

The Value of Simulation Data Management – A Decade of Production Experience

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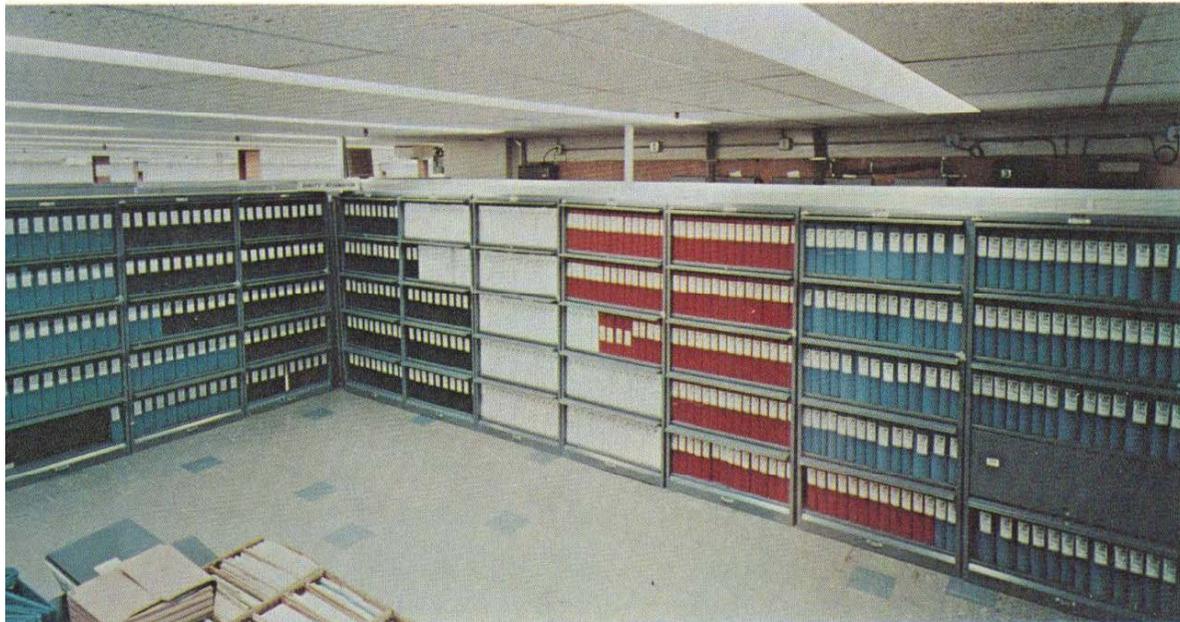
Agenda

- History of Simulation Process & Data Management
- Structured Information Systems & SPDM
- Business Value from SPDM
- Return On Investment from SPDM
- When should an Organisation Invest?
- Conclusion



Simulation Data Management

Our capacity to create data has exceeded our capacity to manage it



Where is that calculation?

The pedigree of just one Apollo spacecraft took this many books. A mind-numbing degree of documentation contributed to reliability, safety, and success. If one batch of one alloy in one part was found to be faulty, for example, a search could show if the bad material had found its way into other spacecraft, to lie in wait there.

Visionary companies have shown that it is possible to manage simulation data structures and make money doing it!



