

LIVE!

MULTI-DISCIPLINE INTEGRATION FOR DAM MODELING

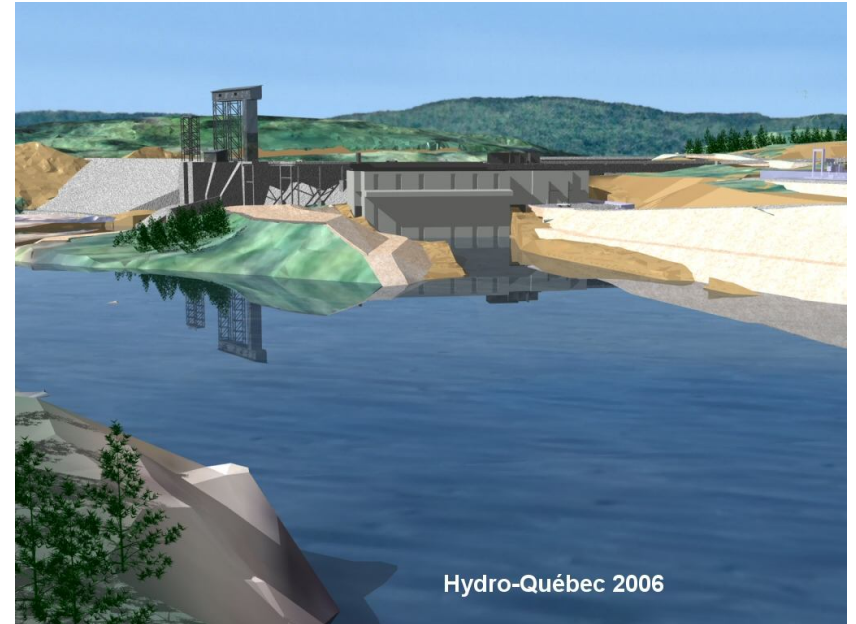
Christian Tessier (Hydro-Québec)
Emmanuel Boivin-Moreau (IBM)



Hydro-Québec generates, transmits and distributes electricity.
 More than 95 % of generated energy is from hydroelectricity.



- More than 23 000 employees
- Number of hydroelectric generating stations = 57
- Number of transmission substations = 509
- Total installed capacity (MW) = 35 647



- Transmission Lines = 33,008 km
- Distribution Lines = 109,618 km (overhead and underground lines)



- **OUR MISSION**

We carry out engineering and construction work related to generating and transmission facilities.

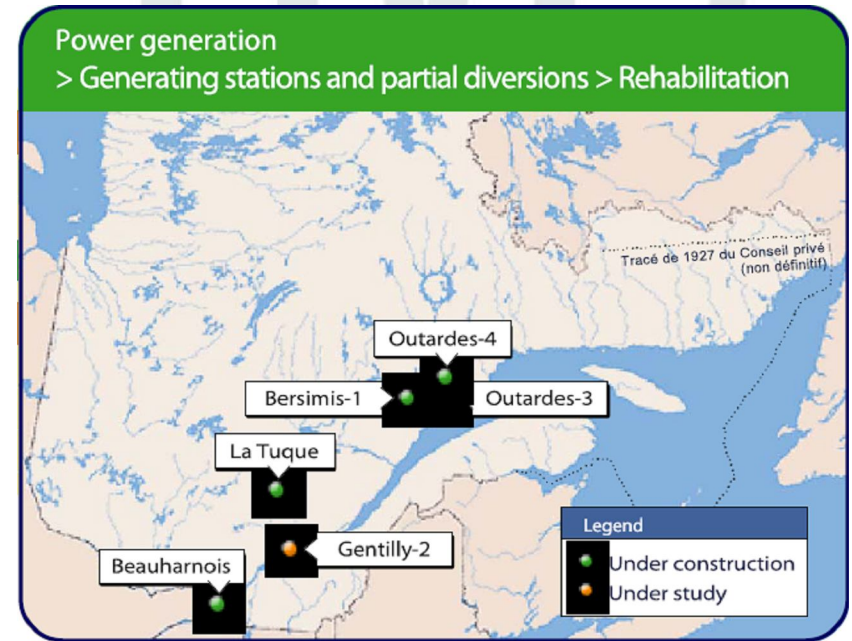
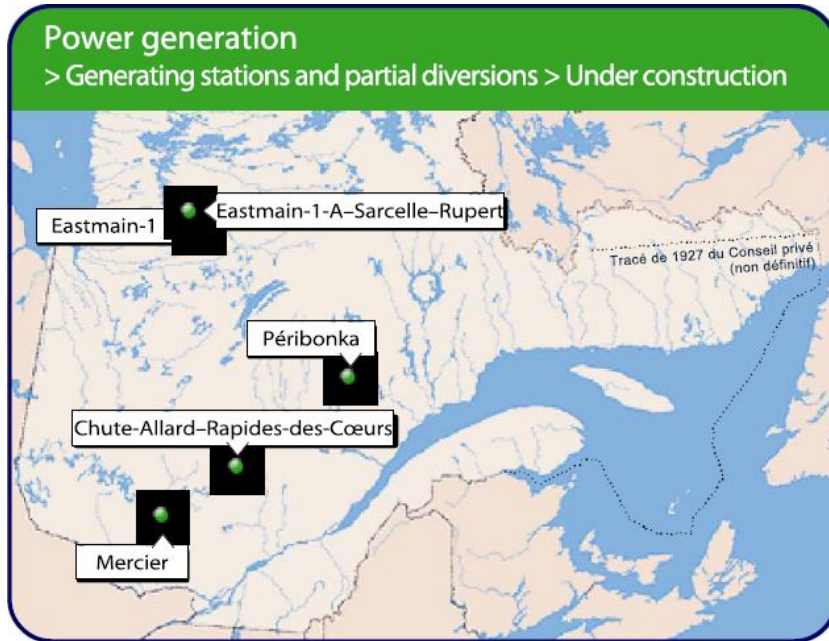
- **OUR ACTIVITIES**

Our services cover all project stages and aspects, from planning through to completion: study of the biophysical and human environment, engineering, construction, project management and handoff to the operator.

