Embedded Systems

Transformation Requires a Comprehensive Approach
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<td>8:00 AM</td>
<td>Registration</td>
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<tr>
<td>8:30 AM</td>
<td>Introductions and Welcome</td>
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<tr>
<td>8:45 AM</td>
<td>Reducing the Complexity of Delivering Software Intensive Automotive Systems</td>
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<td></td>
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Contacts

Randy Cox
Associate Partner
IBM Global Business Services
Strategy and Transformation
Mobile: 1-248-417-9173
e-mail: coxra@us.ibm.com

Anish Verma
Associate Partner
IBM Global Business Services
Strategy and Transformation
Mobile: 1-313-673-1145
e-mail: vermaa@us.ibm.com

Steve Nykerk
Business Solutions Professional
IBM Global Business Services
Mobile: 1-248-910-5278
e-mail: nykerk@us.ibm.com
Key Messages

- Products are getting smarter enabled by increased software content
- Increasing demands in functionality and complexity amid engineering cost management constraints challenge historical development practices and tool chains
- Rational provides leading tools to meet these challenges and to generate enthusiasm behind a vision
- However, when a company chooses to embark on a transformation, the mission is far bigger than simple tool implementation
Technology is making the world smaller and more connected, but it is also enabling it to get smarter.

Digital transformation is global and connected ...

**Global integration** + **Networked technologies** + **Bandwidth explosion**

...enabling a world that is becoming smarter

**INSTRUMENTED**

Digital technologies (sensors and other monitoring instruments) are being embedded into every object, system and process.

**INTERCONNECTED**

In the globalized, networked world, people, systems, objects and processes are connected, and they are communicating with one another in entirely new ways.

**INTELLIGENT**

All the data generated by digital technology is providing intelligence to help us do things better, improving our responsiveness and our ability to predict and optimize for future events.
In the automotive industry this means increasing functionality, complexity and dependencies.

With increasing functionality comes **additional complexity** due to the **volume of code** that must be managed, along with **reuse requirements** and **functional dependencies**.
Software is the invisible thread that make today’s products smarter and hence companies need to adopt methodologies and best practices that make managing embedded software easier.

1. Companies have an increased need for innovation to unleash new business value.

2. Software is the invisible thread of today’s product and service innovation.

3. The convergence of physical assets and IT applications requires a new “Systems of Systems” approach for integrating products and services.

4. Software driven innovation across product lines is complex and difficult which can lead to costly failures and quality issues at a systems level.

5. Best-in-class product & service companies are those that build a strong competency in systems engineering and software development.

Source: IBM Smarter Products Marketing
Methodologies and best practices to be adopted will need to establish discipline and governance in key product development areas

**Common characteristics of Best in Class**

- **Manage Requirements**: Twice as likely as the Industry average and 3 times as likely as laggards to address entire lifecycle of requirements
- **Leaders in Systems Modeling and Simulation**: 5 times as likely as the Industry average and 7 times as likely as laggards to digitally validate system behavior with the simulation of integrated mechanical, electrical and software components
- **Manage Change**: 51% more likely than Industry average and 3 times more likely than laggards to notify other disciplines of changes.
Discipline and governance improvements will produce results and will allow organizations to increase product functionality, improve product quality and reduce time to market.

**Best-of-class produce results:**

- **25%** more likely to meet revenue targets – **96%** on average
- **21%** more likely to meet product launch dates – **92%** on average
- **4.4x** more embedded software than competitors
- **50%** fewer defects in embedded software
- **95%** on average achieve quality targets
- **25%** decrease in product development time

**Top 5 pressures driving improvements in embedded software**

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<th>Pressure</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Customer demand to lower costs of ownership</td>
<td>38%</td>
</tr>
<tr>
<td>Customer preferences for features are dynamic</td>
<td>35%</td>
</tr>
<tr>
<td>Need to launch products prior to competitors</td>
<td>30%</td>
</tr>
<tr>
<td>Competitive landscape is dynamic</td>
<td>19%</td>
</tr>
<tr>
<td>Need to capitalize on new market opportunities</td>
<td>13%</td>
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**Model based software development and collaboration**

<table>
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<th>Improvement</th>
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<tr>
<td>SW components get developed faster</td>
<td>71%</td>
</tr>
<tr>
<td>Misunderstandings are reduced</td>
<td>95%</td>
</tr>
<tr>
<td>SW component is more compliant to requirements</td>
<td>62%</td>
</tr>
<tr>
<td>Communication efforts decrease</td>
<td>48%</td>
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A transformation in performance requires an integrated tool chain and process vision

- Increased quality
- Increased engineering efficiency
- Increased revenue / time
When the initiative is transformational, results cannot be achieved by tool implementation alone; a comprehensive approach is required.