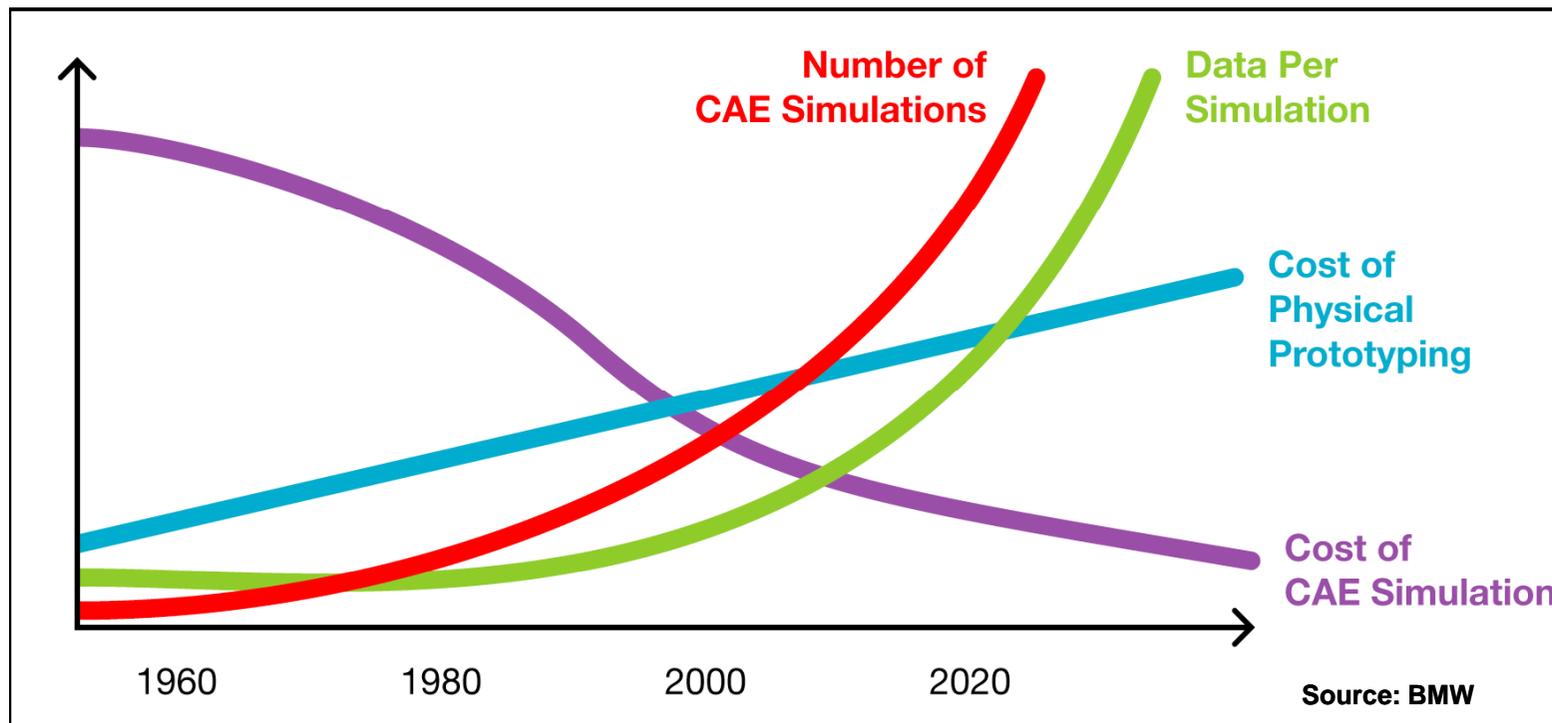
The Simulation Challenge

Exponential Growth of Demand, Data Complexity, Data Volume

- ↑ # of Engineers Performing Simulation
- ↑ # of Simulations
- ↑ Complexity of Simulations

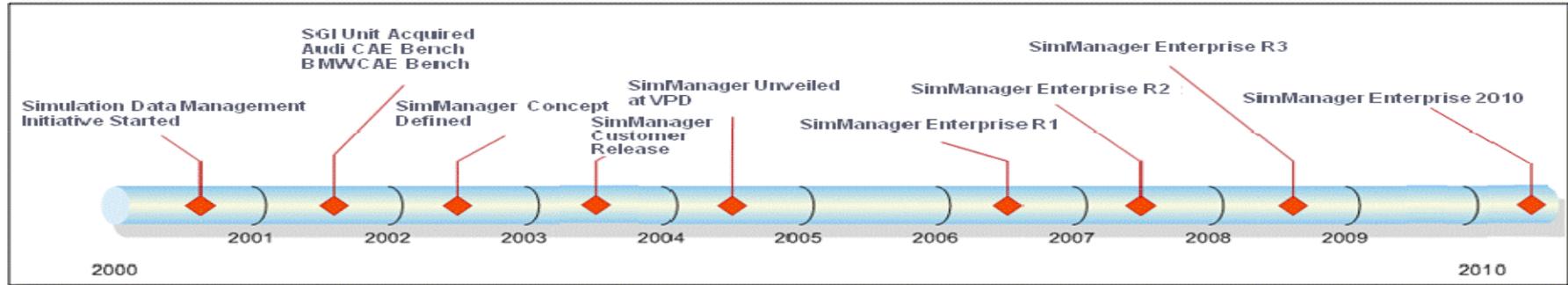


Offshore
Development
& Integration



Driving Demand for Analyst Productivity

SPDM: A decade of Visionary Investment

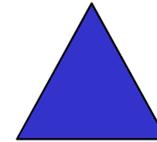


IT Framework

Configurable Application



AleniaAeronautica



These Companies experience will be presented at the NAFEMS SDM conference 24-25 November 2010

