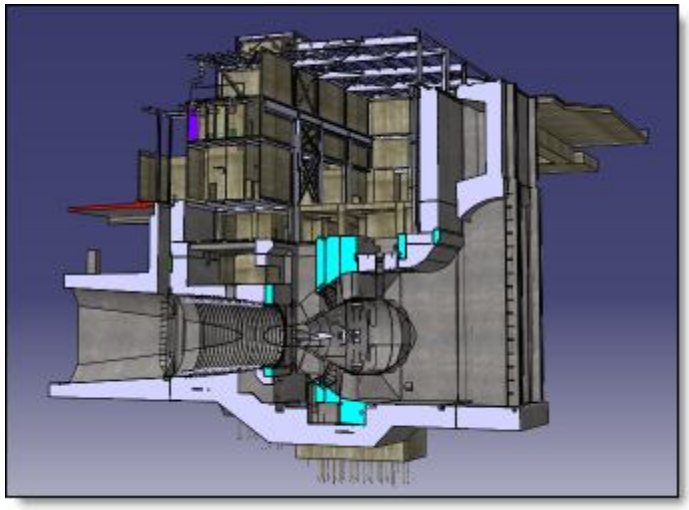
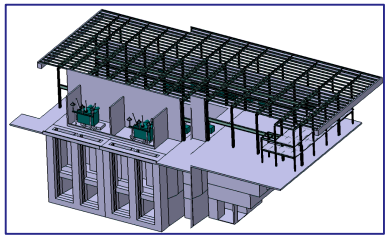
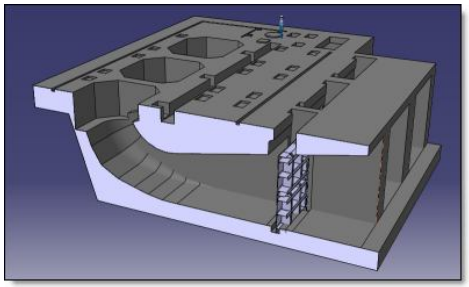
  - Steel Structures (preliminary design phase and detail design)









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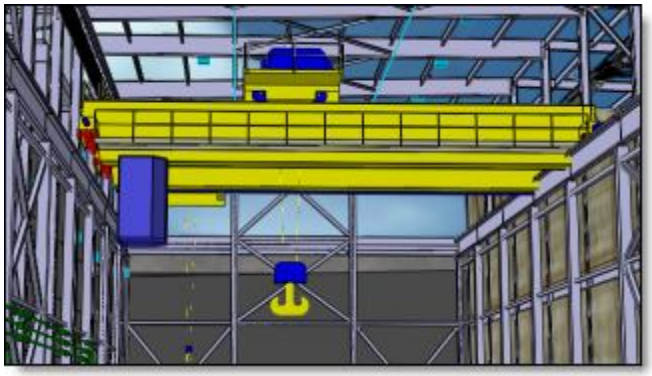
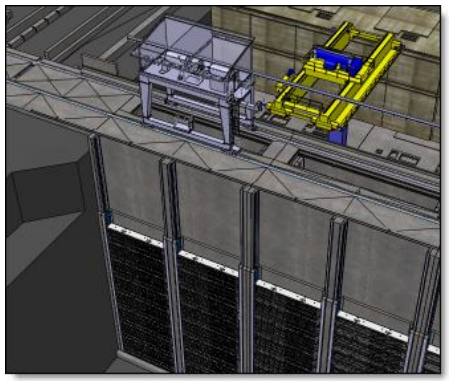
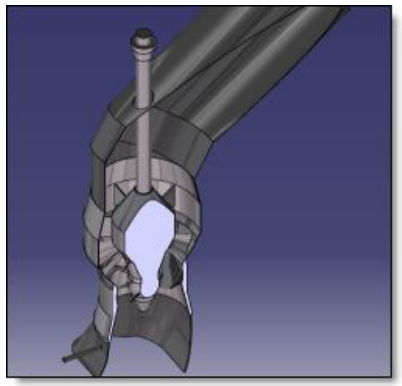
  - Heavy Mechanical (Cranes, Gates, Penstocks, Turbines, etc.)