- **INNOVATION: A CORNERSTONE OF OUR SUCCESS**

“Our innovative work methods are one of the keys to our success.”
(2007 Annual Report)

A lot of new Projects



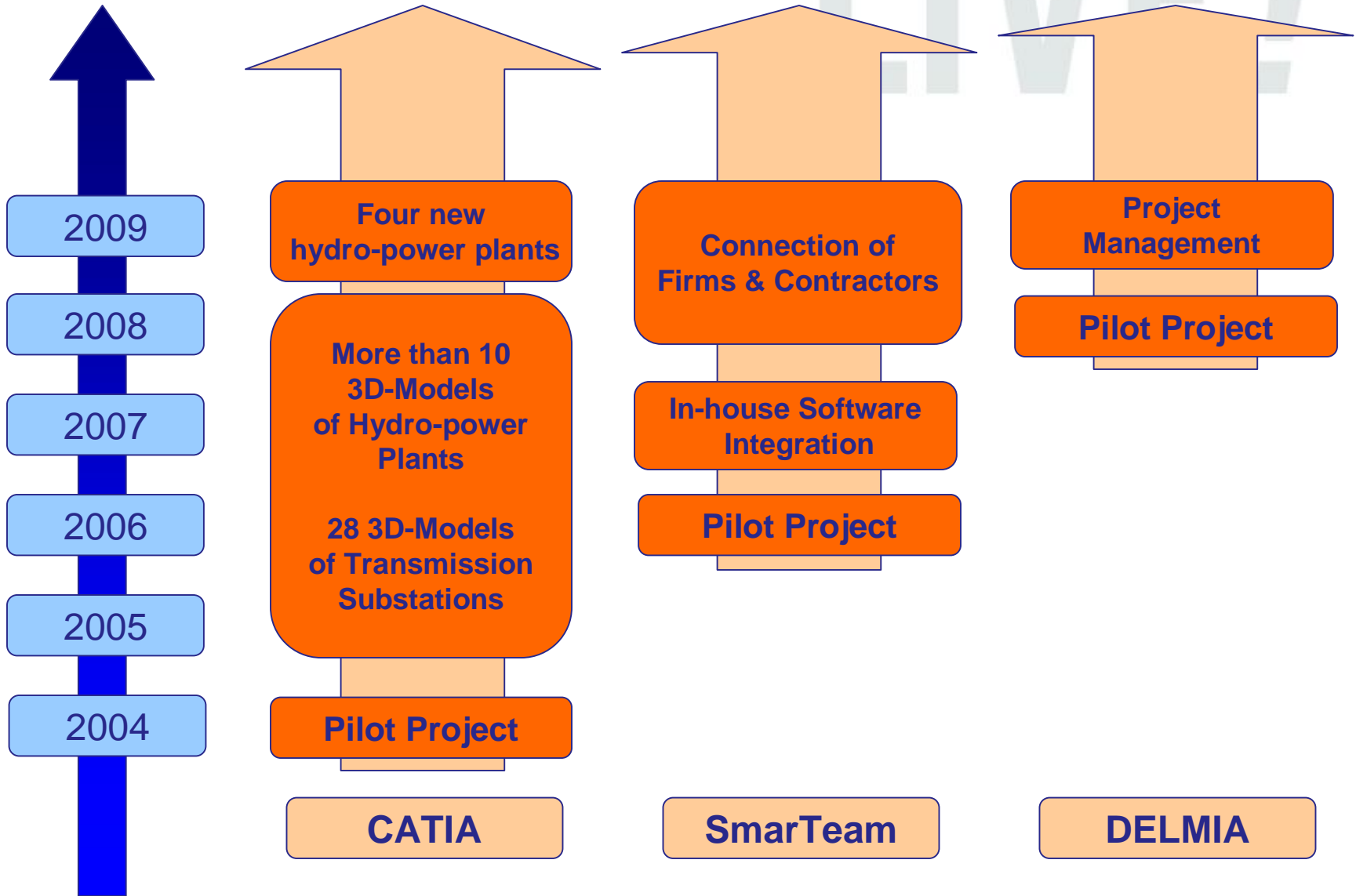
Power Generation:

- 5 new Hydro power plants under construction and 4 under study
- 6 Power plants under rehabilitation

