



3DEXPERIENCE®

“How Can Manufacturing Design
Tools and Processes Assist in
Mine Designs and Operations?”

François Bouffard
DS Industry Affairs Director
Nov 6th 2014

Agenda

- Dassault Systèmes Overview
- The Mining Challenges
- Mining Industry Transformation
- DS Mining Industry solutions
- Dassault Systèmes Academia solutions
- Questions

Our Company



a Scientific company

Combining **Science, Technology and Art** for a sustainable society



12,400 passionate people

- 112 nationalities
- One global R&D / 53 labs
- Game changing **3DEXPERIENCE** solutions



190,000 enterprise customers

- 12 industries in 140 countries
- >10 million on premise users
- >100 million online users



3,500 partners

- Research & Education
- Software & Technology
- Sales & Services



Long-term driven

- Majority shareholder control
- **Revenue: \$ 2.8 Bn***
- Operating margin: 31.5%*

* Non-IFRS

Our Purpose

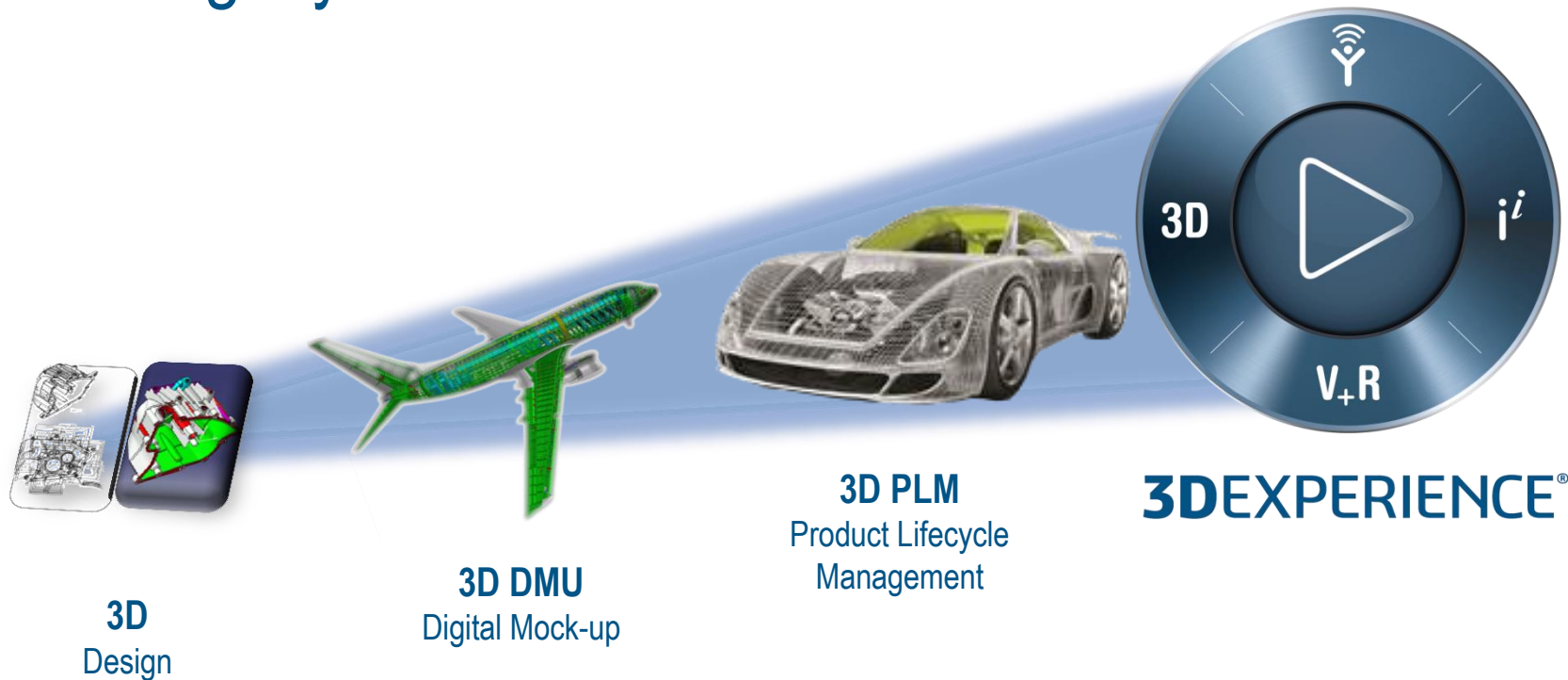


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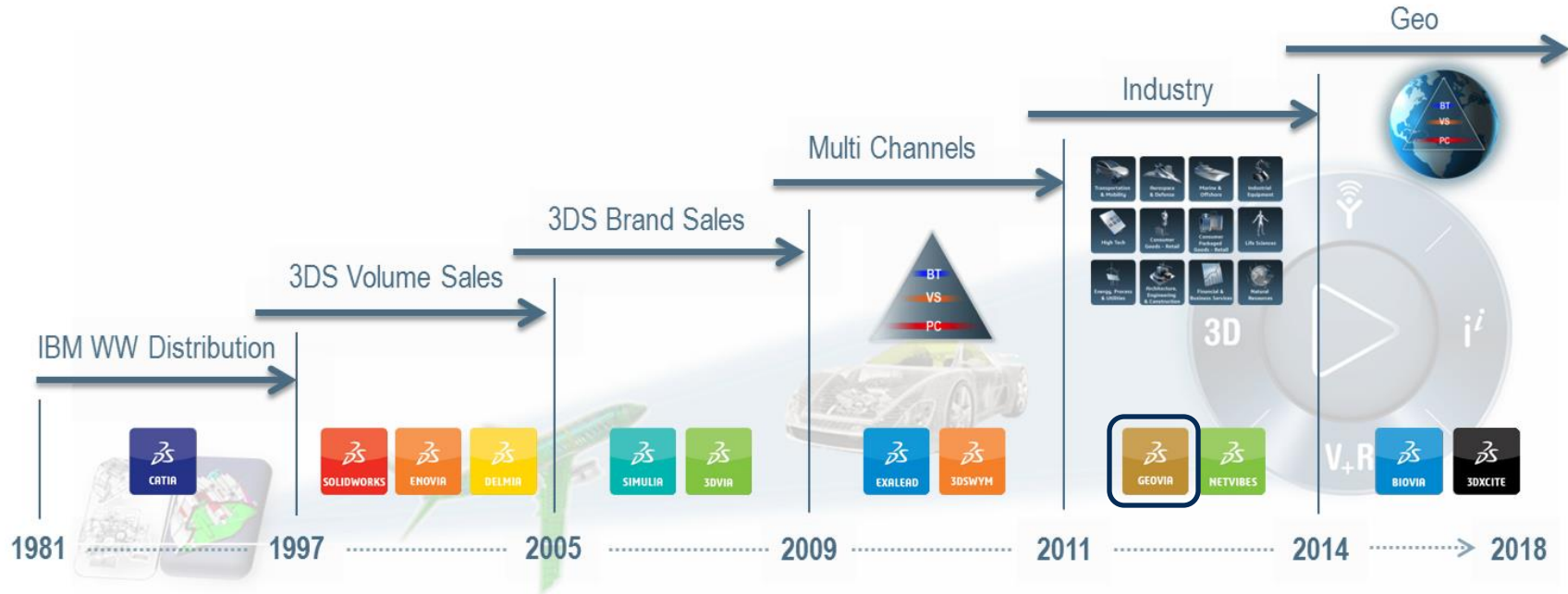
Dassault Systèmes provides business & people with **3DEXPERIENCE** universes to imagine sustainable innovations capable of harmonizing product, nature and life.

”

Our Legacy



Our Story: Brand – Channel – Industry – Sales



Strategic Operational Elements

Brands
“User Experience” & Communities



Software & Applications

+

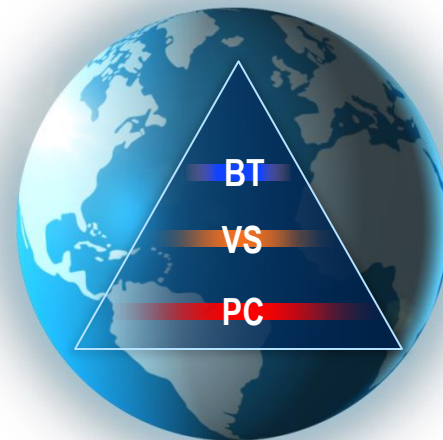
Industries
“Solution Experience”



Content

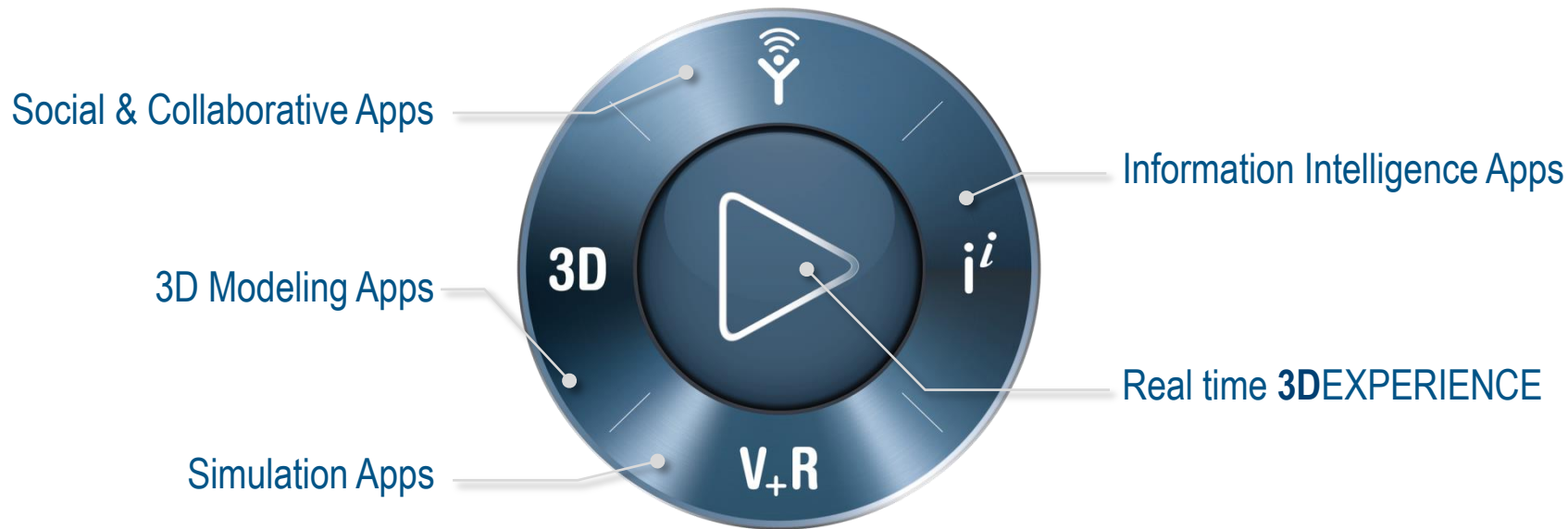
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12 Geo Field Operations
“Customer Experience”



Services

The 3DEXPERIENCE Platform



3DEXPERIENCE®

Value based “Industry Solution Experiences”