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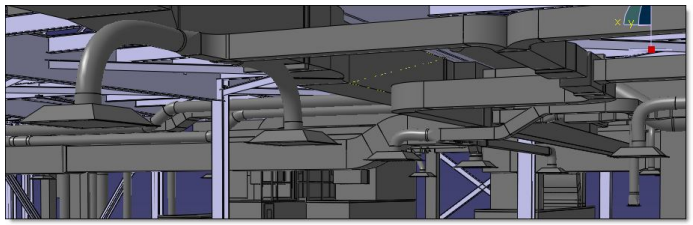
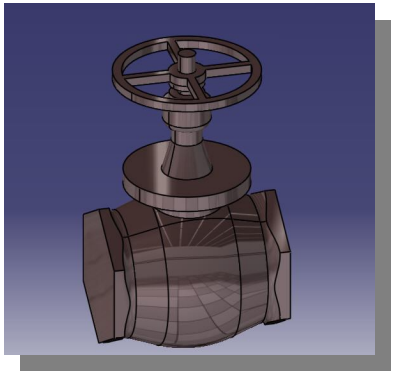
- **Auxiliary Mechanical Design:**
  - Piping
  - HVAC

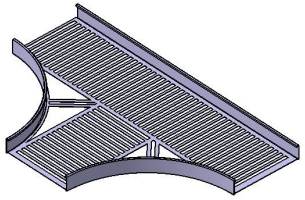


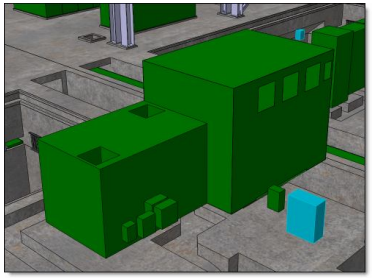


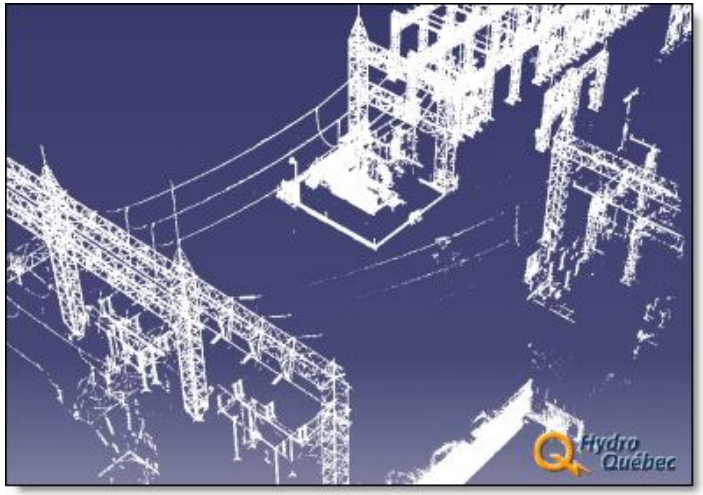
Here are some of the highlights for each Discipline

CATIA and SMARTEAM are now playing a major role in all new and ongoing projects.

- **Electrical**
  - Equipment and cabinets with Space Reservation
  - Raceways and Supports
  - Substation Design







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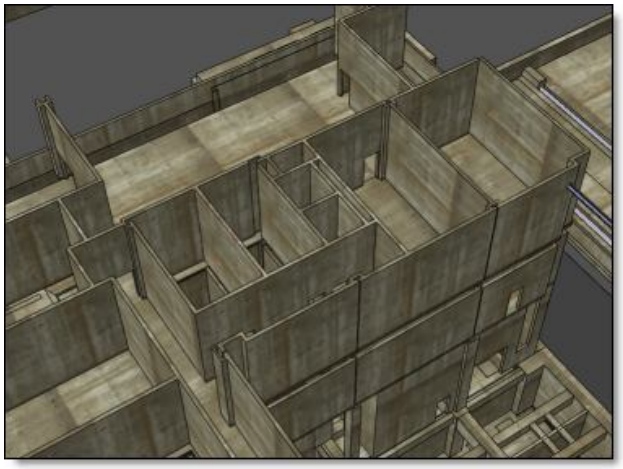

- **Architectural works**
  - Living quarter designed by architects
  - Doors and Windows catalogues