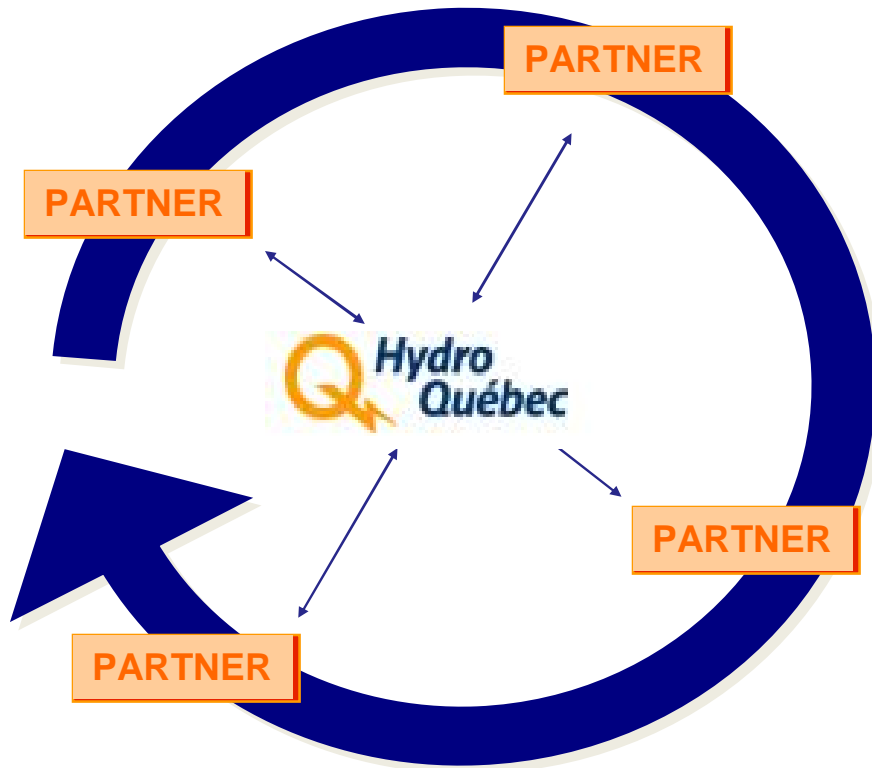
Power Transmission:

- More than 10 New Substations under construction or study
- Interconnection with Ontario, integration of wind farms

Historical Background



Centric Collaborative Environment

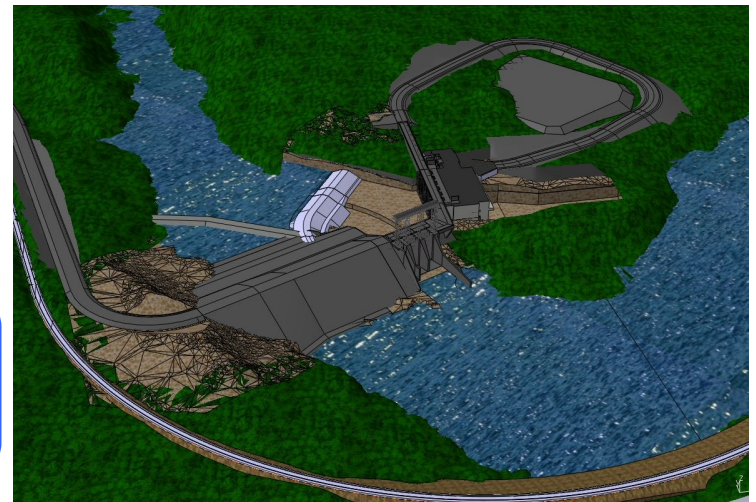


PARTNER

- Project Manager
- Engineering
- Planning
Estimation
Project Control
- Supplies
Contract
Administration
- Contract
Administration
- Owner

Hydro-Québec centralises the information workflows around a single repository (SmarTeam).

Hydro-Québec gives the CATIA licences to its partners.



Benefits of 3D

Generic Benefits	Specific Benefits
<ul style="list-style-type: none">● Optimize processes and reduce the development cycle time by integrating product, process and resources● Bring closer the partners and owners by means of a collaborative environment● Improve communication, share ideas and product related information● Encourage innovative concepts and improve knowledge reusability● Increase estimation process efficiency and improve decision making process	<ul style="list-style-type: none">● Reduction of drawing numbers : 40% to 60% less; Drawings are still necessary for construction● Reduction of technical problems during engineering phase (15% to 30% less) & construction phase (5% to 10% less)● Reduction of the design time : 5% to 10% depending on the discipline● Better estimation of the project costs & delays



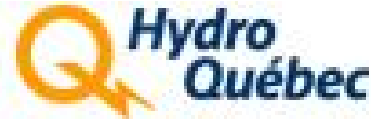
Appendix

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- Presentation of the company
- 3D at Hydro-Québec
- Examples of 3D Modeling
- Advantages and Benefits of 3D
- Information Structure for 3D Modeling

Some information about the Company

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- Hydro-Québec generates, transmits and distributes electricity: its sole shareholder is the Québec government.
- Mainly using renewable energy sources, in particular hydroelectricity, it supports the development of wind energy through purchases from independent power producers.
- Hydropower is a green, renewable generating option that provides great operating flexibility
- Hydro-Québec also conducts research in energy-related fields and takes an active interest in energy efficiency.
- Our employees whole-heartedly embrace the principles of sustainable development and work tirelessly to protect the environment for today and for tomorrow ("Green Energy")

Some information about the Company

The Company comprises four divisions :

Hydro-Québec Production

Generates and wholesales power on domestic and external markets.

Hydro-Québec TransÉnergie

Operates the most extensive transmission system in North America for the benefit of customers inside and outside Québec.