**Major Workstreams**

- Goals, Benefits Realization and Roadmap
- Process Definition
- Requirements Definition
- Architecture Definition

**Best Practices**

- Identify operational goals and establish a benefits realization dashboard to monitor and measure program success
- Use system engineering principles
- IBM SME participation (provocative questions, industry examples)
- Converge processes and build consensus
- Use scrum and agile methods to build the solution incrementally
- Use an organizational change framework to ensure solution adoption

**Build & Pilot**

**Deploy & Roll Out**
Scrum and agile methodologies should be followed to configure the tools and build a solution incrementally. Once enough functionality is built and tested it should be piloted, deployed and rolled out to engineers.

**Critical Success Factors**

- Educate the client about scrum and agile methodology and adapt the methodology to suit the client environment
- Identify scrum master from the client and the IBM team
- Allocate use cases to sprints
- Establish value to effort ratio for these use cases and prioritize based on maximum value
- Establish a framework to tradeoff between use cases from one sprint to another to ensure timely deployments
Typical project failure rates are significantly high...

Average Project Success Rates

- Projects that either missed all goals or were stopped: 15%
- Projects that did not meet either time, budget or quality goals: 44%
- Projects that fully met their objectives: 41%

Only 41% of all projects achieved their goals in terms of either time, budget or quality

We found those who create extraordinary success...

Change Masters vs. Change Novices

- Share of successful projects
- Bottom 20% Change Novices: 8%
- Average: 41%
- Top 20% Change Masters: 80%
- Success rate increase: 95%

The top 20% of organizations reported an average project success rate nearly twice as high

They focus on four areas—the Change Diamond

Four Facets of the Change Diamond

- Right investment
- Real insights
- Better skills
- Solid methods
- Real actions
- Better change
- Solid benefits

Detailed analysis revealed a correlation between project success and four important areas of focus

Source: IBM Global Making Change Work Study, 2008; (n=1,532)
IBM’s Better Change Method is a proven framework that systematically addresses typical points of failure

**Better Change Method Framework**

- Focus on Strategic Execution
- Program Leadership and Governance
- Program Strategy and Management
- Organization Design
- Stakeholder Engagement and Communications
- Skills & Knowledge
- Culture Transformation
- Value Realization

**Highlights…**

- Establish a sense of urgency and create a coalition for change
- Develop and communicate the future vision
- Cascade the mission to the project team and enable the team
- Actively manage stakeholder communication and involvement
- Understand change impacts and provide the necessary user training to support new processes and technology
- Drive the program with value…

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Value Realization is the “engine” that drives a transformation program.

Value Realization
- Identify Benefit Opportunities
- Refine Business Case
- Secure Benefits Ownership
- Develop Benefit Measures
- Develop Benefit Action Plans

Identifying & Developing Value
Realizing Value

Identify Value
- Review Strategic Priorities
- Analyze Performance
- Evaluate Opportunities
- Develop Value Proposition

Drive and Realize Value
- Establish Performance Targets / Accountability
- Drive Value Delivery Actions
- Manage Performance Delivery
- Leverage Success
An implementation dashboard begins with metrics, establishes accountability and measures results achieved.

Cascade **operational objectives** to **improvement strategies** to the **metrics** that will enable monitoring progress.

Establish improvement targets, executive accountability and actions plans.

Drive the transformation program at a dashboard level.
Transformation is like setting your hair on fire and then putting it out with a hammer

Lessons learned....

- Strong and active executive leadership
- Engineers have day jobs
- Develop a process design and adoption program
- Design the deployment strategy....early
- Quick wins are a must
- The value realization program creates inertia
- Visions and strategy are easy; execution is hard
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