

10 Giugno 2014

System Driven Product Development Beppe Grimaldi – Manager, Professional Services

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Smarter Decisions for Industry

AGENDA



- Automotive Global Scenario
- SPL Investment on System Engineering
- Traditional vs. Evolution of System Engineering
- System Engineering execution

Greater innovation pressure on suppliers while maintaining profitability and meeting delivery expectations



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Fuel Economy & Emissions Reductions Are Driving Innovation To New Levels – Challenges For Quality & Cost

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Double vehicle fuel economy levels and cut emissions in half by 2025 as well as increase fleet fuel economy by 4% per year





Electronics and embedded software

OEMs increase use of electronics and embedded software to meet zero emissions, zero accidents, intelligent mobility and customer lifestyle integration



Increasing use of electronics and software requires suppliers to expand product development capabilities

IMPLICATION

OEMs and Suppliers must grow electronics and software capabilities as well as system and development knowledge to deliver more complex systems

"Every part of the vehicle has been impacted by electronics in the past 30 years, and today it accounts for more than 40% of a vehicle's cost, up from 20% just 10 years ago."

Jacqui Dedo, Chief strategy and procurement officer, **Dana Corp**



New emerging marketplace growth drives expansion





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THE OPPORTUNITY FOR OEMs - capitalize on innovation while improving overall program control and risk management



THE SOLUTION - Harness innovation through model-driven program execution

Comprehensive development of systems through model-driven simulation and validation	Fast and efficient design creation
Integrated validation of manufacturing to optimize process productivity and efficiency	Integrated program planning and costing for predictable program performance

Addressing Subsystem performance validation in a systems-driven approach



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THE SOLUTION - Harness innovation through model-driven program execution

Comprehensive development of systems through model-driven simulation and validation	Fast and efficient design creation
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NX for fast and efficient design creation Increase your productivity – fast performance, high quality, full flexibility



Functionality to cover all automotive product areas	•	Concept, Styling, Refinement, Detailed Engineering & Tooling for production Design from Sketch / Scan reference or "Clean Sheet" Design in-context of engineering packaging
Flexible working methods and technology	•	Powerful integration of curves, surfaces, and solids into a single environment Unique ability to work in mixed geometry representations Parametric history and direct modeling capability
Securing your knowledge and intellectual property	•	Frontload best practices and knowledge (reuse library, Product Template Studio, workflows) Knowledge-driven automation Open architecture
Managed system and connection to other domains	•	Teamcenter inside NX Materials management• Visual reporting ECAD integrationRequirements management• Visual reporting ECAD integration
Migration and multi-CAD	•	Geometry, features, attributes and structure for Catia V5 and Pro/E JT data format and Teamcenter allowing multi-CAD work- flows

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NX – Comprehensive Automotive Capability

A single system for whole process from concept to production





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INTEGRATED VALIDATION OF MANUFACTURING Optimize process productivity and efficiency



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Comprehensive development of systems through model-driven simulation and validation	Fast and efficient design creation
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INTEGRATED PROGRAM PLANNING AND COSTING Predictable Program Performance

Predictable Program Timing

- Track tasks in context of stagegate process
- Perform what-if analyses for optimum performance
- Integrate master schedule with group schedules

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Predictable Program Profitability

- Accurate and reliable crossfunctional product and tooling costing
- Profitability calculation for project profitability over product lifecycle
- Knowledge management with
- global cost factors, reference machines and processes



Responding to Change

- Manage change systematically according to industry-standard CMII closed-loop change model
- Fully and rapidly assess impact of all potential changes
- Virtually verify impact of



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INVESTMENT ON SYSTEM ENGINEERING TC Modules, Functionalities, Acquisitions and Partnerships



INVESTMENT ON SYSTEM ENGINEERING

TC Usability and Accessibility



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SYSTEM ENGINEERING What is It?



«DESIGN» Means «CREATE TECHNICAL SOLUTION»

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TTM is never fast enough...



How to move from Today to Tomorrow?