 TRANSPORTATION & MOBILITY Smart, Safe & Connected 	 AEROSPACE & DEFENSE Winning Program 	 MARINE & OFFSHORE On Time to Sea 	 INDUSTRIAL EQUIPMENT Single Source for Speed 	 HIGH-TECH HT Body 	 CONSUMER GOODS RETAIL My Collection 
 CPG RETAIL •Perfect Shelf •Perfect Package 	 LIFE SCIENCES Licensed to Cure 	 ENERGY, PROCESS & UTILITIES •Optimized Plant Construction •Sustainable Wind Turbines 	 ARCHITECTURE, ENG. & CONSTRUCTION Lean Construction 	 FINANCIAL & BUSINESS SERVICES Product Innovation Factory 	 NATURAL RESOURCES Mining Execution Management 



The Mining challenges

Mining Productivity Decades Behind Other Industries



Mark Cutifani
Chief Executive, Anglo American



“To deliver on our potential we will have to put in place new processes that reach outside the mining industry for their inspiration and application. To be brutally frank, our industry lags the petroleum, manufacturing and aviation sectors and other more progressive and innovative heavy industry players in terms of operating practices – there is no reason why our industry should not use the best from all of these ‘restless innovators’.”

19 April 2013, Anglo American AGM Address
www.angloamerican.com/investors/meetings/agm2013/agm2013_ceo_speech

“That is the big high grade deposits generally have been discovered, most of them are now lower grade and so to be successful in your sector in the industry, you're going to have to be smarter, quicker, innovative, productive, low cost and I think there is much to be learned from the manufacturing sector and various other groups in terms of improving outcomes.”

17 February 2014, Interview with MineWeb
www.mineweb.com/mineweb/content/en/mineweb-europe-and-middle-east?oid=229336&sn=Detail

IDC Industry Analyst Perspective on Mining Market

- **The landscape is changing...**
 - *“Mining companies have been making money no matter what they do, but that’s quickly changing. A fundamental rethink is happening on the way these organizations are run. There is a focus on productivity and efficiency that has come to the fore and that leads to a discussion on technology.”*
- **A change in culture is a prerequisite for technology adoption...**
 - *“We need to start talking about lean mining” Other industries are focused on lean, continuous improvement processes. It’s important for mining organizations to look at companies in other industries to see how they’ve actually embarked on that journey.”*



Source: COMPASS Magazine interview with Dr. Christopher Holmes, Head - International for IDC Manufacturing Insights

<http://compassmag.3ds.com/#/Industry/UNCERTAIN-TIMES-Mine-owners-focus-on-technology-to-control-costs>

Current State of the Mining Industry will lead to Innovation

Slower growth in the emerging markets, new suppliers coming on stream, declining commodity prices, lower grades, higher input costs, resource nationalism, environmental concerns are taking a heavy toll on the performance of mining companies.

There's no doubt the mining industry is experiencing tremendous pressure on costs. But cost constraints often lead to innovation. Mining has grown bigger over the past 200 years – bigger plants, bigger trucks, bigger blasts. But the industry itself hasn't evolved much. Now is the time to make fundamental and dramatic change.

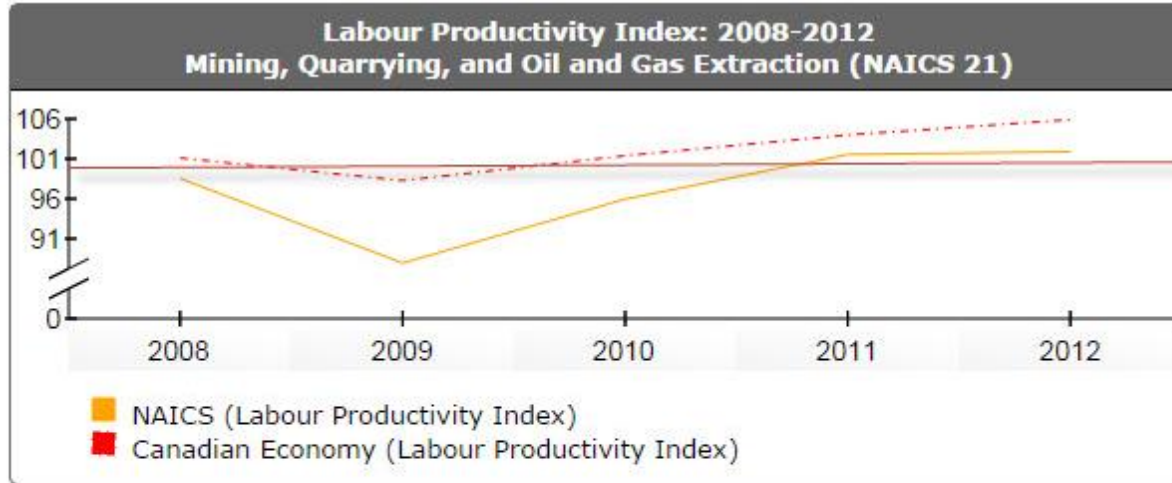
– Glenn Ives, Americas Mining Leader, Deloitte

“Beyond automation and remote operations, numerous technologies can help miners keep costs down. With production visibility tools companies can get an automated visual of their mining operations from pit to port, enabling management to identify inefficiencies, track productivity levels, streamline processes and re-plan based on actual performance and conditions”



Source: Deloitte “Top Trends in the Mining Industry 2014”