Hydro-Québec Distribution

Provides Quebecers with a reliable supply of electricity. To meet needs beyond the annual heritage pool supplied by Hydro-Québec Production, it obtains supplies on open markets. It also works to encourage its customers to make efficient use of electricity.

Hydro-Québec Équipement / Société d'énergie de la Baie James

Are the prime contractors in construction projects for Hydro-Québec Production and Hydro-Québec TransÉnergie.

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Some information about the Company

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- 2007 in Figures :
 - More than 23 000 employees
 - Revenue = 12 330 \$M
 - Net Income = 2 907 \$M
 - Total assets = 64,852 \$M
 - Total customer accounts in Québec = 3,868,972
- Facilities :
 - Number of hydroelectric generating stations = 57
 - Total installed capacity (MW) = 35 647
 - Transmission Lines (overhead and underground) = 33,008 km
 - Distribution Lines (overhead and underground) = 109,618 km
 - Number of transmission substations = 509

Hydro-Québec Équipement and Société d'énergie de la Baie James

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- **OUR MISSION**

We carry out engineering and construction work related to generating and transmission facilities for Hydro-Québec Production and Hydro-Québec TransÉnergie. Our projects meet stringent criteria in terms of profitability, respect for the environment and social acceptability.

- **OUR ACTIVITIES**

Our services cover all project stages and aspects, from planning through to completion: study of the biophysical and human environment, engineering, construction, project management and handoff to the operator. We are continually seeking new ways to reduce costs and construction time while maximizing facility performance. We work actively with partners in the industry and in the communities concerned.

Hydro-Québec Équipement and Société d'énergie de la Baie James

Innovation: A cornerstone of our success

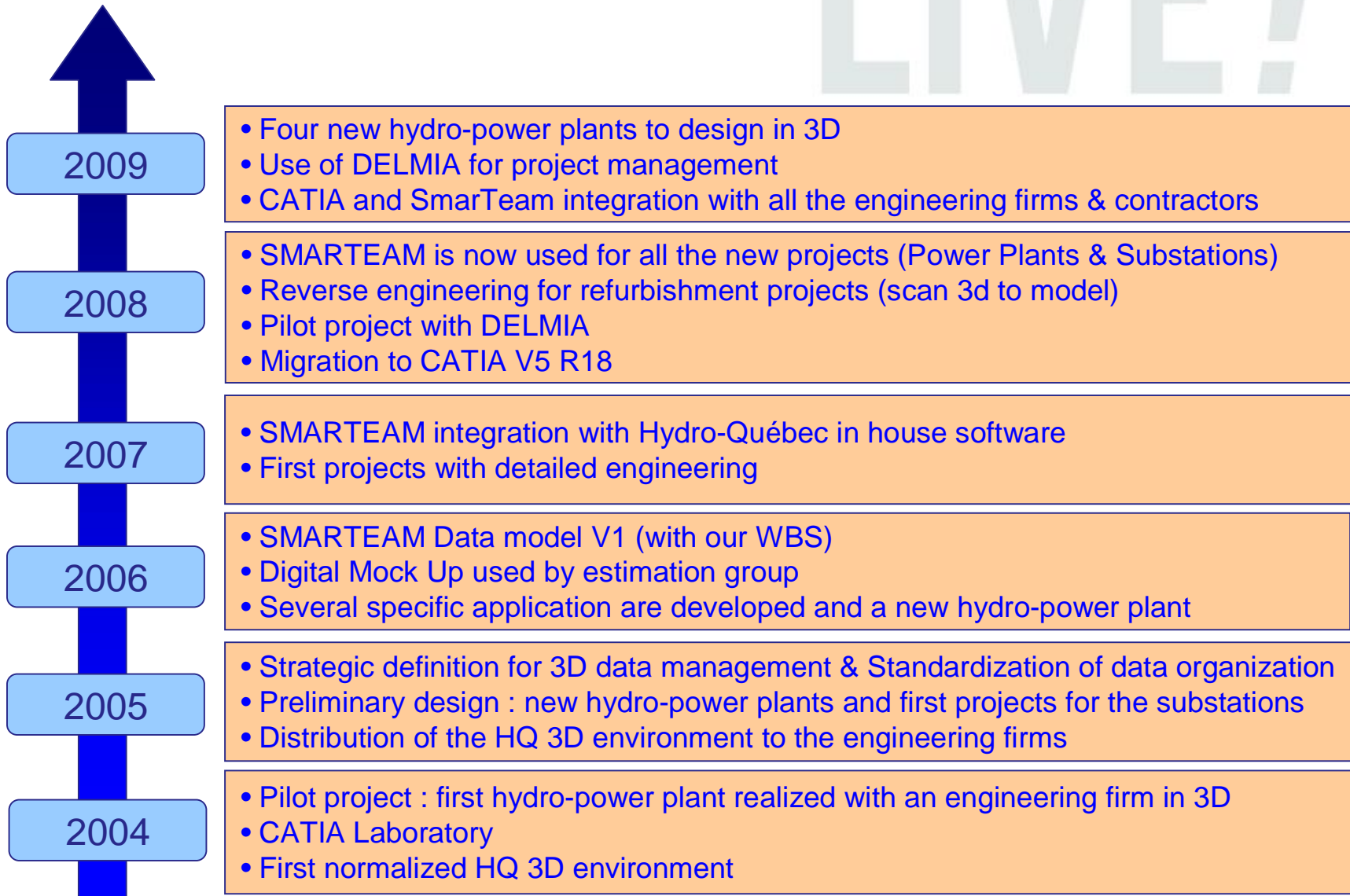
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- “Our innovative work methods are one of the keys to our success.”*
- Innovative practices and concepts are behind the success and profitability of our projects.
- “...we continued to deploy version 5 of CATIA and used it to model several new and existing facilities. This software allows many different project variants to be analyzed in order to find the best solutions”*