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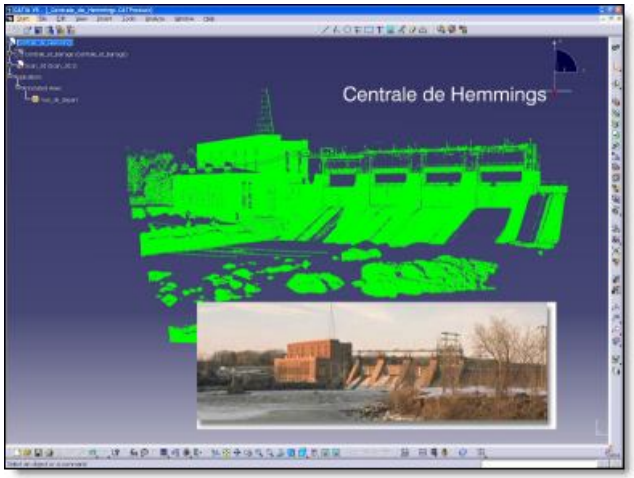


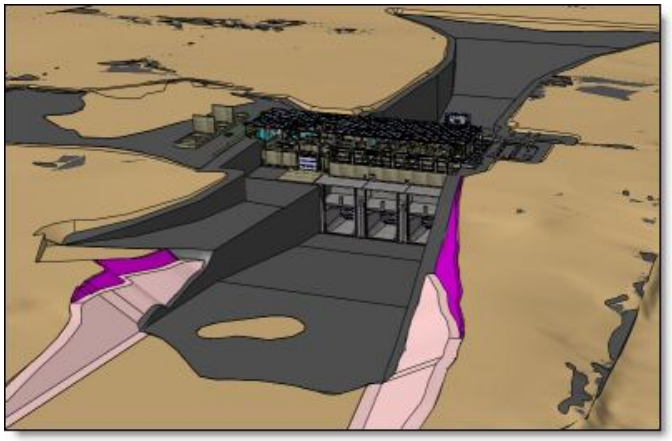
- **Architectural works**
  - Living quarter designed by architects
  - Doors and Windows catalogues

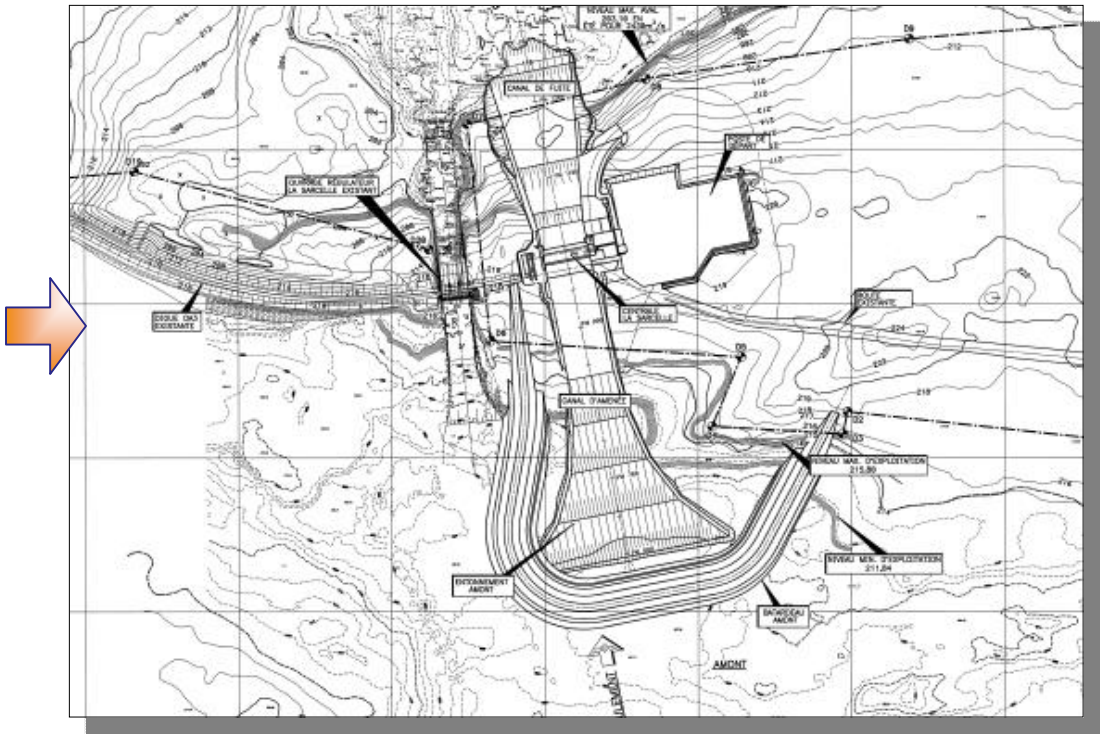
- **Reverse Engineering**
  - Applied in Terrain Modeling, Refurbishment Projects, Substation Expansion and Maintenance Operations

Here are some of the highlights for each Discipline

CATIA and SMARTEAM are now playing a major role in all new and ongoing projects.

