Intégration des outils de tests dans une plateforme de développement

Karine Rouelle

Business Development Manager – Embedded Systems Design and Test

National Instruments France

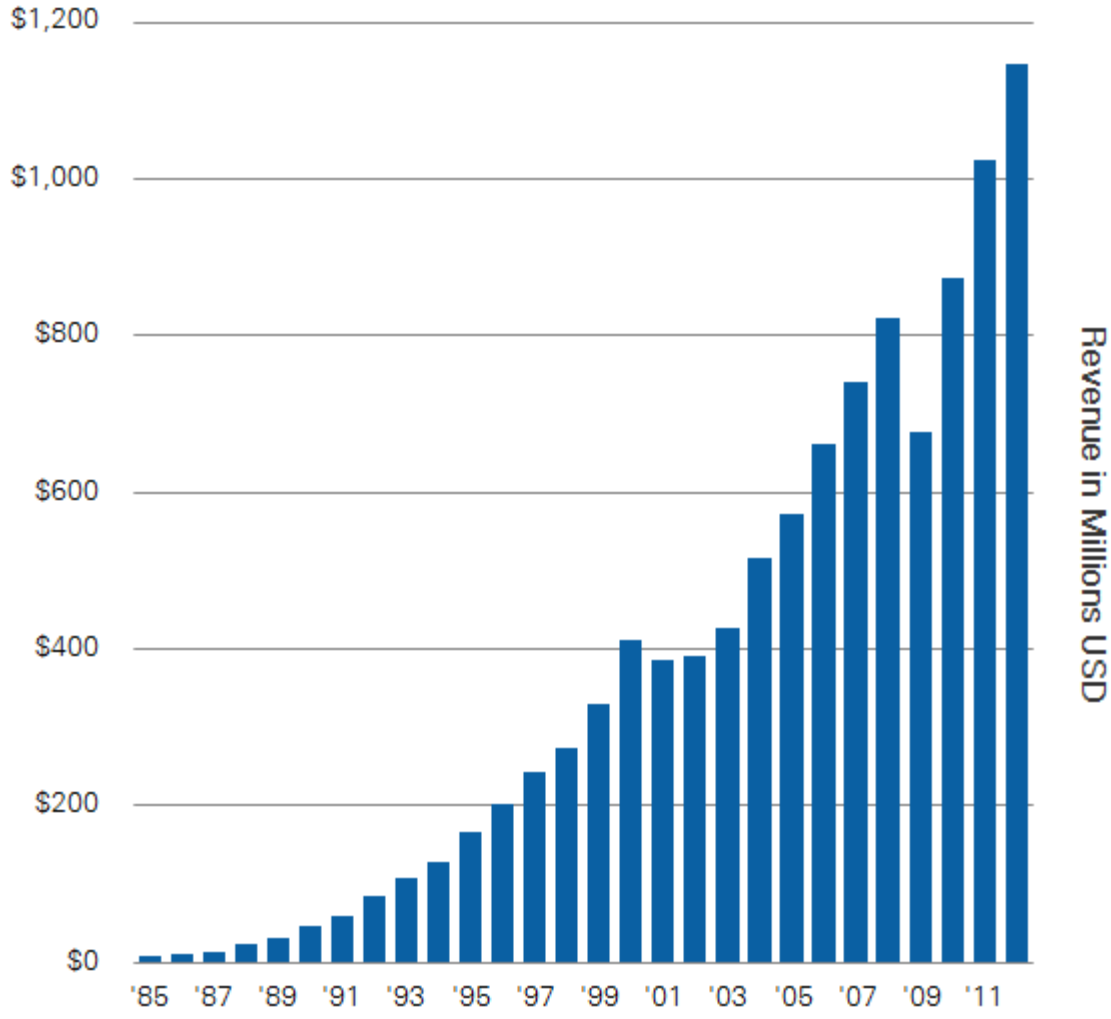
NATIONAL INSTRUMENTS

Agenda

- NI Solutions
- IBM Rational
- Embedded systems design challenges
- National Instruments and IBM rational plug-in
- Conclusion