Productivity index for Mining

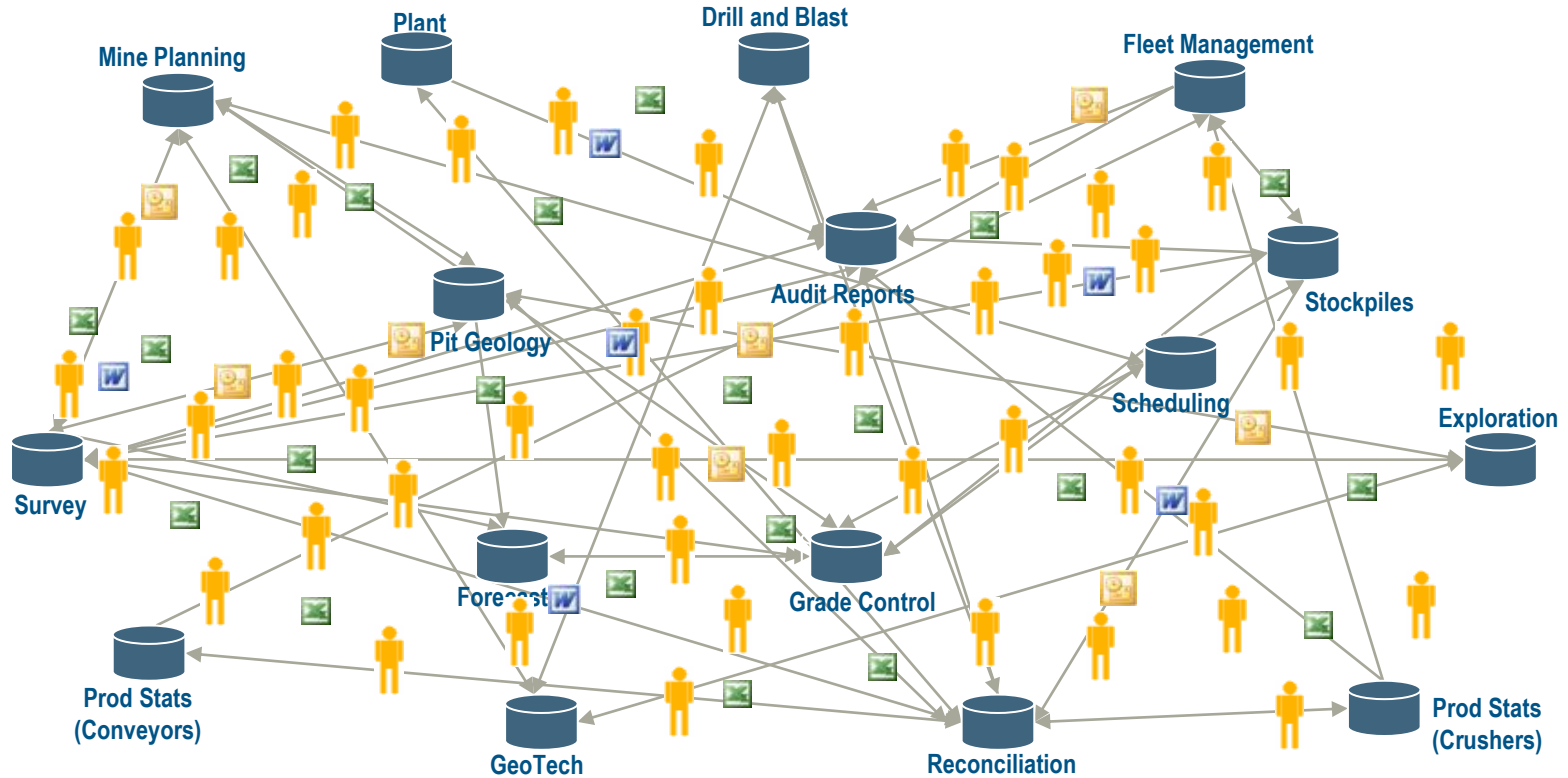


Source: Statistics Canada, CANSIM table 383-0012, 2008 to 2012.

Between 2008 and 2012, labour productivity for the Mining, Quarrying, and Oil and Gas Extraction sector increased **0.8%** per year on average. In comparison, labour productivity for the Canadian Economy increased **1.2%** per year.