- **2D Drawings !**
  - Still a major deliverable in this field
  - Use of GVS, macros, view superposition and Clipping planes





Benefits of using PLM Solutions at Hydro-Québec

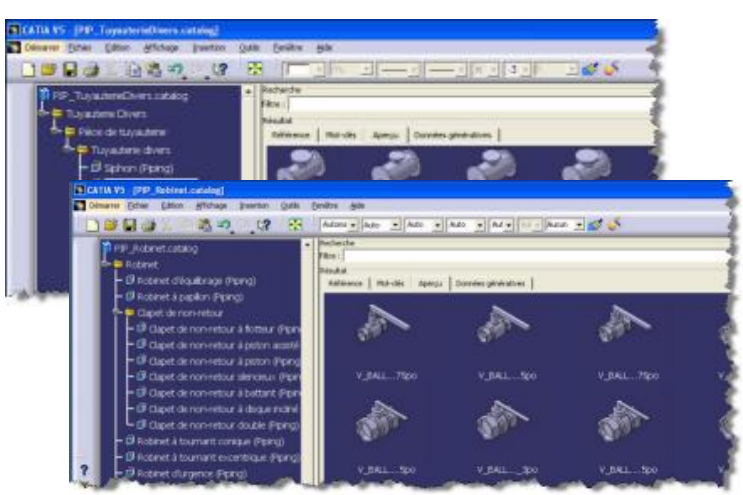
Every one of the 8 major projects since 2004 involved CATIA and SMARTEAM

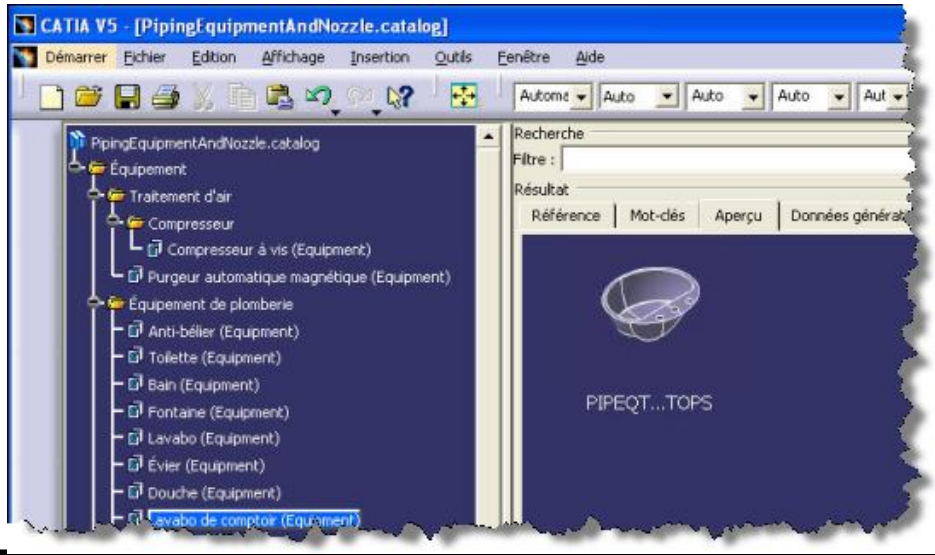
- **CATIA is an Integrated and Complete Solution**
  - Unique complete living mock-up including the major disciplines
  - One single tool to learn – easier for the users
  - No data transfer required – everything is in CATIA
  - Design Optimization – with knowledgeware
  - Allows more design iterations during conception
- **Quick 3D Results Visualization – great for project review**
  - No more 2D interpretation errors
  - Efficient clash analysis
- **Local team helping with Training and Support in French**
- **Preliminary studies are more accurate – using DELMIA**
- **Better project explanation for environmental issues at Public Hearings**

The secret of this successful deployment:
a core team of PLM product experts and HQ Domain Specialists.

Since 2004, the IBM and Hydro-Québec core team is responsible for the "HQ Image", a collection of developments, HQ parts catalogues, required Methodologies and Customizations.

This image, now based on R18sp3, is distributed and supported by this core team. The 5GB "standard environment" has customizations in ALL workbenches !