Long-Term Track Record of Growth

- **Revenue:** 1,14 M$ in 2012
- **Global Operations:** Approximately 7,100 employees; operations in more than 40 countries
- **Broad customer base**: More than 35,000 companies served annually
- **Diversity**: No industry >15% of revenue
- **Culture**: Ranked among top 25 companies to work for worldwide by the Great Places to Work Institute
- **Strong Cash Position**: Cash and short-term investments of $327M at March 31, 2013

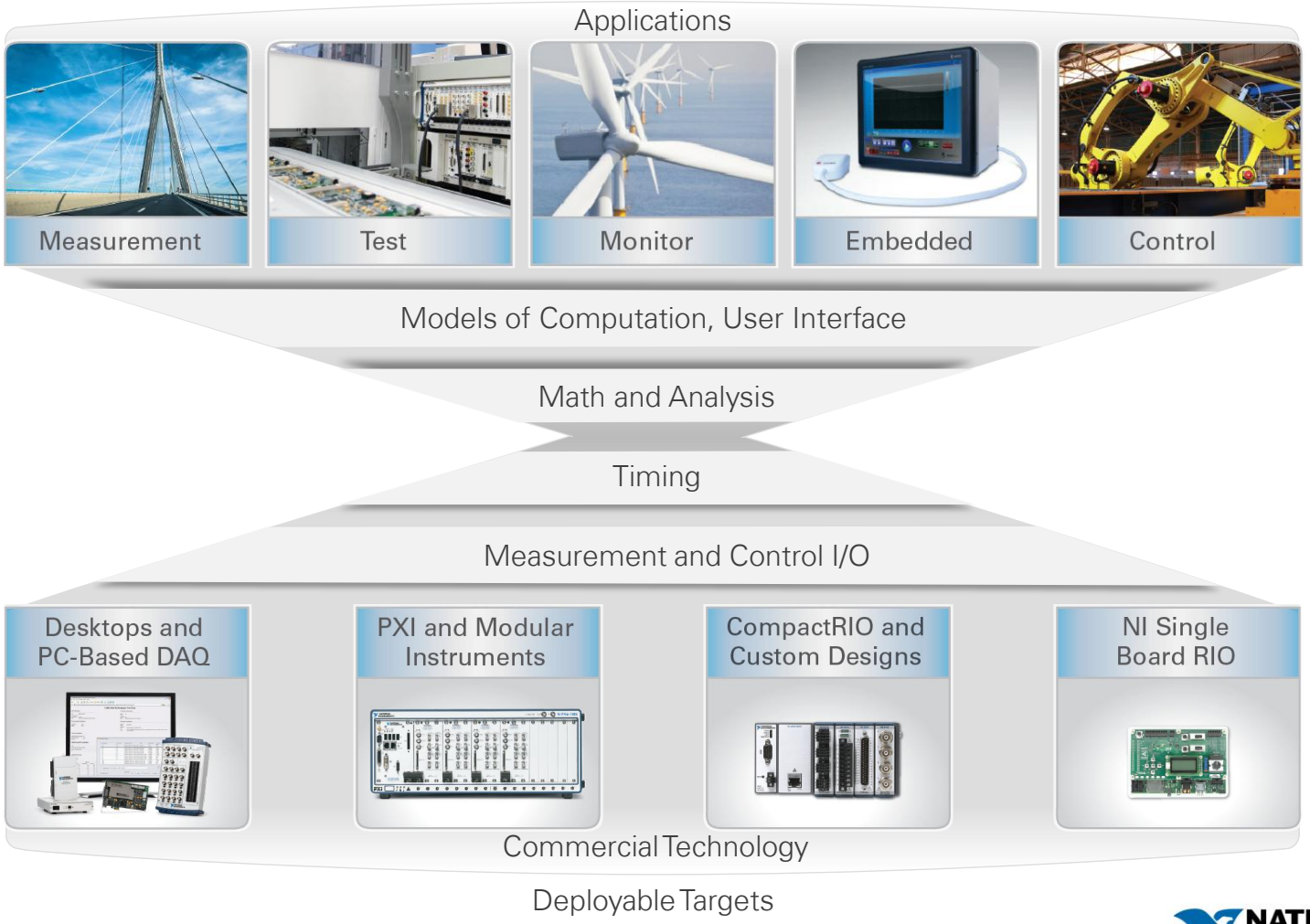


Committed to Your Success

- Global team of technical sales engineers available direct in more than 40 countries
- Systems engineers to assist with reference and application designs
- Local technical support worldwide
- World-class NI services
- 700+ NI Alliance Partners worldwide