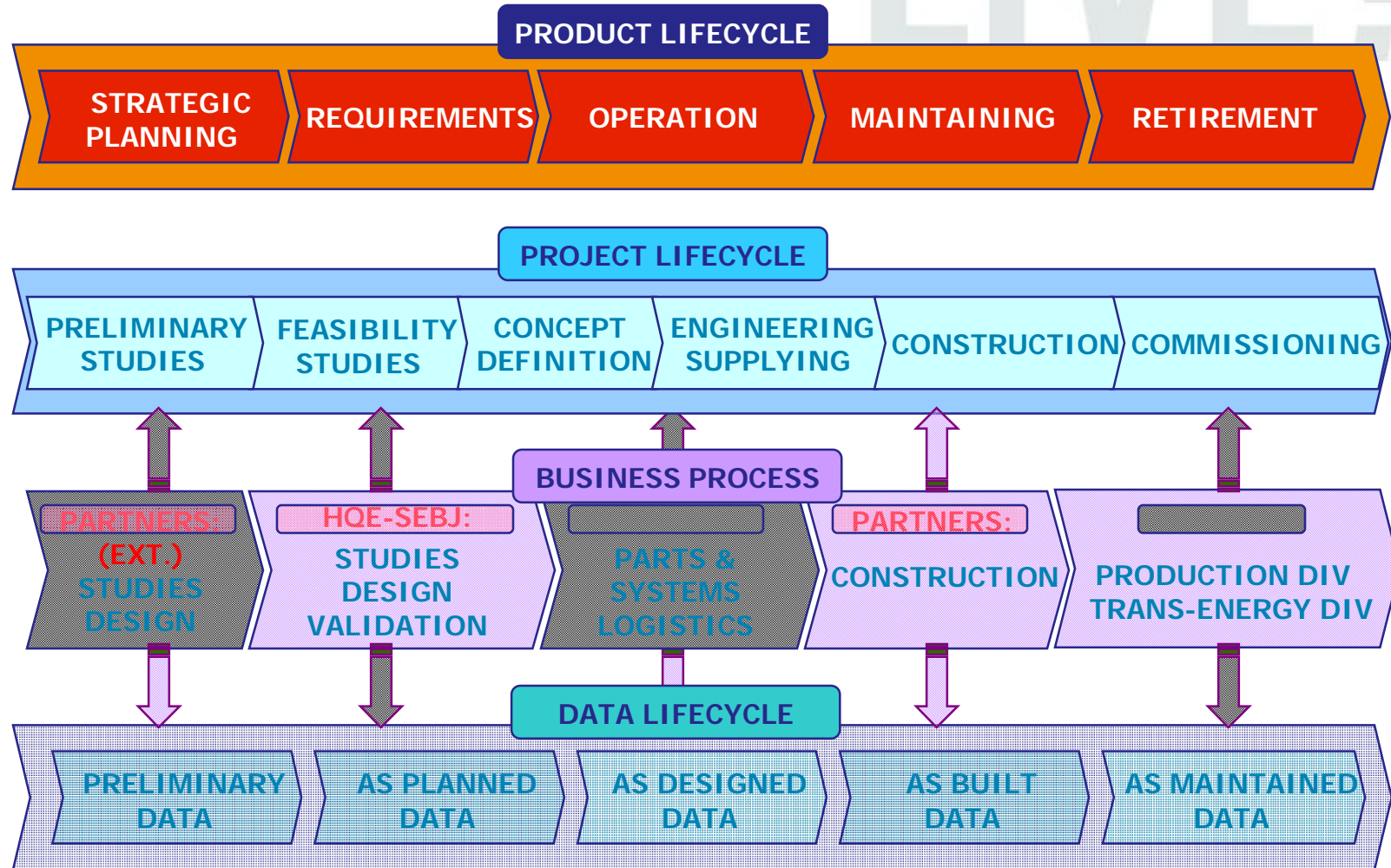
* 2007 Annual Report

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Historical Background



Different lifecycles



Lifecycle Management & Business Objectives

- Methods and tools used to manage all activities related to the product lifecycle, from concept to retirement.
- Strategy based on sharing product data, applying common processes and improving knowledge reusability in business & engineering processes.
- Improve collaboration between engineering, project management consultants and contractors:
 - **Concept of Extended enterprise**
 - **Collaborative environment: internal and external partners**
 - **Providing access and use of unique product definition information**
- Maintaining the integrity of the product's definition and related information throughout the life of the product:
 - **Keep the digital mock-up up to date during the entire lifecycle (from the feasibility study until the retirement)**
 - **As a single source of information**