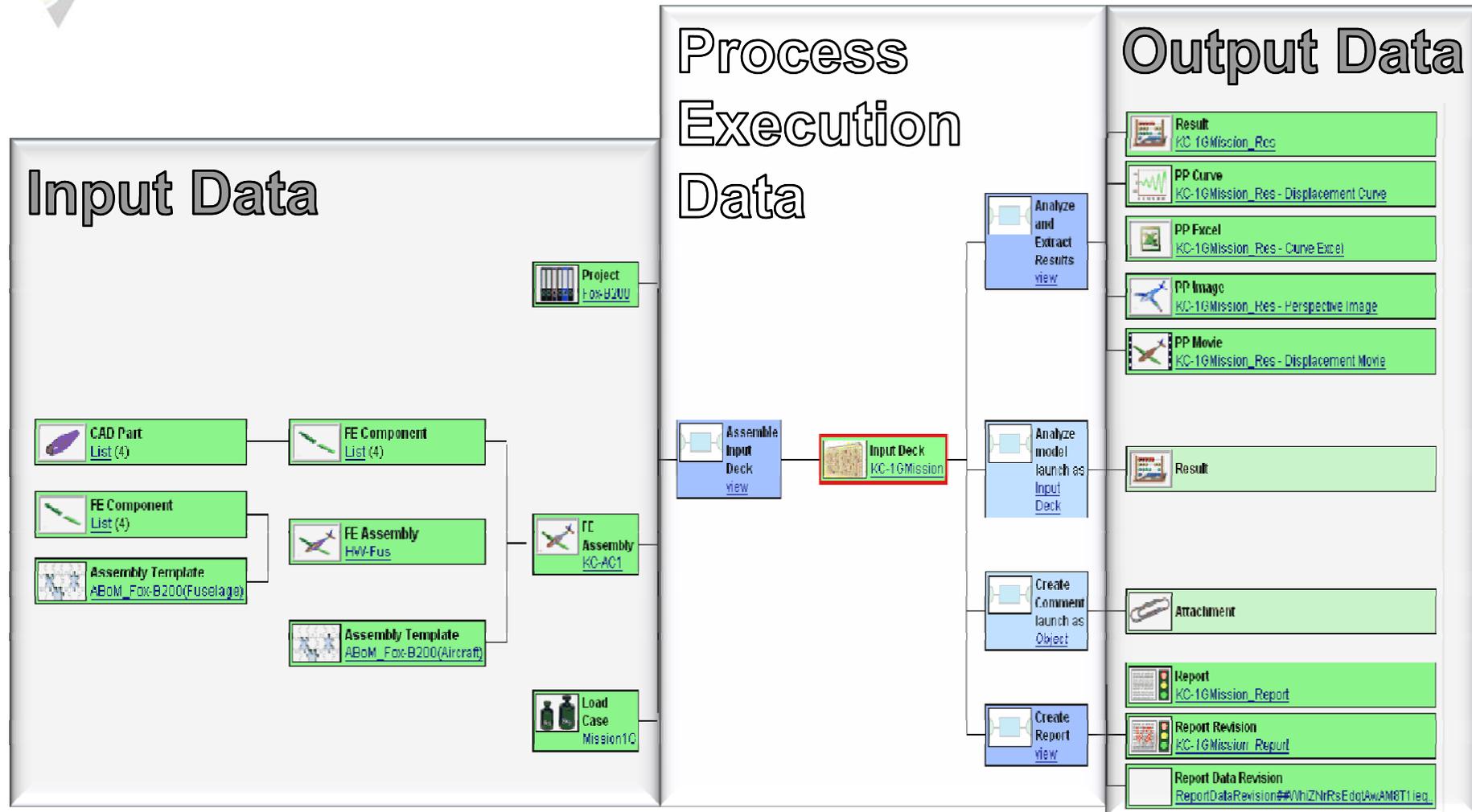


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Structure of Information in a SPDM

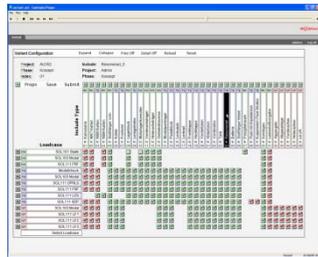


What were the Inputs? the Process Parameters, the Outputs? the Key Results? Structure provides the Answer