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PLM Solutions in other Hydro-Québec Divisions

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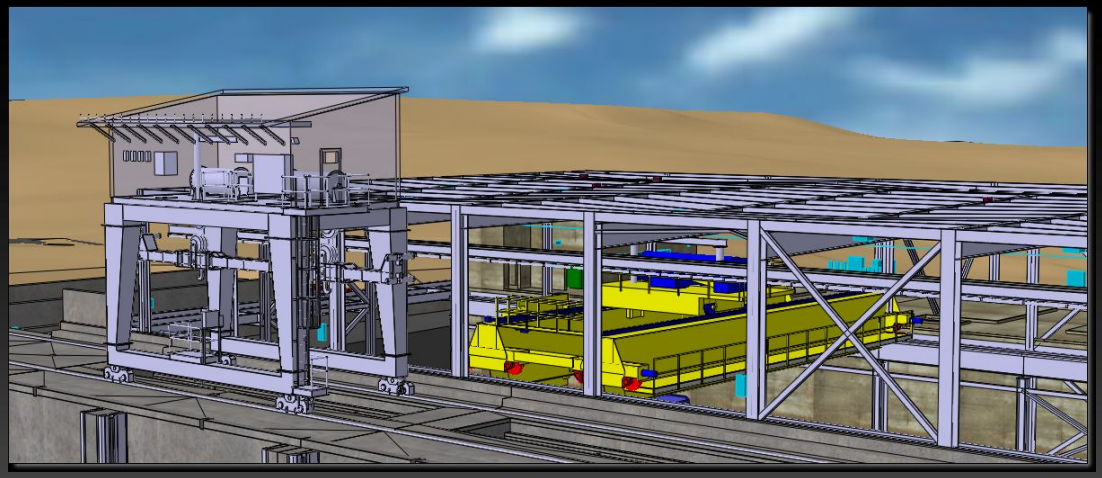
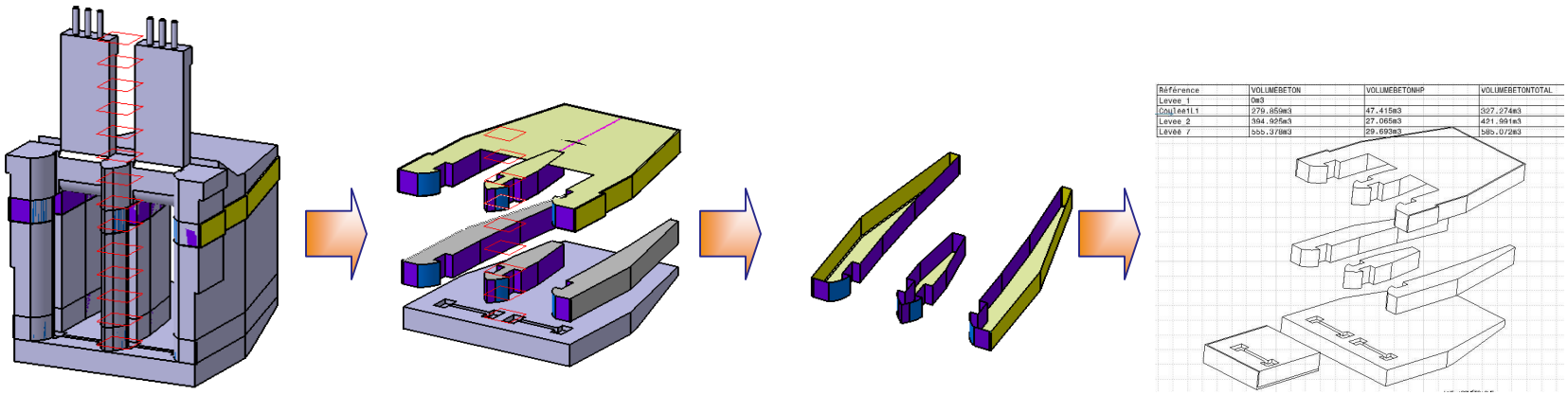