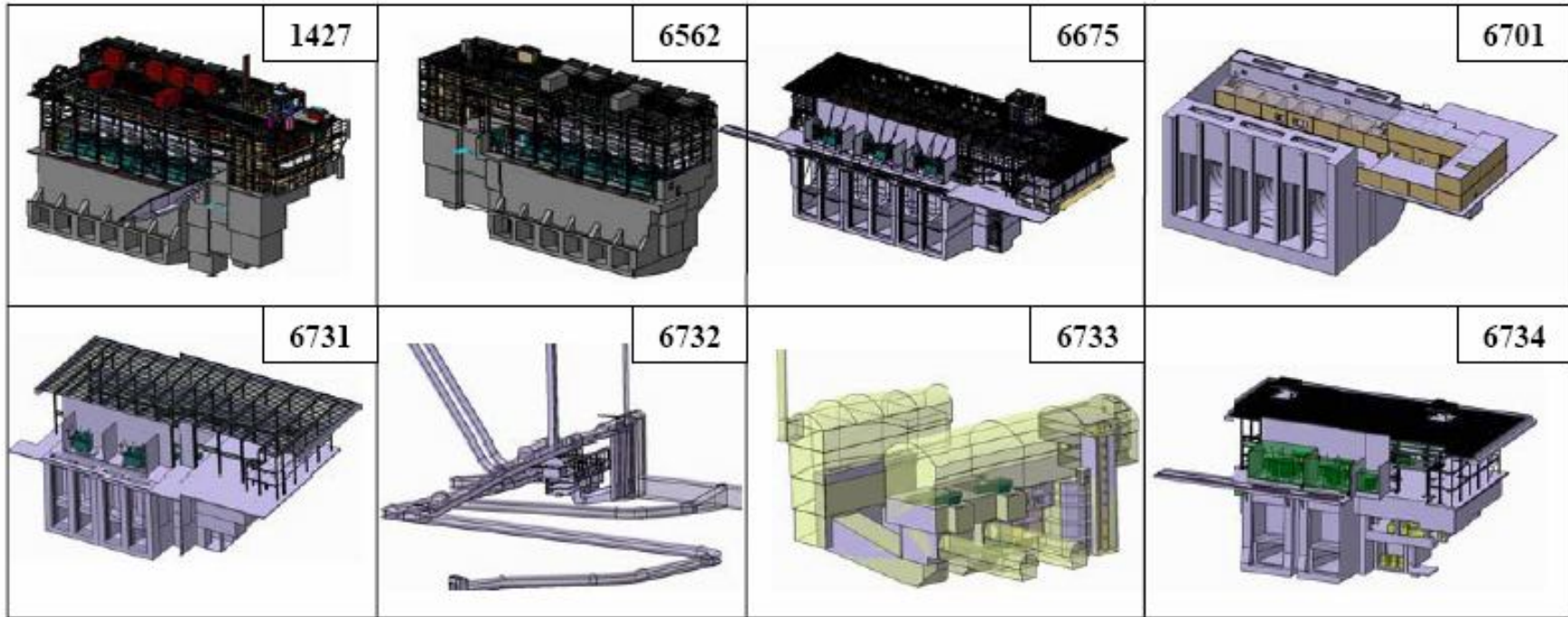
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Solution components

- Software
 - Dedicated CATIA V5 Licences for Engineering
 - Dedicated SMARTEAM Licences for 3D data management
- Logistics
 - «CATIA» Laboratory
 - Specific environment for development purposes
 - Specific environment for production
- Teamwork: Application specialists CATIA / SMARTEAM
 - Develop, maintain and improve the environment
 - Customization and special projects
- Strategic planning and deployment
 - Strategic planning (new functionalities)
 - Deployment agenda and related issues
 - Catalogues Management



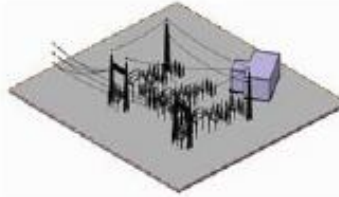
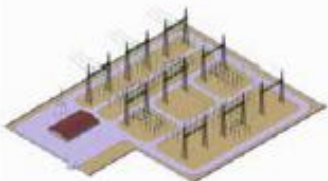
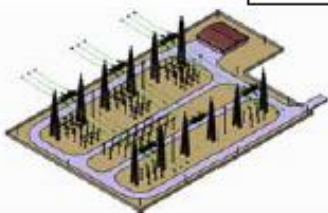
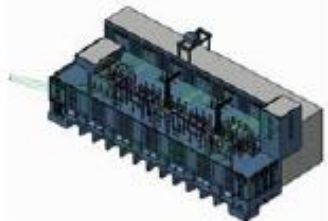
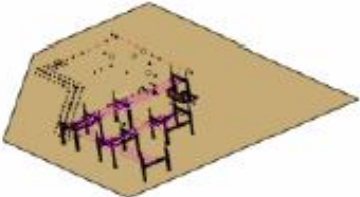
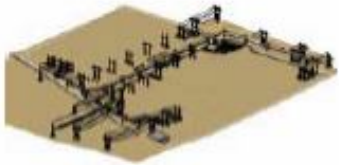
Examples of Different Power Plants