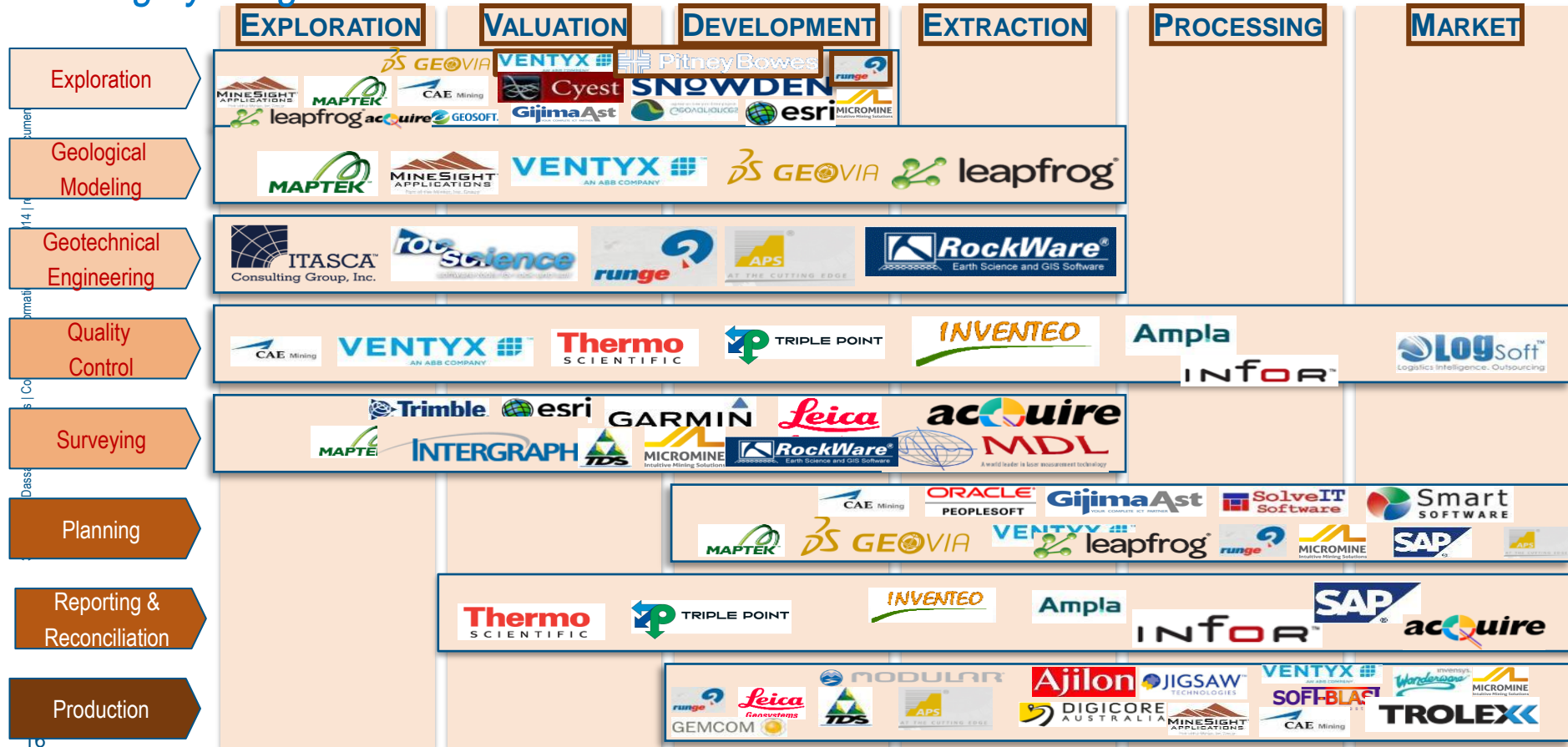
Over the most recent year, labour productivity in the Mining, Quarrying, and Oil and Gas Extraction sector increased 0.3%, compared to an increase of 1.8% for the Canadian Economy.

The Need for Greater Agility in Mining: Data Challenge



Software Applications in the Mining Industry

Highly Fragmented Environment

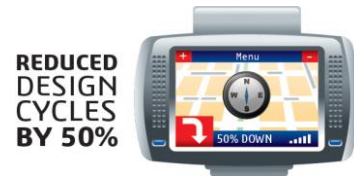
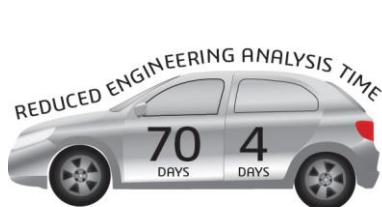


Why the Desire to Learn from Other Industries?

- Change happened decades ago in industries such as manufacturing which were facing cost pressures and a deep recession.
- **Data** is seen as an asset to be leveraged.
- Manufacturing execution management successfully employed for decades.
- **Common software applications** are used across industries proving they can be adopted by anyone and are waiting for mining to leverage them.
- The best run companies employ agility in their:
 - Strategies to seize opportunities and manage risks in unpredictable markets.
 - Portfolios to exploit market opportunities in boom and bust markets.
 - Operations to continuously improve productivity and control costs.



Proven History of Helping Customers Transform Their Business



What are the elements for success?

- ***One single version of the Truth***
 - Better Collaboration
 - Traceability of the Information
 - Data sustainability (life of the assets)
 - Data and information exchange with other Enterprise Information Systems
- **Model --- Simulate --- Optimize --- Execute --- Analyze --- Remodel – etc. - -- etc.**

Dassault Systèmes solutions for Mining



Dassault Systèmes Vision – The Future of Mining Technology

Industry Solution Experiences that leverage the best practices from other industries into mining

PERFECT ORDER

- Inventory Management
- Shipment Planning and Monitoring
- Blending
- Contract management



PERFECT MINE AND PLANT

- Mine Planning
- Operation Modeling and Simulation
- Production Scheduling
- Virtual Training
- Work Management



LEAN MINE CONSTRUCTION

- Project Planning and Execution
- Mine Infrastructure Design
- Mine Facilities Design
- Mine Operation Simulation
- Mining Procurement



OPTIMIZED MINE CLOSURE

- Reclamation Design
- Mine Closure Management
- Post Closure Monitoring



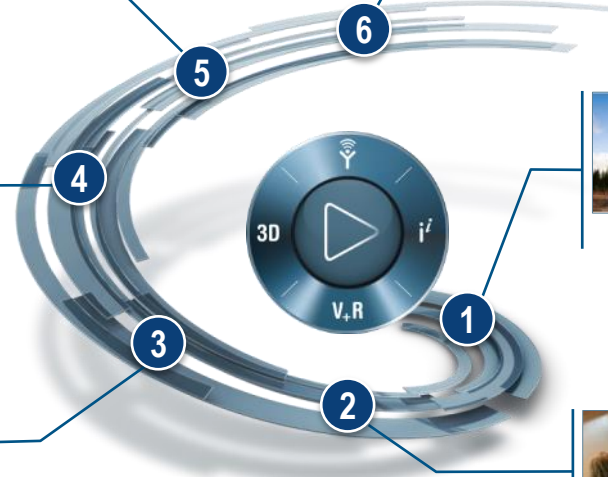
PREDICTIVE DISCOVERY

- Geological Studies
- Cost and Economic Planning
- Resource Estimation
- Portfolio Management