Supporting the Simulation Process

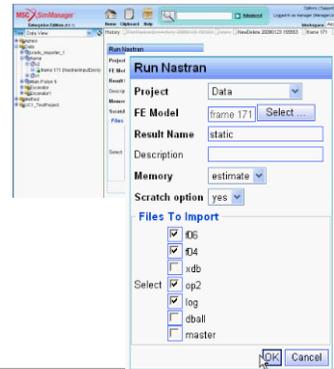
Modeling & Assembly



Load Case Setup



Job Submit



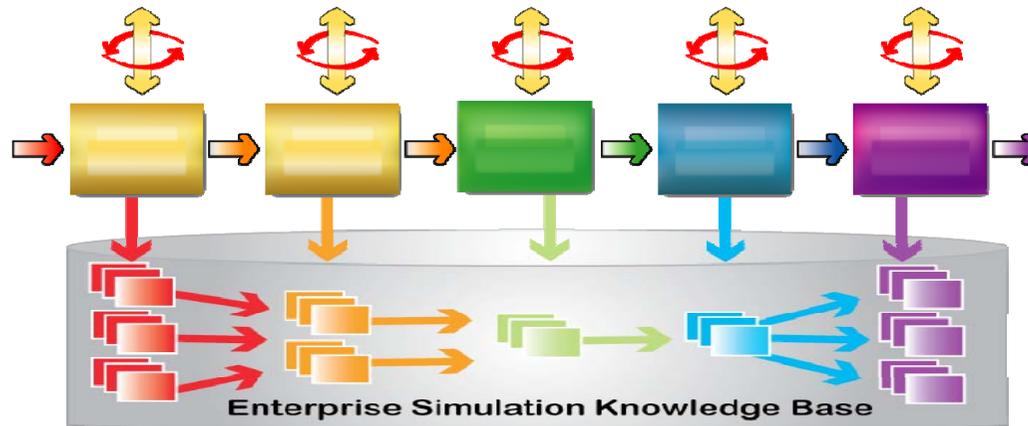
Post-process Key Results



Create Reports

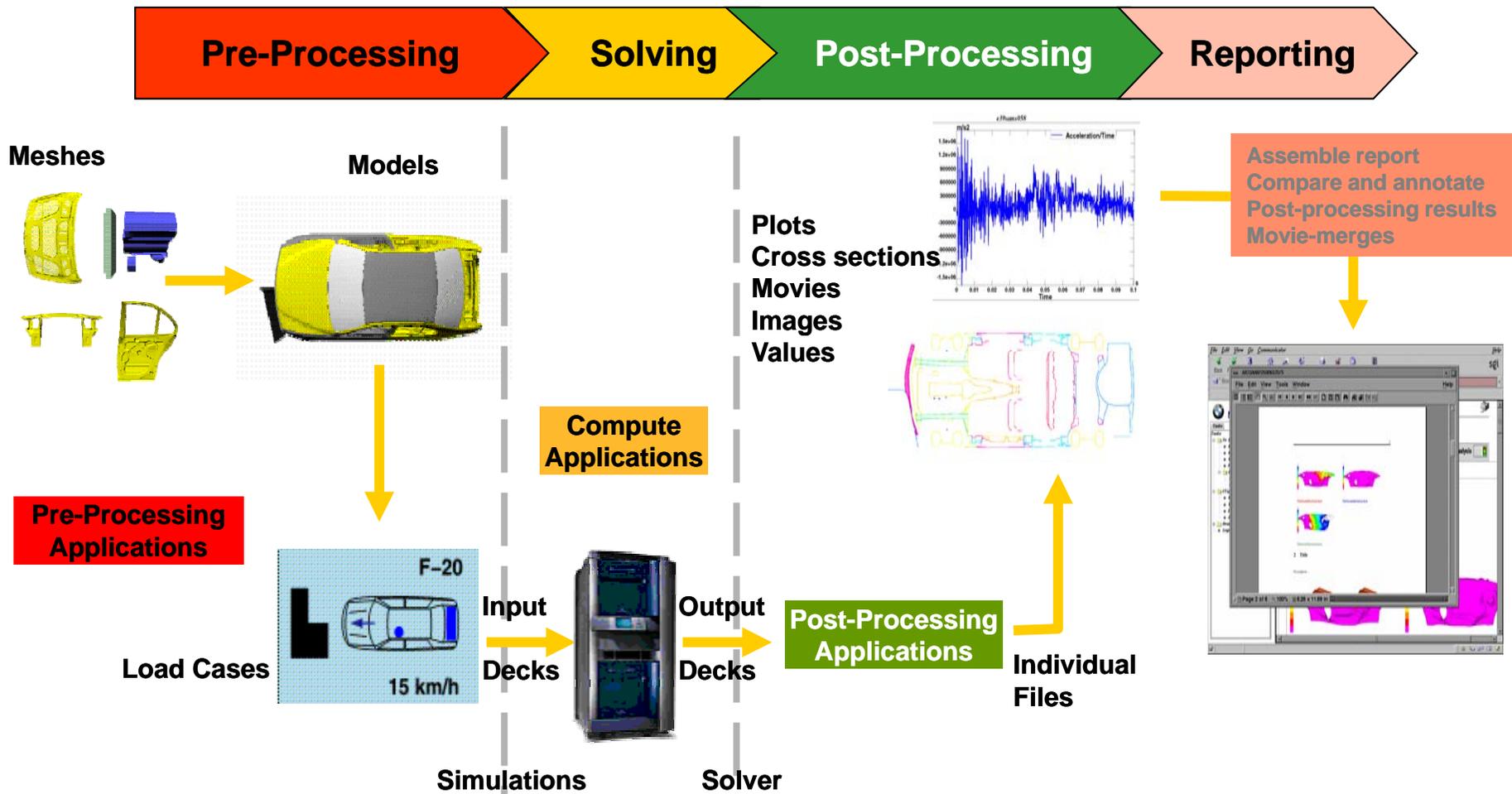


SimManager Process Management

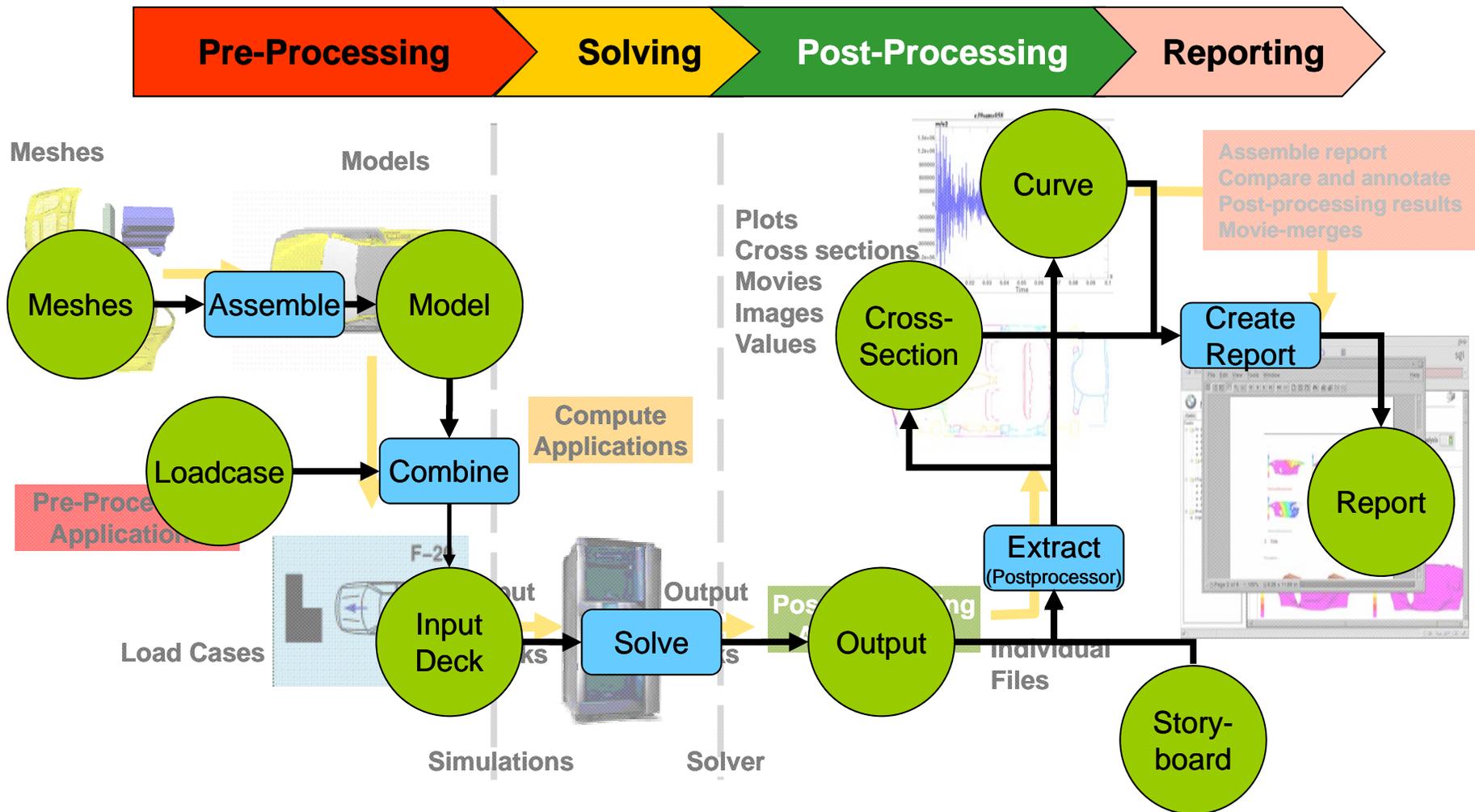




Complex Automotive CAE Process



Process & Data - Managed & Accessible

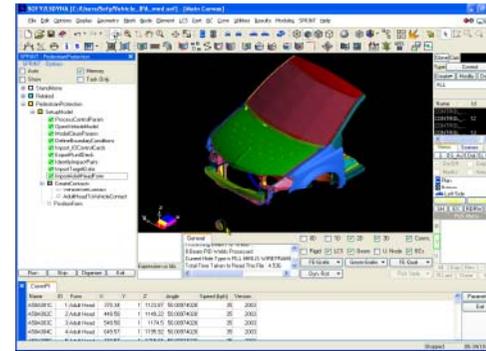




Schematic of a SPDM System



Web client



Client within Applications



SPDM Application

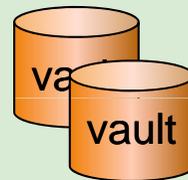
SPDM Object & Metadata Platform

Web Application Server

RDB Server

Metadata

Database