Improving the Estimation Process by making use of PSD/WBS and 3D modelling

A simple yet very efficient DELMIA implementation

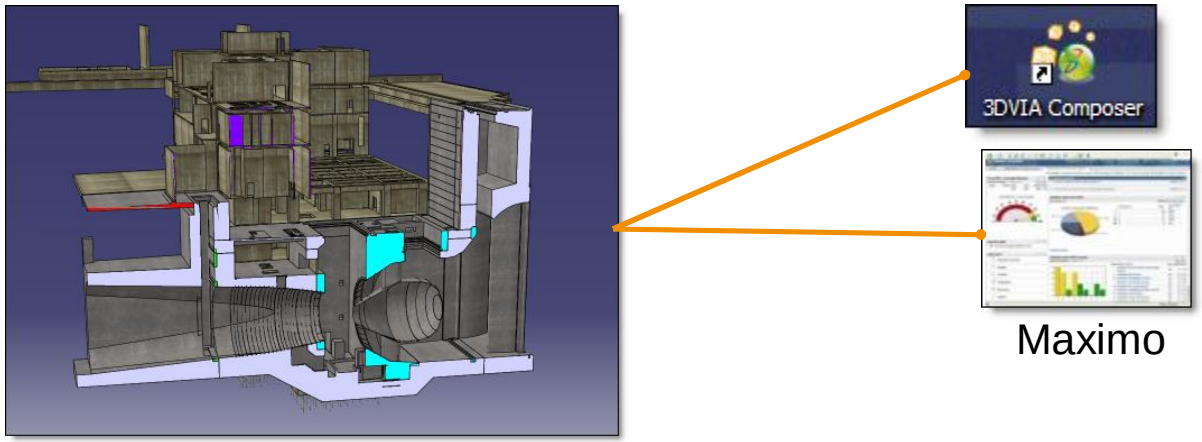
- **DELMIA used for estimation of Concrete Formworks:**
  - Initial Concrete Component
  - 3D Cutting Grid Definition (lift definition)
  - Formwork Quantities Calculations
  - Microsoft Project Plan Federation



Ongoing 2009 Development projects

The on-site IBM/Hydro-Québec core team is working on developing solutions to further deploy the PLM Solutions throughout Hydro-Québec.

- DELMIA and MAXIMO Interoperability
  - Similar to the working ENOVIA-MAXIMO demo at La Gaude
- 3DVIA Composer for 3D pdf publishing
- Steel Detailing and Rebars
- Getting the Contractors to use CATIA at the construction site
- SMARTEAM connection to existing legacy in-house systems



LIVE!

Thank you !

Presenters:

Christian Tessier, Hydro-Québec

tessier.christian@hydro.qc.ca

Emmanuel Boivin-Moreau, IBM Canada ltée.