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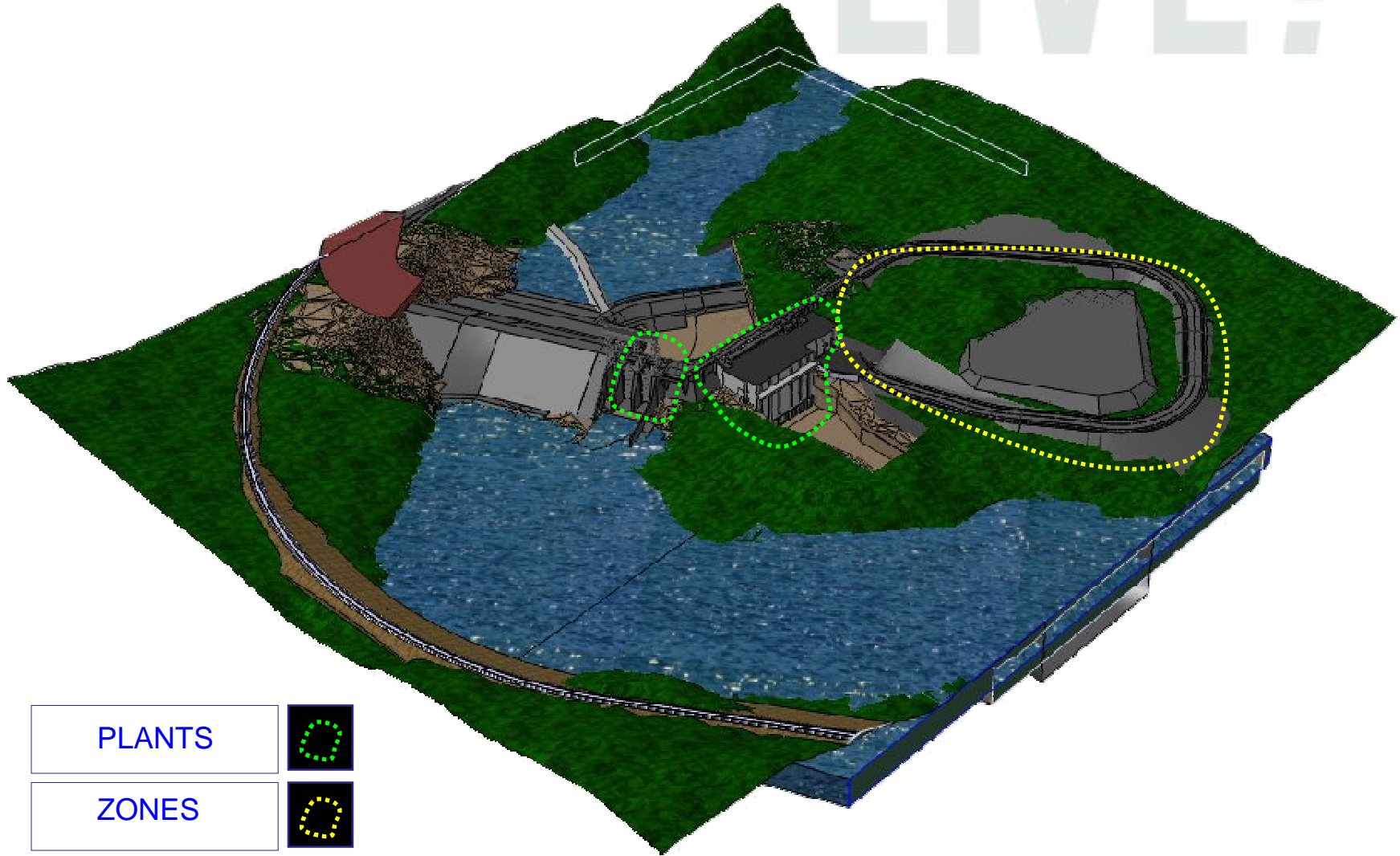
Examples of Different Transmission Substations

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 <p>6601</p>	 <p>6602</p>	 <p>4012</p>	 <p>6612</p>
 <p>6703</p>	 <p>4233</p>	 <p>0083</p>	 <p>0066</p>