Oracle/DB2/
MS-SQL



Storage
• NFS
• FTP-vault



Compute Cluster (HPC)



Agenda

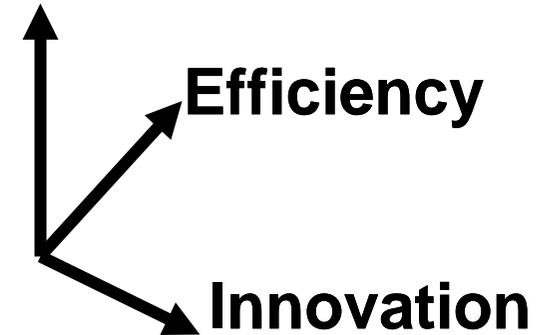
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The 3 Vectors of Business Value

- Process Effectiveness
 - Getting the right effect, on time
 - Delivering certainty, reducing risk
- Process Efficiency
 - Getting there with less resources
- Product Innovation
 - Pushing the Performance Envelope (Features, Cost, Quality, Time To Market,...)

Effectiveness



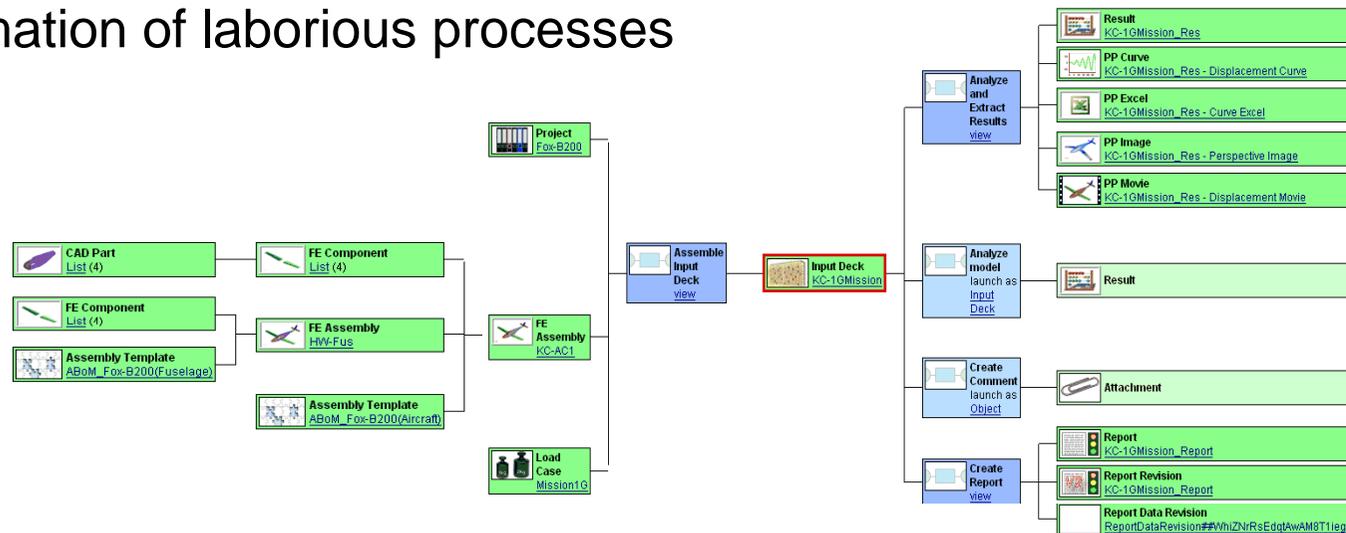
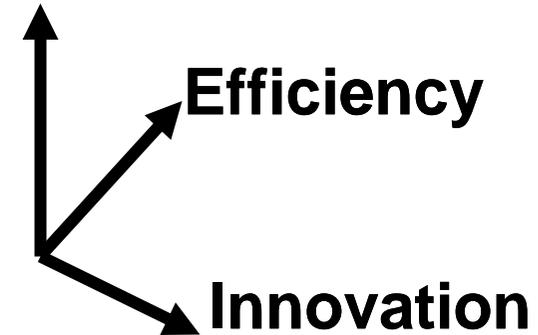
The three vectors provide different Returns, calculated in different ways, to different organisations