LICENSE TO DIG

- Mine Design
- Visualization
- Stakeholder Engagement



Perfect Mine and Plant

Deliver on your promises across your operation

Virtual Training
lower risk, improve safety



Production Scheduling
create robust executable schedules



Operation Modeling and Simulation
prove before execution



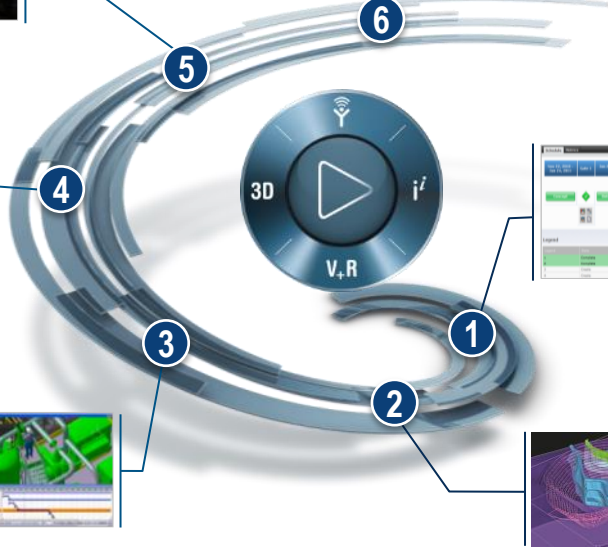
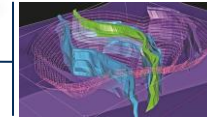
Work Management
achieve operational control