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Traditional Development Process (Serial) Mechanical Discipline - BIW Example

Step & Gate serial process Each area has its own internal constraints, norms and validation

R&D

Requirement are accomplished through authoring systems (ie CAD, ...) Validation is performed through simulation tools (ie CAE, DMU, Process Sim...)

Styling

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AME

ME



System Development Process (Concurrent) Mechanical Discipline - BIW Example

Step & Gate process

Each area has its own internal constraints, norms and validation Each area start sharing infos with other areas before final gate validation occurs



Requirement are accomplished through authoring systems (ie CAD, ...) Validation is performed through simulation tools (ie CAE, DMU, Process Sim...)



resterday		Today	Tomorrow
Process	serial	serial, shortened by tools	parallel
Level			
Product			
Process			
Mechanical			

System Development Process (Parallel) Mechanical Discipline - BIW Example



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Today

parallel

Yesterday

System Development Process (Parallel) Mechanical Discipline - BIW Example



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serial

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System Development Process (Parallel) Mechanical Discipline - BIW Example



System Development Process (Parallel) Multiple disciplines to be parallelized



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Traditional System Engineering Concurrent development within "Silos" disciplines



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Traditional System Engineering "Silos Approach"

Design						
Mechanical Engineering						
Embedded Systems/Software						
Test						
Manufacturing						
Development Phase	Concept Design	Detail Design	Proto- typing	Evaluation	Production Ramp-Up	Full Production
Resolution Cost per Problem	1 X	10 X		100 X	1000 X	20000+ X

Problem Frequency Curves With Decision-making Process Silos

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SYSTEM ENGINEERING Evolution



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SYSTEM ENGINEERING Evolution



Front-loaded Decision-making Process Leveraging Closed-loop Systems Synthesis and Validation

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EXECUTING THE VISION Requirement Management

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REQUIREMENTS MANAGEMENT Key solution areas

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Capture, share and maintain



"Live" Integration with Microsoft Office Requirements Integrator with DOORS, RIF, ... Single secure source

Tie requirements to project plans



Link requirements to tasks and resources Focus efforts, identify risks and monitor status Participate in workflows

Link requirements to the lifecycle



Assess the impact of changes



View relationships across the lifecycle Trace, verify and assess dependencies Follow URL-addresses

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REQUIREMENTS MANAGEMENT

Assess the impact of changes

Identify dependencies and intelligently assess the impact of changes



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REQUIREMENTS MANAGEMENT

Capture, share and maintain requirements

Simplify the process of capturing and maintain requirements



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EXECUTING THE VISION System Logical and Functional Design

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A systems modeling approach to support validation



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EXECUTING THE VISION 3D Virtual design and simulation - System integration and validation





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NX Integrated CAD/CAE Rapid iterations to deliver faster validation



- Fast direct geometry editing with Synchronous Technology
- Knowledge-based meshing and geometry simplification
- Quick creation of meshable fluid domain geometry
- CAE performed on geometry variants
- Best-in-class tetra mesher
- Robust automatic/manual meshing for 1D/2D/3D

Open solver support
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NX CAE Capabilities



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EXECUTING THE VISION

Test-based validation





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TEST SOLUTIONS





TEST SOLUTIONS

Design Validation for Structural Dynamics & Durability

Structural Validation



Structural Testing



Modal Analysis



Test-Simulation Correlation

Durability Validation



On-road Durability



Test-bed Durability



Loads for Simulation

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Delivering Unique Value to Our Customers Unified Modeling, Simulation and Verification



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SUMMARY

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SPLM continues to deliver on the vision

- Siemens keeps focus on Auto Industry software regardless of recent industry challenges.
- SPLM is making good progress with integrating acquired companies.

SPLM's strategy is addressing automaker's future needs

- Building the engineering platform for future vehicle development
- Successful projects in a number of areas critical to the OEMs.
- A few examples: Systems Engineering, Class A Surfacing, Model Based Design, Embedded Systems . . .

SPLM's Continues to Focus on Scalability, User Experience, and Openness

- Performance and scalability continue to be core to our next generation architectures
- Active Workspace Space continues to make good progress and is expanding across products
- Building systems engineering solutions in an open architecture



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Thank you! Beppe Grimaldi – Manager, Professional Services

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