Process Effectiveness

Structured information model

- provides:
 - Navigation to data – reducing search times
 - Automatic Audit Trail creation - less admin
 - Ability to supervise remote working – multi site and outsourced
- enables:
 - Automation of laborious processes

Effectiveness





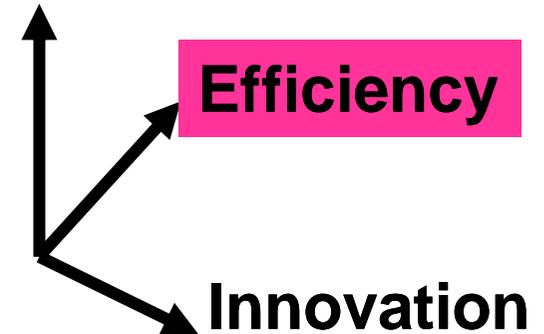
Process Efficiency

- Process Automation, enabled by SPDM,
 - Model Assembly and Load-case setup, especially for iterative analyses
 - Results extraction, less effort
 - Automated Report Generation, less effort
 - Easier Re-Use of data

enhances Analysts' Productivity by **up to 35%**

- Emphasis on elimination of low added value, laborious tasks to enable Analysts to spend their time on high added value engineering
- The SPDM system may create up to 100 data and key result objects from a complex simulation, saving analysts valuable time, hours per simulation, viewable in a browser

Effectiveness



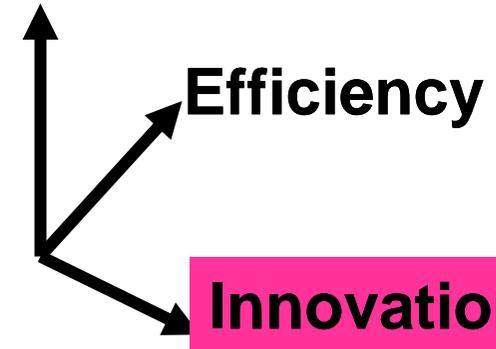


Product Development & Innovation

Increased Simulation Capacity enables

- Development of more products
- Development of Innovative Products thru
 - Simulation of more design options
 - Different simulations
 - More complex simulations
 - Better data for decisions
- Improved First-To-Market Capability
- Benefit is greater sales and/or margins
- Business/Program Managers own these numbers