Business Planning Excellence
streamlined adaptive planning



Mine Planning
rapidly deliver integrated plans

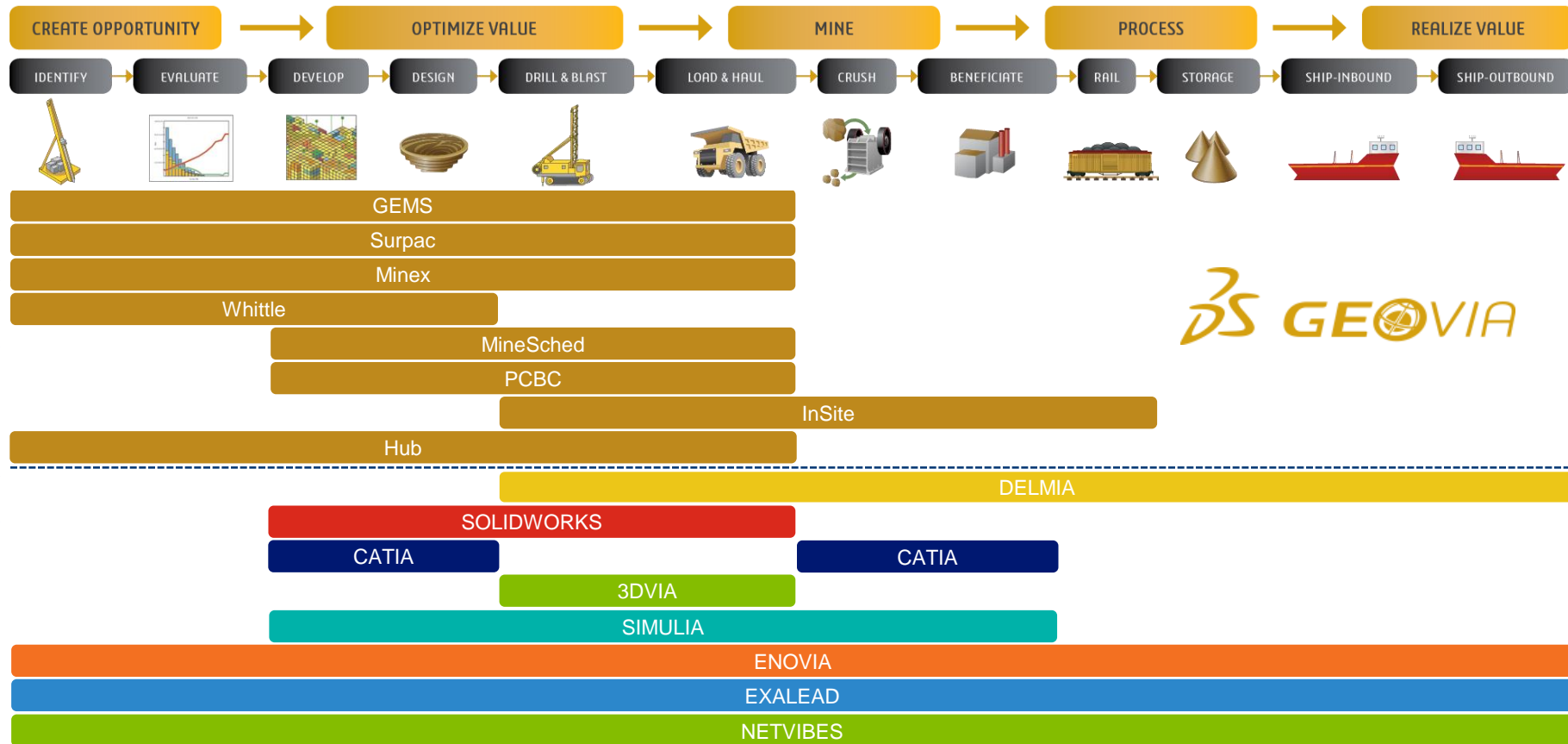


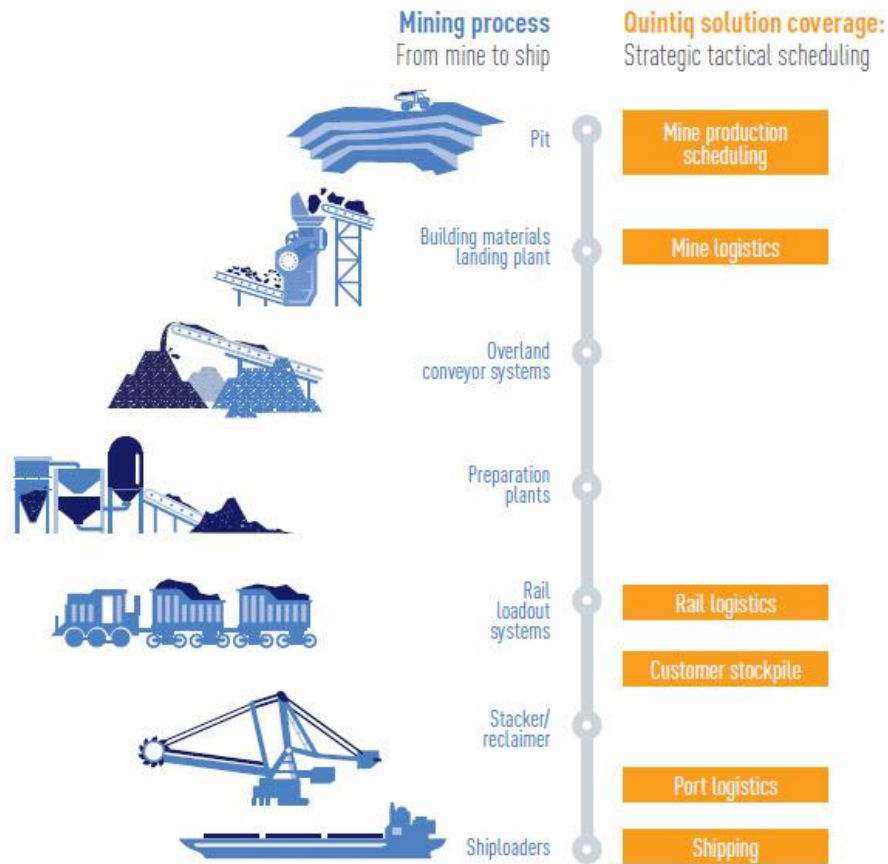
Perfect Mine and Plant

Deliver on your promises across your operation

- Help restore the financial returns of your mining business
 - Predictability, visibility and control across your entire operation
 - Enable disciplined and controlled capital allocation
 - Increase asset performance
 - Robust, executable plans which will restore financial credibility in the industry
- Assess the environmental footprint, mitigate impact/wastage, and communicate in a more meaningful and powerful way to the community and other stakeholders

Expand Beyond GEOVIA Applications to Address the Entire Mining Lifecycle





The Quintiq solution at the mine

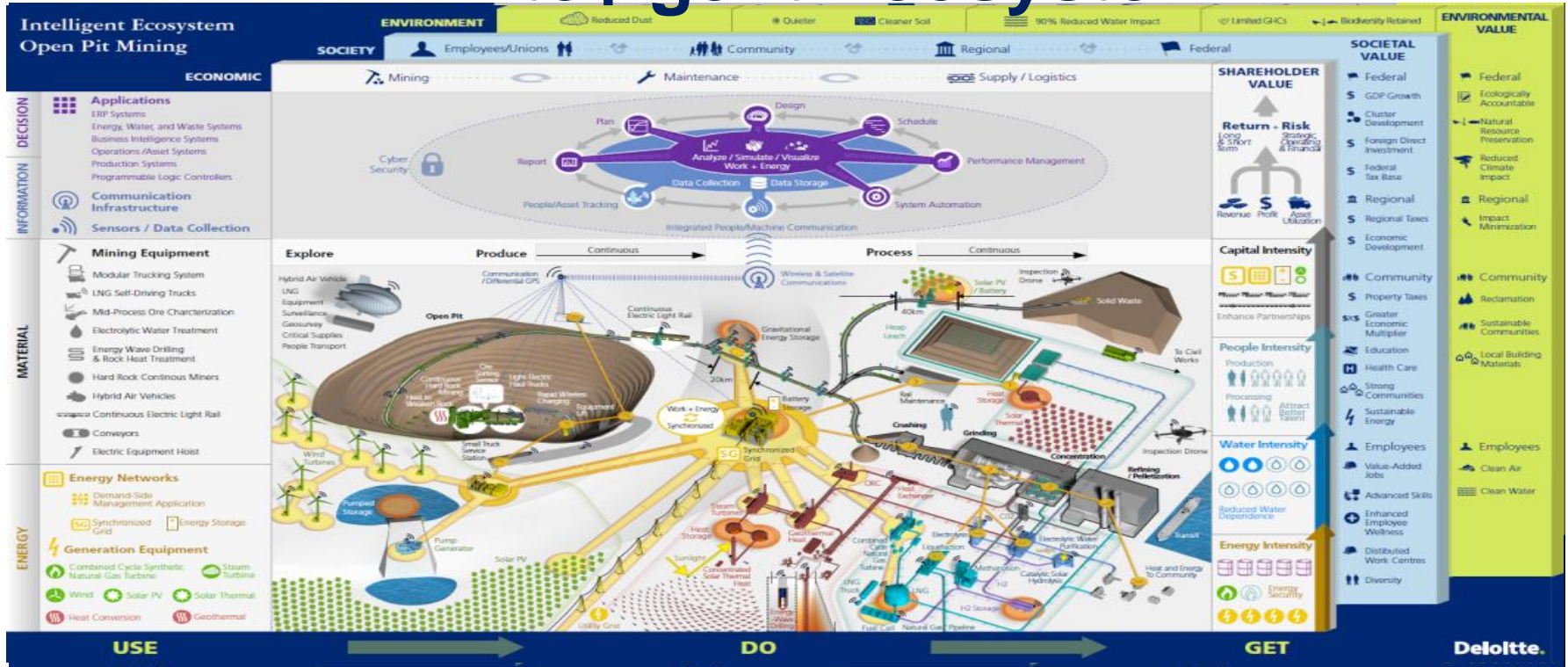
Whether it is for a fully integrated mine, rail and port operation, or a complex set of mines feeding one or more ports with different products, the Quintiq solution ensures the optimal allocation of product from seam to shipment. It provides:

- Seam and block forecasts and allocations to run-of-mine (ROM)
- Processing of plant capacities and schedules
- Clean product stockpiles and rail product plans
- Port remnant management.