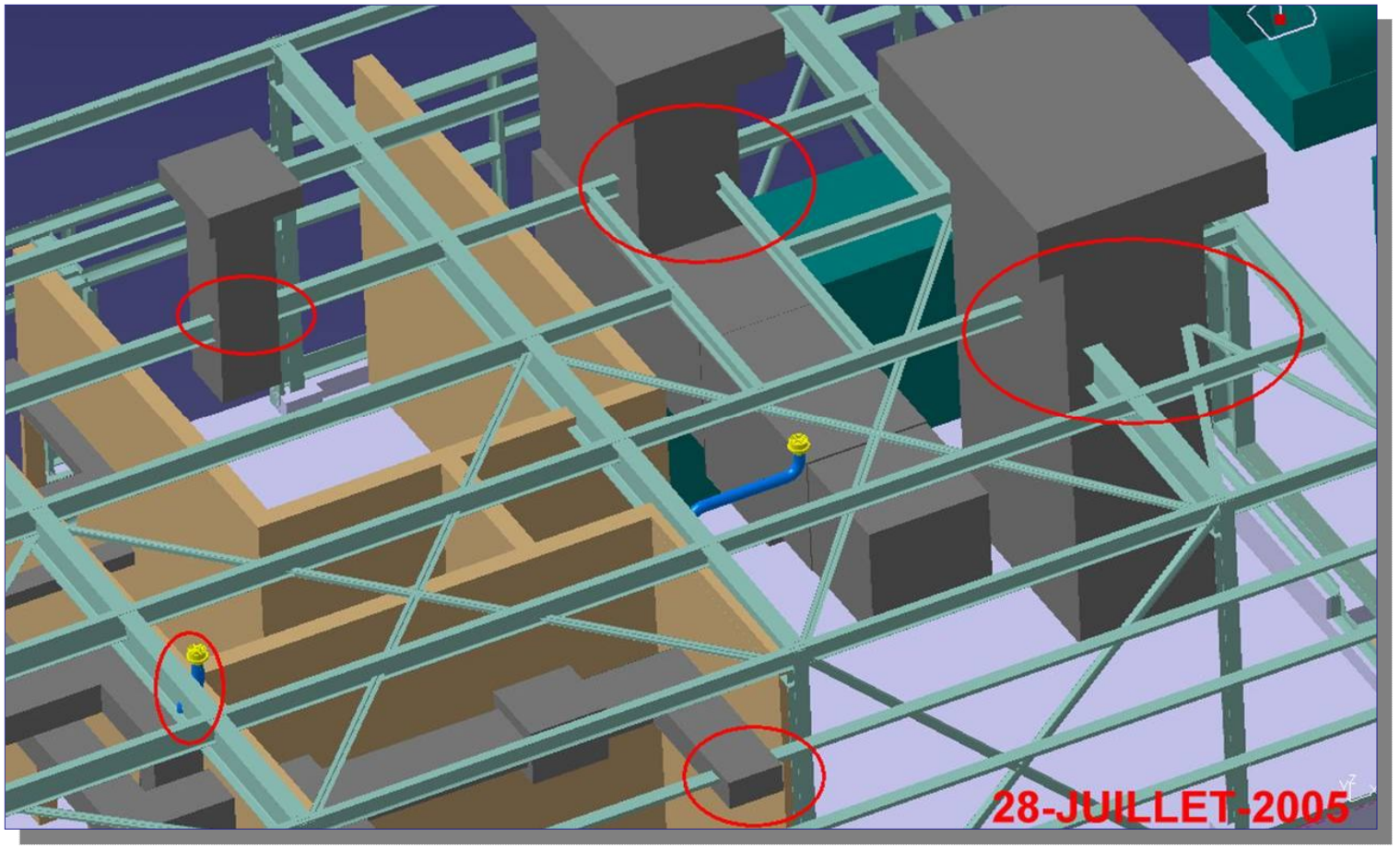
ebm@ca.ibm.com

Partners Involved

Contributors to the success of the 3D initiative, from Engineering Consultant Firms, Architects to Construction Contractors.

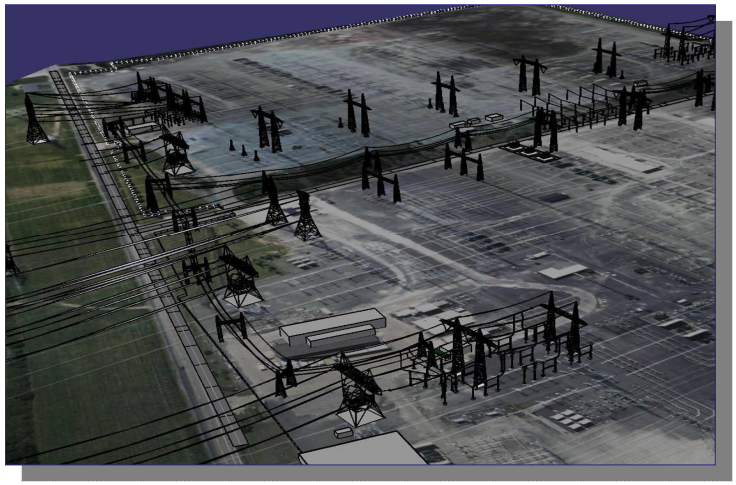
Example of a 3D benefits in Hydroelectrical Projects 1/4

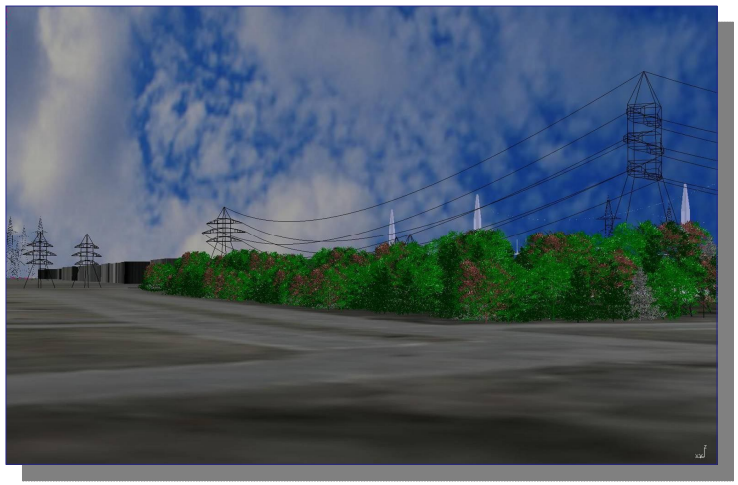
Inter-disciplines clash analysis now available, including HVAC, Structures, Piping, Electrical and Architectural systems. Also, all design reviews are now done using the 3D mock-up instead of 2D drawings.