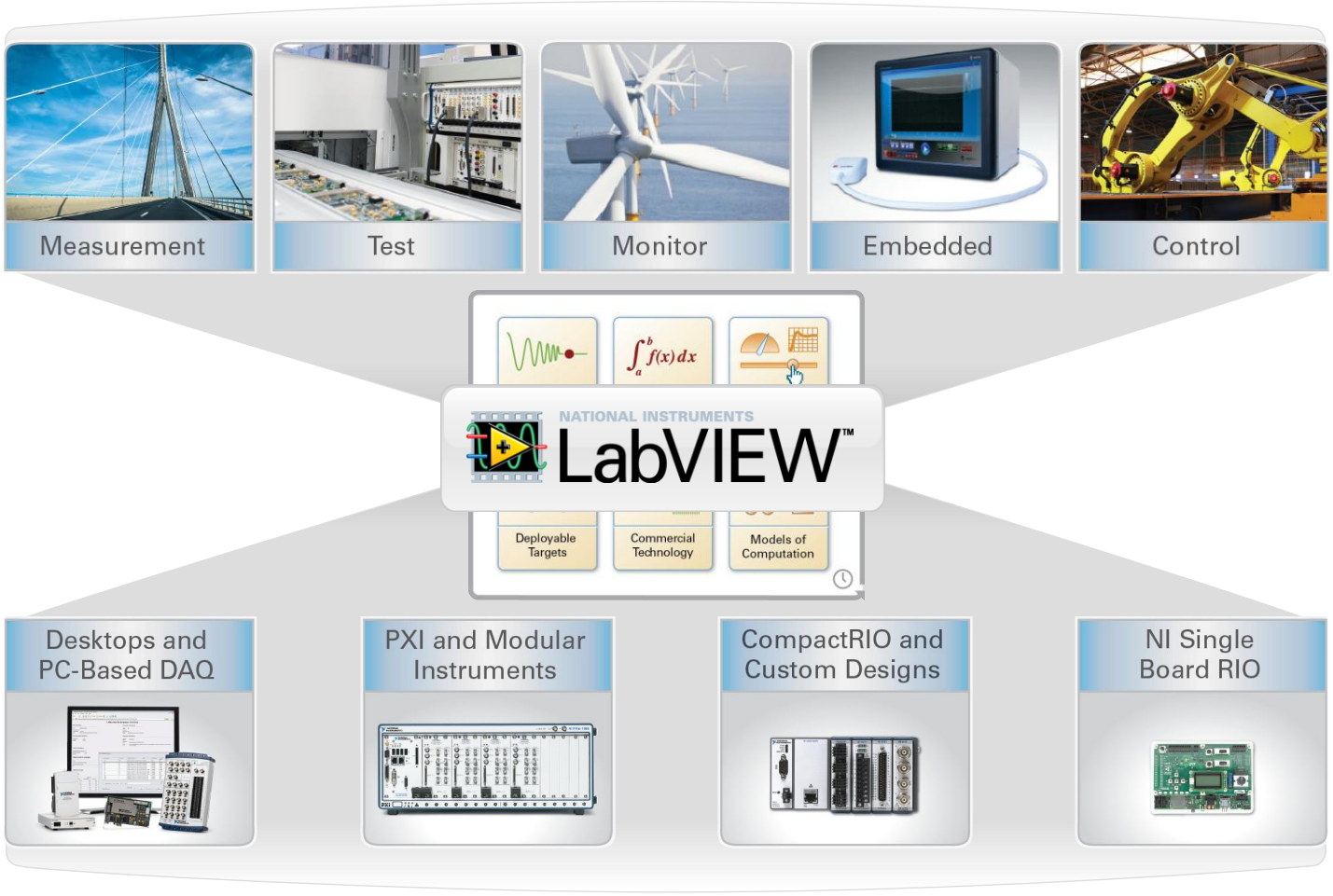
Graphical System Design Platform

A platform based approach for control design and measurement

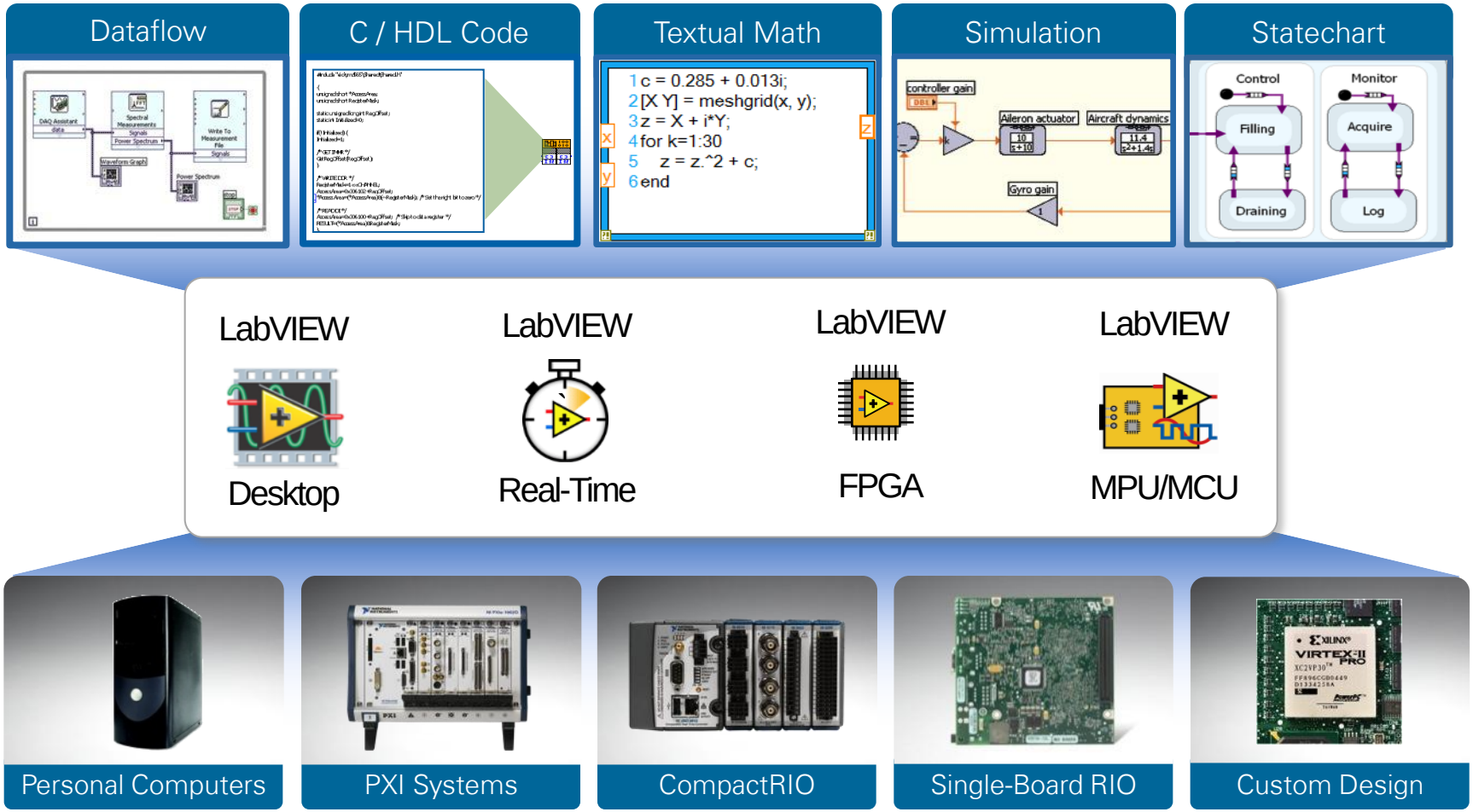


La plateforme NI: la conception graphique de systèmes

Une approche basée plate-forme pour la mesure et le contrôle/commande



LabVIEW Graphical System Design



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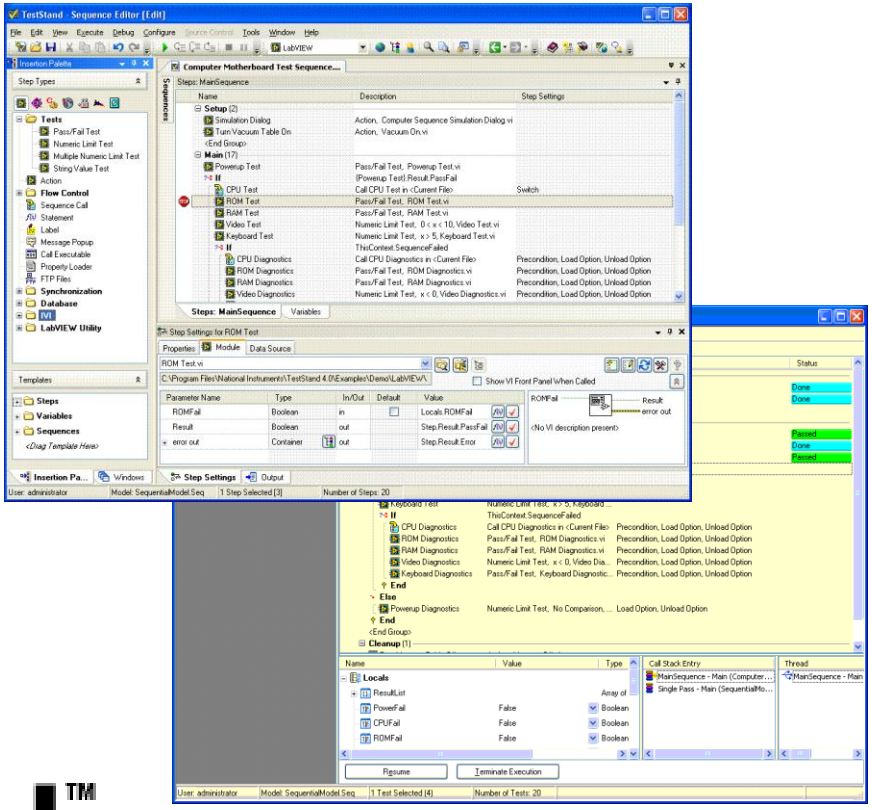
NI TestStand—Test Management Software

- Graphical sequence editor environment
- Automate tests written in any language
- Multithreaded sequence execution
- ASCII, HTML/Web, XML, and ATML report generation
- Access, Oracle, SQL Server database connectivity



NI TestStand™

NATIONAL INSTRUMENTS™

The NI TestStand Ecosystem

1000+ companies worldwide
10000+ existing developers
20+ partner products

100+ consultants and integrators
2 levels of development certification

NI TestStand™

500+ new developers trained annually since 2007
40+ worldwide branches providing support
10+ programming languages supported

NI VeriStand™

Real-Time Testing and Simulation Software

- RT Stimulus Generation
- Data Logging
- Test Automation
- Single-Point I/O
- Alarming
- Calculated Channels
- Deterministic Model Execution
- User Account Management
- Multi-Chassis Synchronization
- Multi-Chassis Data Sharing
- Closed-Loop Control
- Scaling and Calibration