Hydro-Electric Development

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PLANTS

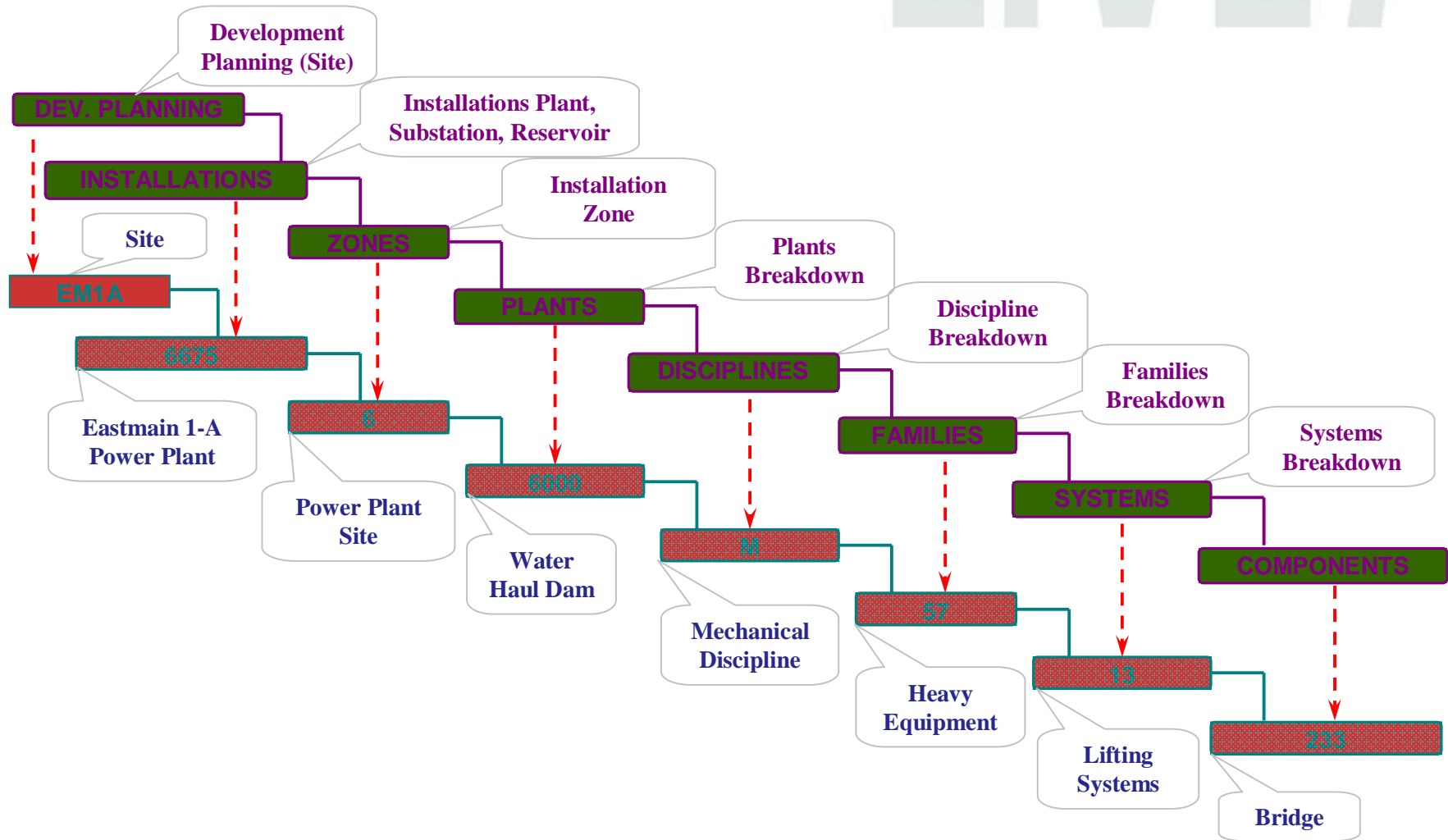


ZONES



Product Structure Definition

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Information Structure

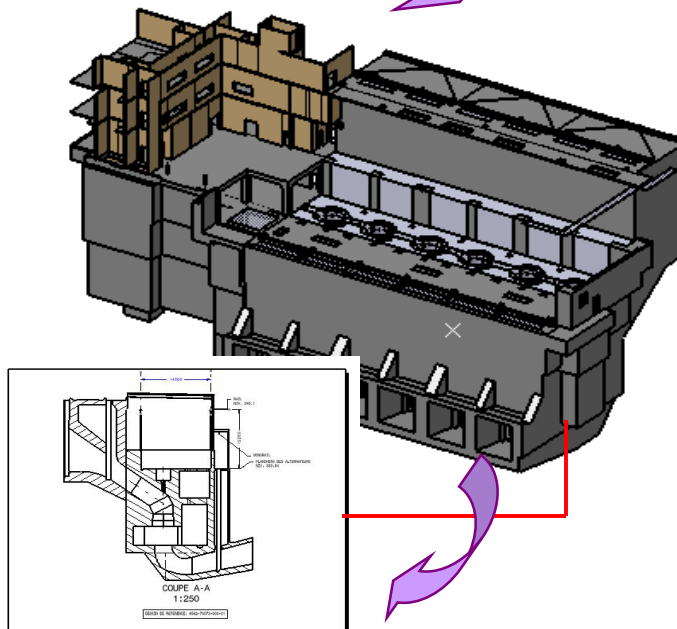
PRODUCT STRUCTURE
DEFINITION
PSD

ZONES

PLANTS

SYSTEMS

COMPONENTS



PART BASED
STRUCTURE
HIERARCHICAL TREE

- CHA_CEN_CIB
 - CHA_CEN_AxeDesGroupes_REF (Reference_Axe_Des_Groupes.1)
 - CHA_CEN_AxeDesGroupes_REF
 - Publications
 - CHA_CEN_AxesDesColonnes_REF (Référence_Axe_Des_Colonnes.1)
 - CHA_CEN_AxesDesColonnes_REF
 - Publications
 - CHA_CEN_Planchers_REF (ReferenceDesPlanches.1)
 - CHA_CEN_Planchers_REF
 - Publications
 - CHA_CEN_CIB_PriseDeau_PhaseI (CA_PriDeaPhaIBet.1)
 - CHA_CEN_CIB_PriseDeau_PhaseI
 - CHA_CEN_CIB_Groupes_PhaseI (CA_GroPhaIBet.1)
 - CHA_CEN_CIB_Groupes_PhaseI
 - Publications
 - CHA_CEN_CIB_AireDeService (CA_AirDeSerBet.1)
 - CHA_CEN_CIB_AireDeService
 - Publications
 - CHA_CEN_CIB_PhaseI_Et_II (CHA_CEN_CIB_PhaseI_Et_II.1)
 - CHA_CEN_CIB_PhaseI_Et_II
 - Applications

Information Structure

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