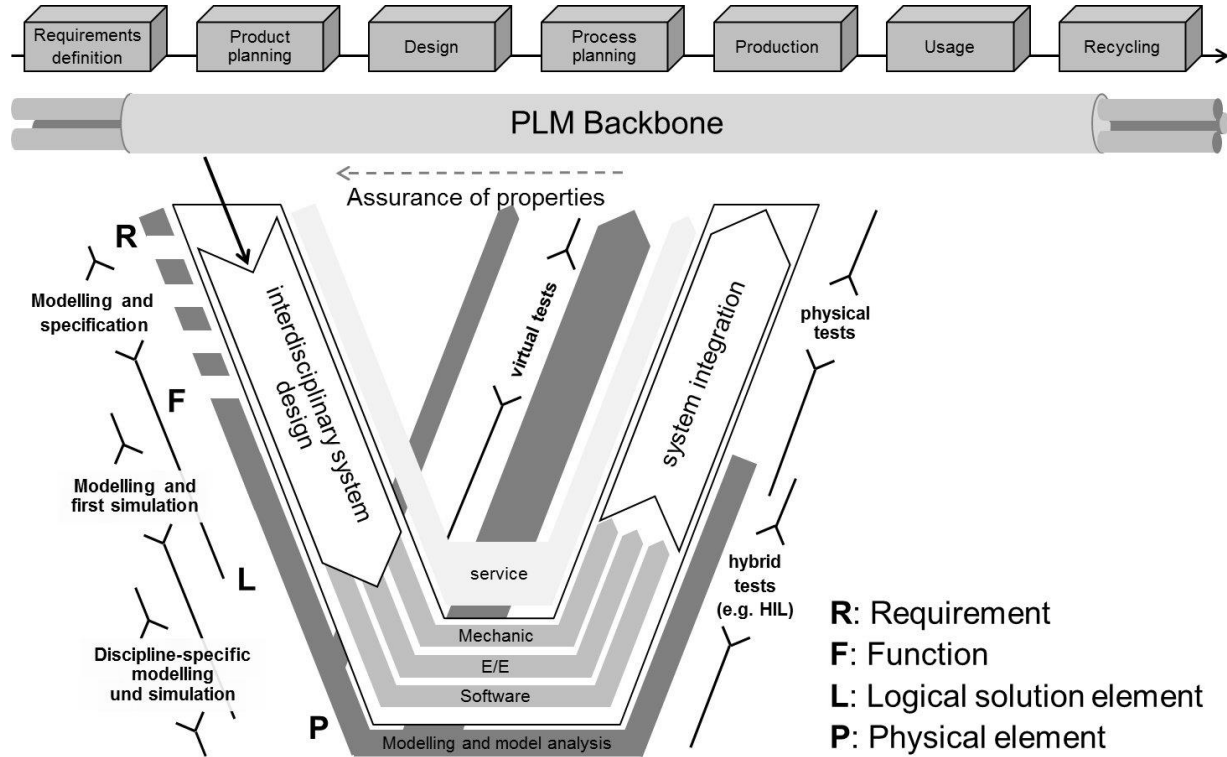


Innovate towards ZERO based mining

Intelligent Ecosystem



MBSE for Mining





3DEXPERIENCE®

3DS ACADEMIA

Education Lab

3D Extended Texbook

BE an ENGINEER

NAO and its avatar: a Swiss knife in engineering education

Extend flipped classrooms with virtual labs for cyber-physical systems

Impact of 3D on User Experience

Customizing your own 3D application

Teaching Geology in 3D

Publishing Online Learning experience

Teaching Mechatronics

Course En Cours

Internet of Things with ARDUINO

Print your helicopter!

A cyber-physical approach to extend LEGO® Mindstorms®' learning experience

CATIA Systems Labs

Teaching Technology

Charly4U

Animated 3D assembly instructions for LEGO

Cyber-Physical Systems

Virtual Laboratories

Moving frontiers in engineering education

Ma pierre à l'édifice



Academia

Learn, Work and Play in 3D!



Dassault Systèmes & The Academic World

Dassault Systèmes (3DS) provides the academic world with learning opportunities for all ages in the latest 3D and PLM technology; from the early discovery of 3D at kindergarden and middle schools through a more sophisticated PLM knowledge at high-schools and universities. 3DS promotes the advancement of excellence in all aspects of engineering, engineering technology and design while fostering innovative student projects and professors' educational practices. Engineering and design students want to express their talent and find the job of their dreams.

Students also need to develop PLM skills in order to be prepared for the 21st century job market and to access the best and largest employment opportunities. As a fact, academia has the same challenges as industry to innovate cleaner and safer products by taking into account the environment. The 21st century professionals of now and tomorrow contribute to the creation of new ideas thanks to 3DS solutions which facilitate product design innovations.



3DS Academy for tablets

Available for Android and iPad



Available on the iPad

App Store



Google play

READ MORE



Conclusion

How can we help the Mining Industry?

- Based on business of uncertainties, we could:
 - First provide **Agility** with better information for better decision making process
 - Adopt new methodologies and processes from other industries:
 - Ex.: MBSE, Simulation
 - Better Collaboration System
- Partner with Universities, associations, OEM and Mining companies to develop new processes and methodologies based on better integrated information systems .

Questions?





Thank You