Multi-Chassis Systems

PXI

CompactRIO*

Single-Board RIO*

** 128MB DRAM or great required*

NI DIAdem

- Ready to use data search and mining
- Easy, flexible access to databases and files
- Interactive analysis and report generation
- Automation through VBScript

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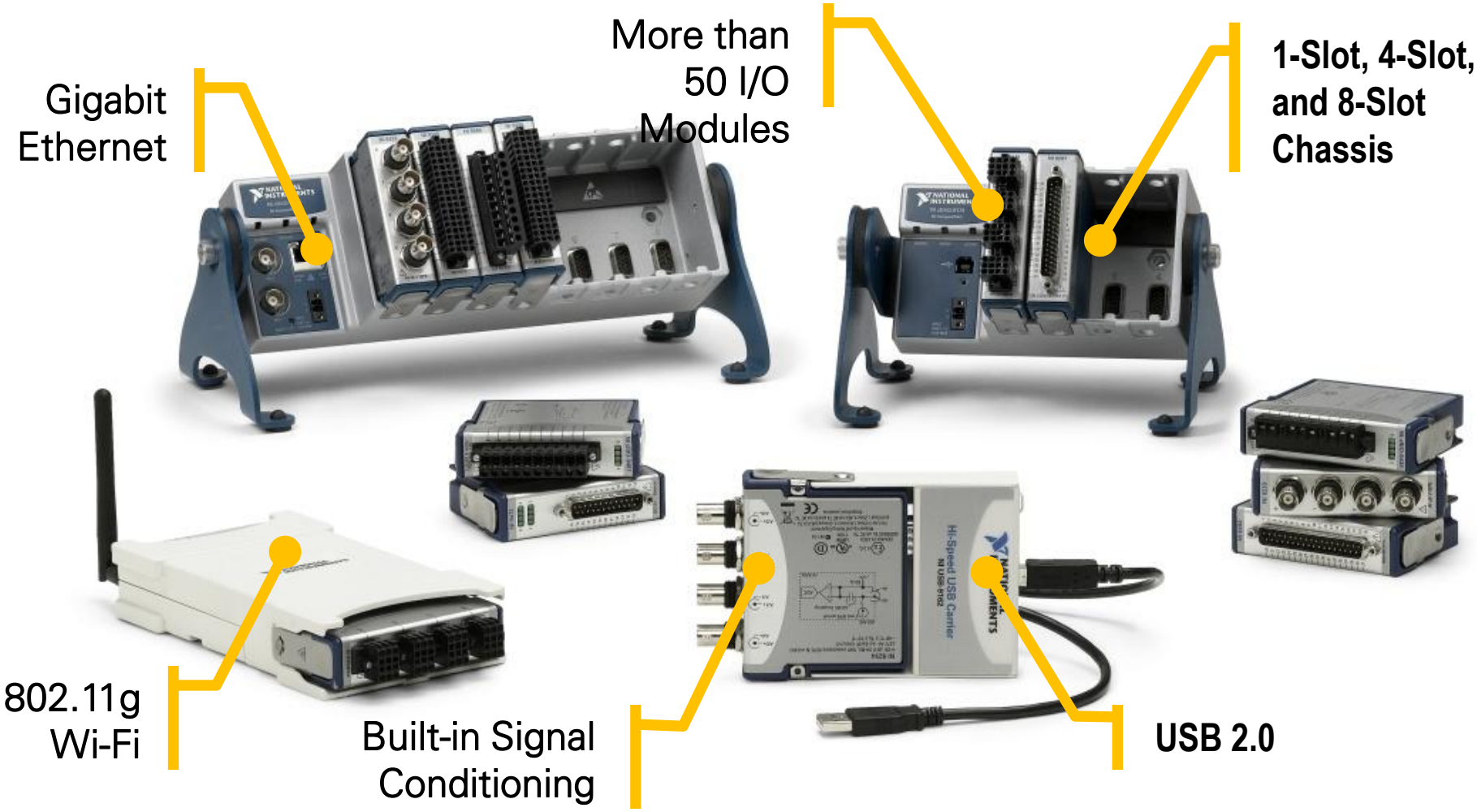
NI CompactDAQ Platform



PCI eXtensions for Instrumentation

- PCI electrical-bus with the rugged, modular, Eurocard mechanical packaging of CompactPCI
- Advanced timing and synchronization features
- Support for real-time multicore processors

Real-Time Processer Controller

I/O Interface Modules

More than 1,500 PXI Products Available!