Effectiveness

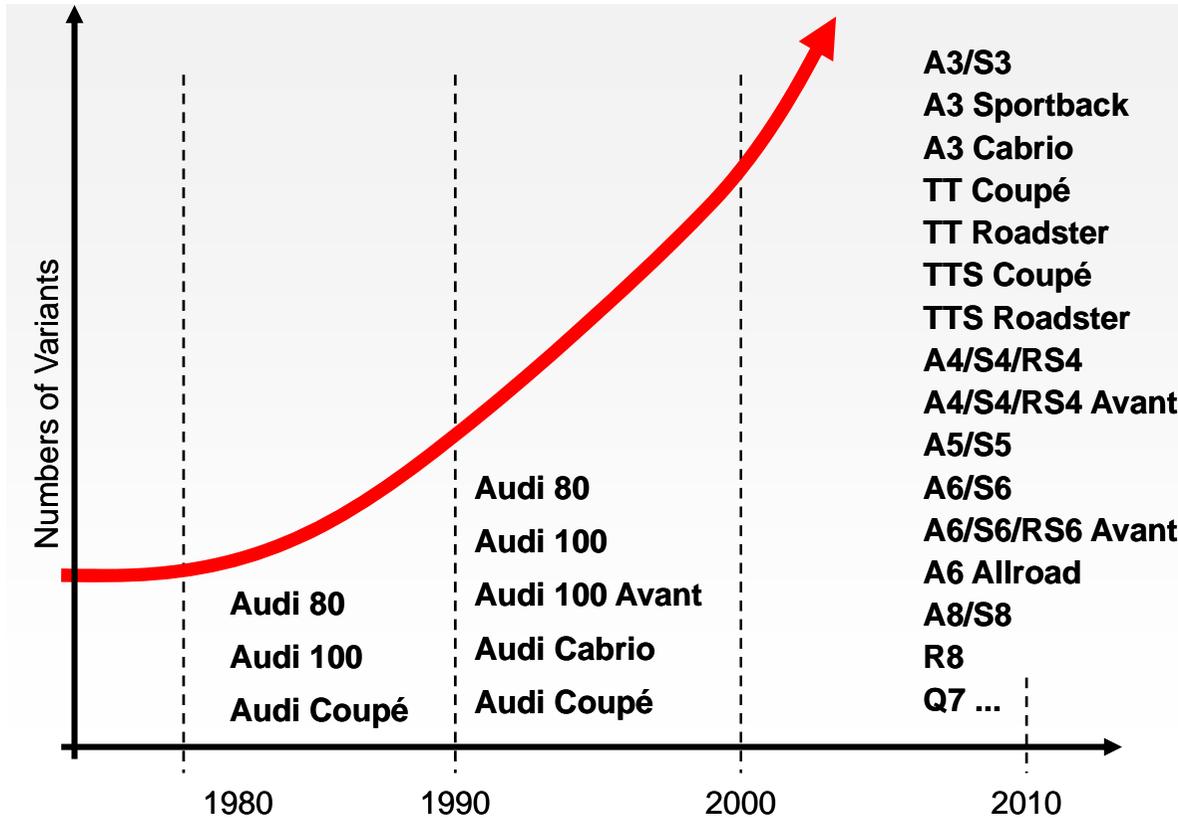




Motivation for More Simulations



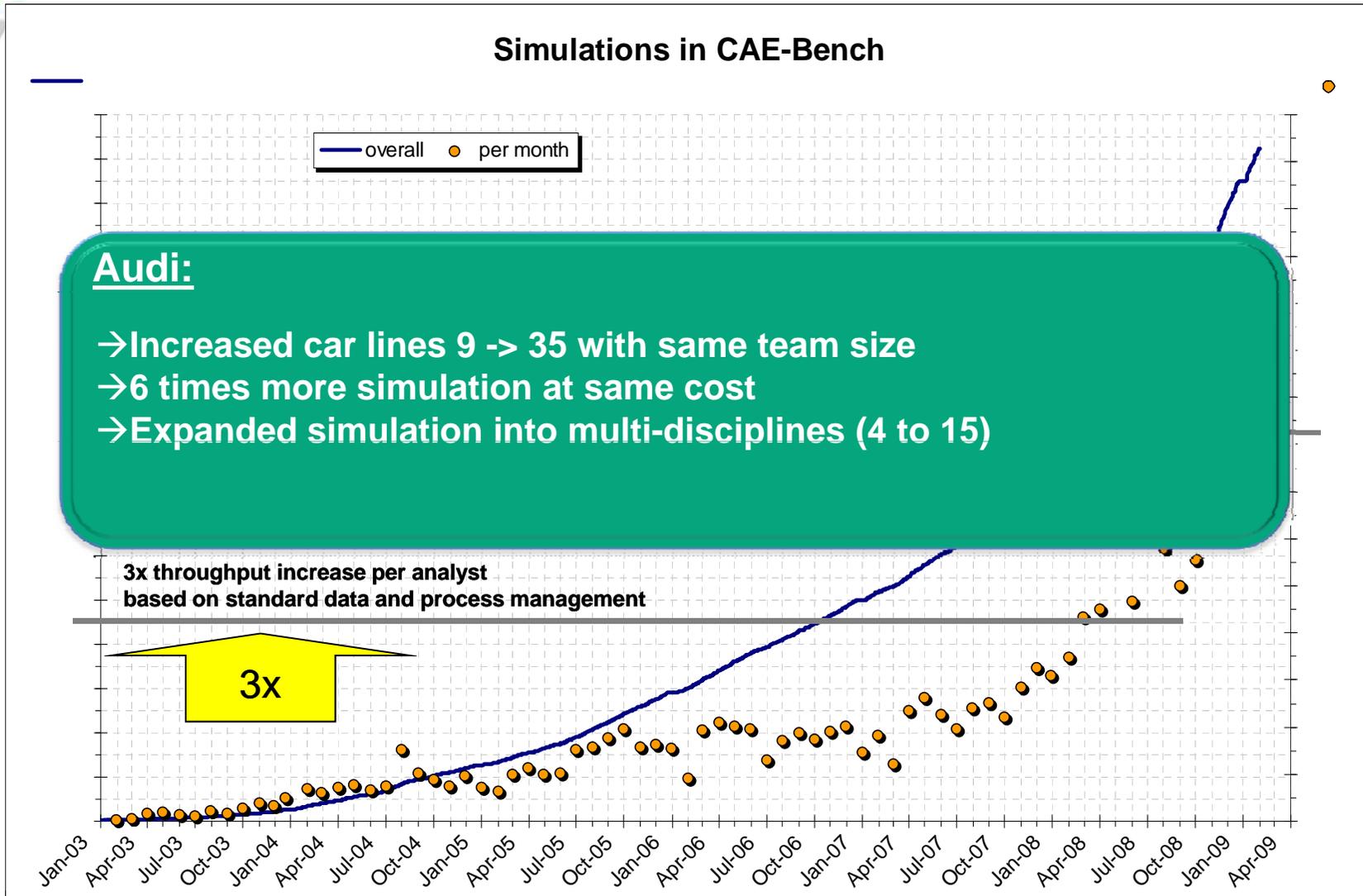
Derivatisation



➡ Model offensive for customer orientation and answer on tightened competition

Source: AUDI / EC SIMDAT projet

Audi SimManager Implementation Metrics



Josef Reicheneder, I/ET-83 CAE/CAT Processes, Methods, CAE-Bench at Audi, 31. Juli 2008



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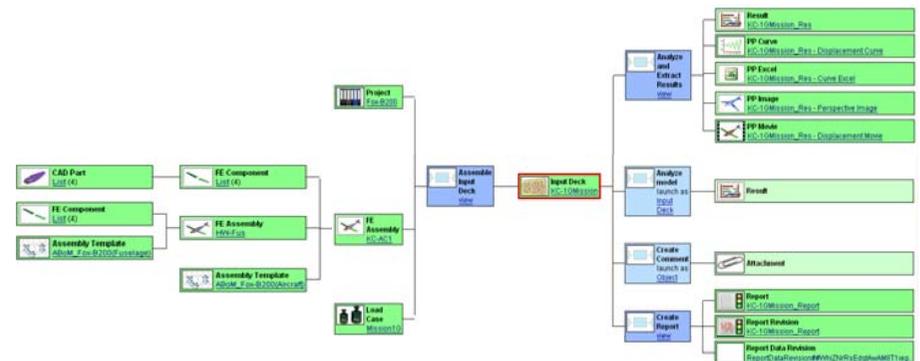
Returns on Process Efficiency

- Process Automation, enabled by SPDM, can enhance Analysts' Productivity by up to 35%
- This total saving is achieved when an organisation requires extra simulation capacity for growth or to enhance product development
- Where the organisation uses contractors or sub-contracts work, this can be taken back in-house