Example of a 3D benefits in Hydroelectrical Projects 2/4

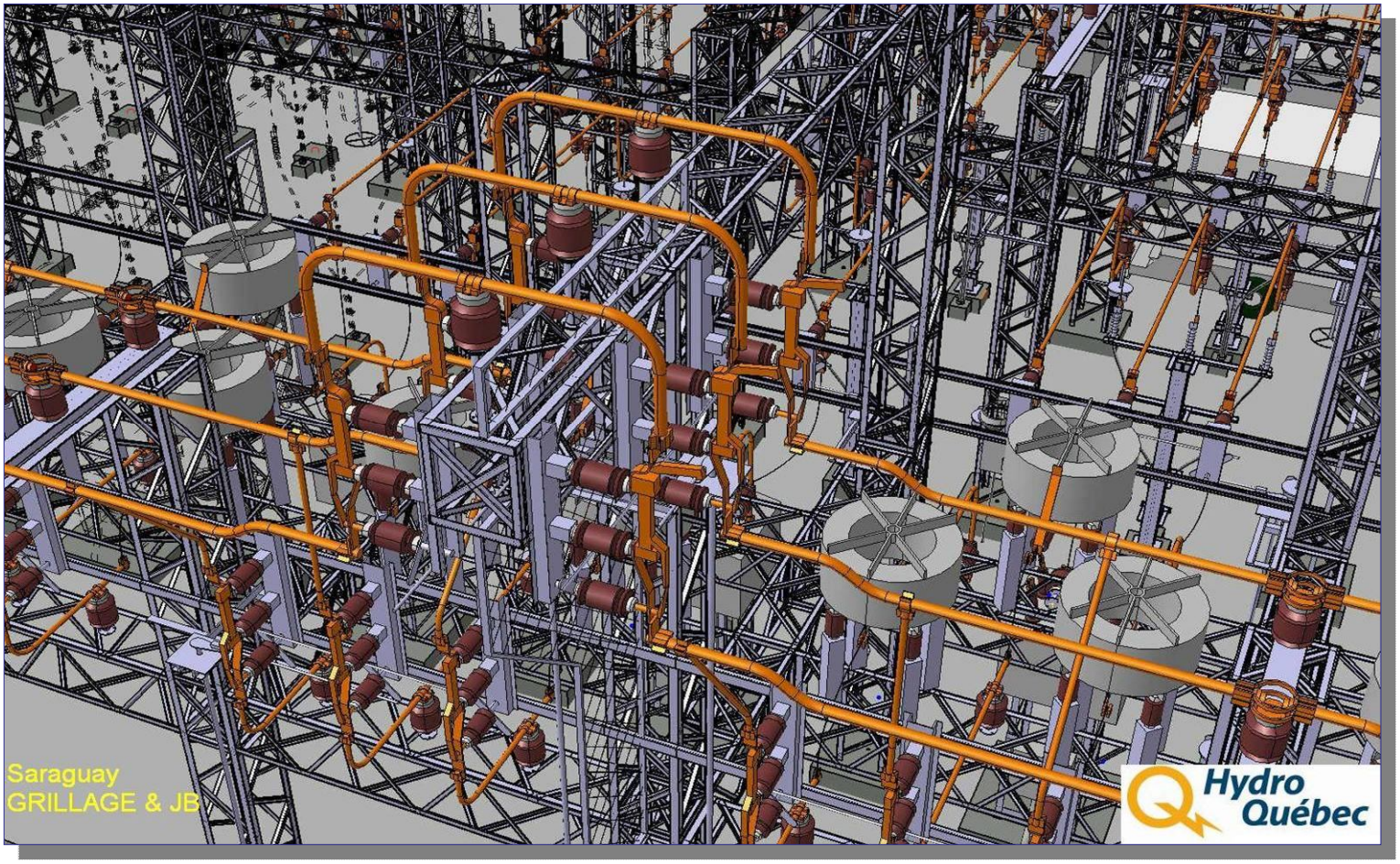
Visual Environmental Impact analysis leading to faster Project Acceptance





Example of a 3D benefits in Hydroelectrical Projects 3/4

Extensive Clash analysis on highly cluttered Substations, leading to more accurate feasibility studies on capacity augmentations.



Example of a 3D benefits in Hydroelectrical Projects 4/4

Pure 3D coverage analysis of lightning protection of substations using 3 axis milling machine analysis *(developed by Charles Crétaz, HQ TAM)*