Effectiveness

Efficiency

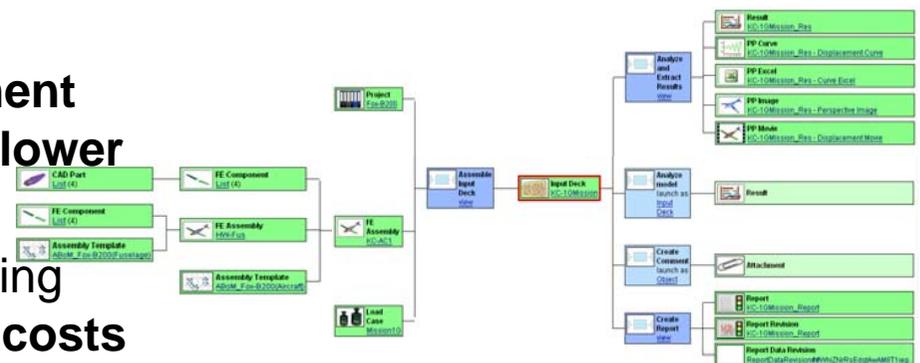
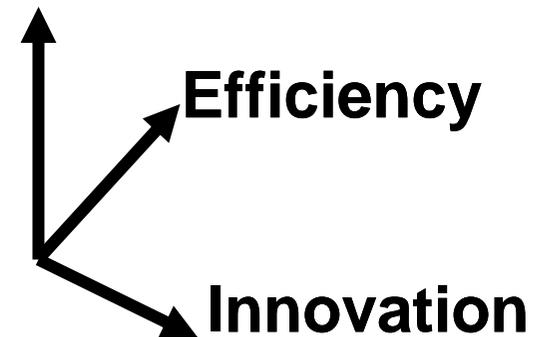
Innovation



Returns on Process Effectiveness

- **Structured Information & Secure Global Content Management enables**
 - More effective management of the CAE process by providing status visibility to managers enabling them to take **timely decisions**
 - Direct access to the information pedigree and Audit trail enabling effective **timely response** to any Quality request
 - Elimination of simulation **re-work** by systematic usage of controlled data reducing costs of non-quality
 - Secure Outsourcing under **management control** providing effective access to **lower cost resources** and **expertise**
 - Supplier Integration with remote working reducing **travel costs** and **IT /admin costs**

Effectiveness

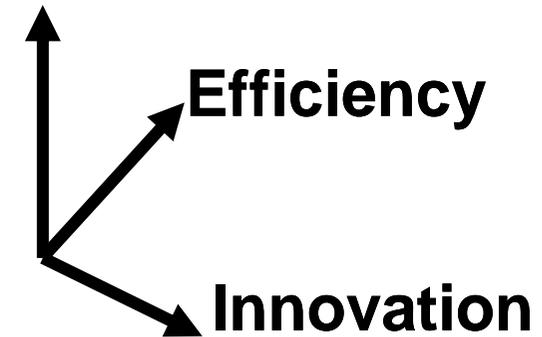


Returns on Process Effectiveness (2)

More comprehensive simulation of product performance:

- Enables **version control** ensuring working with the correct parts.
- Eliminates physical tests, except final validation, saves **\$M**
- Ensures on-time program delivery – avoidance of **program overruns \$M & lost revenues \$M**
- Reduces late changes requiring tooling changes – **tooling cost avoidance \$M**
- Avoids **failures in-service, potentially \$M**

Effectiveness

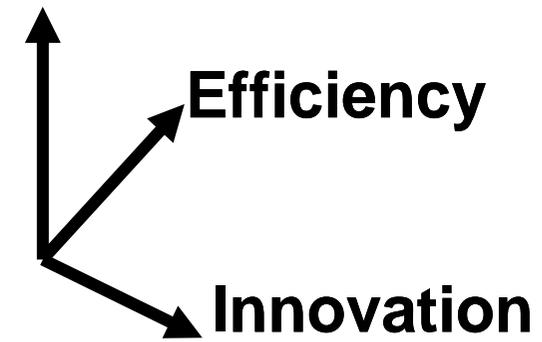




Returns on IT Process Effectiveness

- A Global SPDM system enables:
 - Consolidation of Hardware, Licenses, IT operations in a single centre, globally accessible 24/7, with lower **IT costs**
 - Orderly, prioritised queueing and job execution ensures high utilisation of hardware resources and licenses
 - Storage optimisation by better definition of what can be deleted when controls storage **costs**

Effectiveness





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When to Invest?

- Automotive OEM
 - 250 analysts x 35% productivity gain x 130,000€ = €11M per annum once fully deployed
 - Hard savings fully justify SPDM
 - Investment cost is reduced by new SPDM functionality & configurability from production experience (SimManager AutoPortal)
- Organisation with 50-25 Analysts, iterative processes
 - Potential hard savings of ~€2M per annum once fully deployed
 - SPDM is becoming an attractive investment
- Small and Medium Enterprises
 - core simulation process and data management is becoming affordable in 2011
- Business consulting teams can help with justification
 - Best justification is (sadly) a business project/program/product failure with well defined cost impact



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Managed Simulation makes the Difference

- BMW – a decade of SPDM drives product performance
- 0-90 in 8s, 0.41 l/mil, 109gCO₂/km
- Moving to the next level with Auto Portal



320d EfficientDynamics



- Audi – 6 times increase in simulation throughput
- SimManager-based Process Automation eliminates laborious tasks and drives up productivity

Please applaud the teams at BMW & Audi



Thanks!

- Questions?

**NAFEMS European Conference:
Simulation Process and Data Management
(SDM)**

24 - 25 November 2010, Frankfurt, Germany