PXI Systems Alliance

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A global Platform

Services and support

Systems management softwares
NI TestStand, NI VeriStand,
Switch Executive, DIAdem, Requirements Gateway

LabWindows/CVI

NATIONAL INSTRUMENTS LabVIEW™

Measurement Studio

Drivers and measurement tools
NI-DAQmx, NI-VISA, Measurement and Automation Explorer (MAX)

Data acquisition and conditionning

Modular Instruments

Control of programable automatism

Instruments communication

Introduction to IBM Rational

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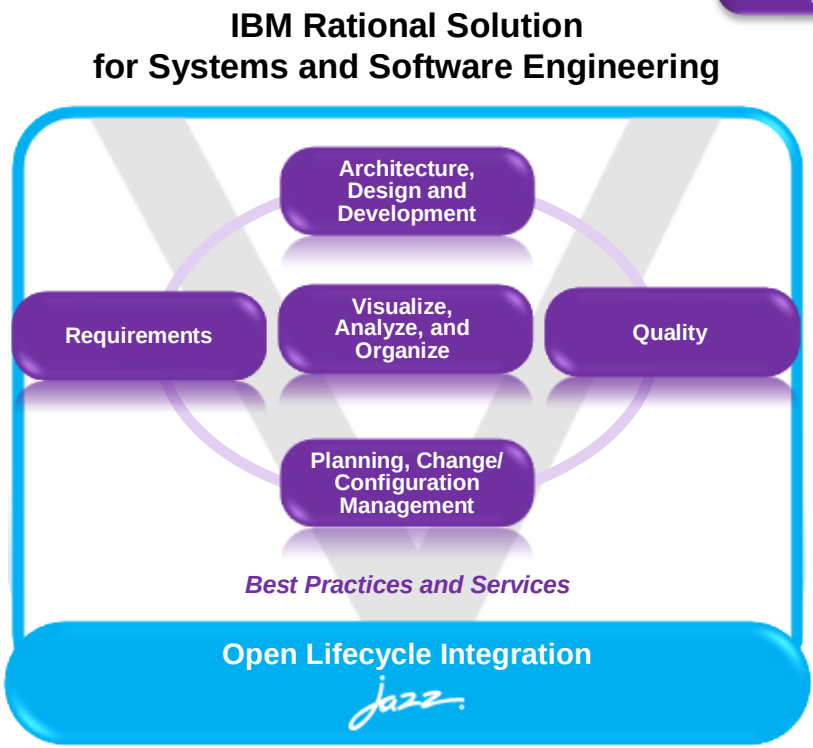
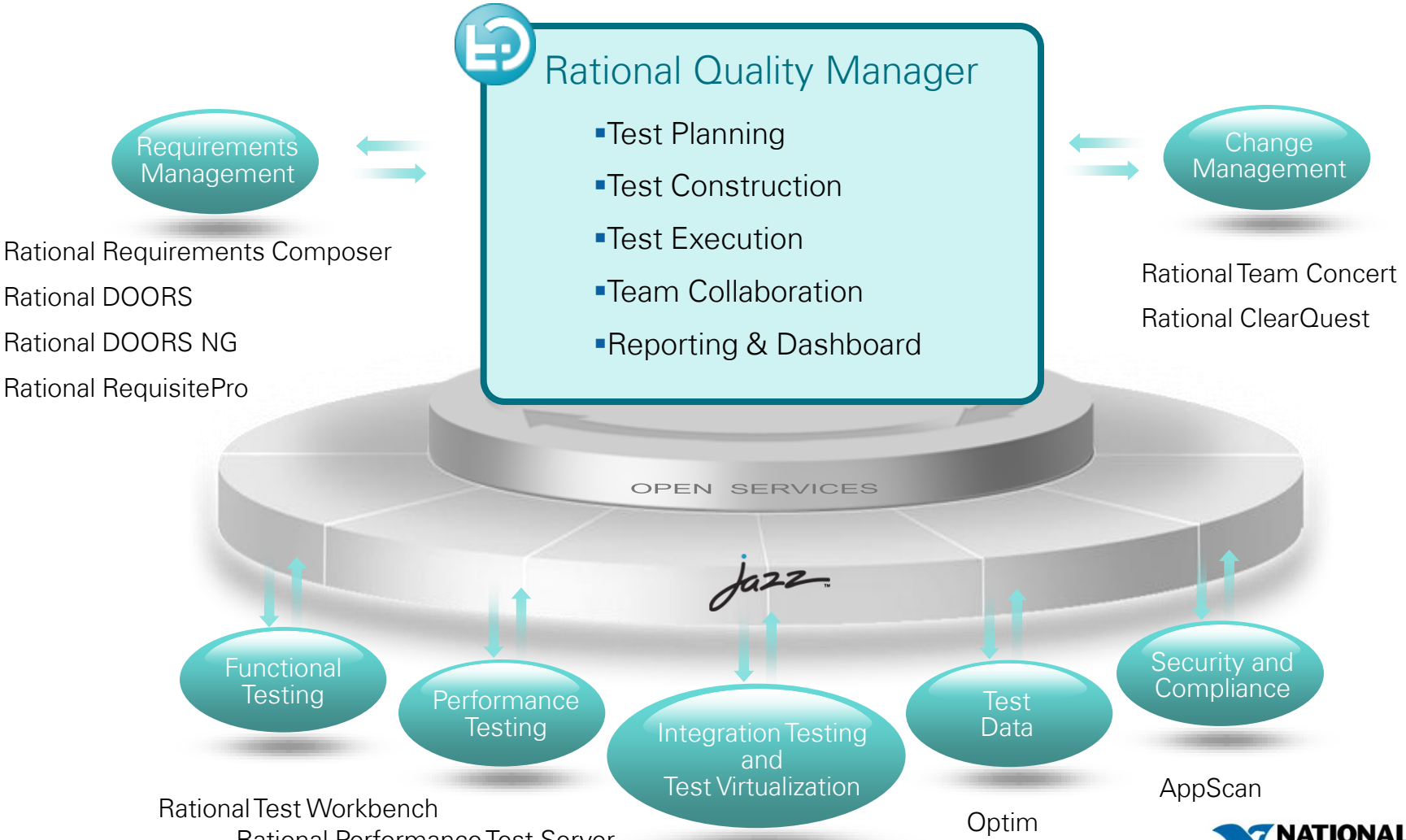
IBM Rational Solution for Systems and Software Engineering

- **Specify, design, implement and validate complex products and the software that powers them** with an integrated set of tools, practices, and services.
- **Improve quality, predictability and consistency** with best practices and process guidance.
- **Assess and manage changes** throughout your systems lifecycle.
- **Unify software, electrical and mechanical engineering** through a federated, linked data approach.
- **Increase agility** in embedded software development.



Systems Engineering	Embedded Software Engineering
• Optimize design alternatives	• Develop against changing requirements
• Link design and test	• Reduce compliance overhead
• Manage change across domains	• Integrate HW/SW development

Rational Quality Manager: Central Hub for Quality Management



Rational Requirements Composer
Rational DOORS
Rational DOORS NG
Rational RequisitePro

Rational Team Concert
Rational ClearQuest

Rational Test Workbench
Rational Performance Test Server
Rational Test Virtualization Server

Optim

AppScan

Embedded Software Quality Challenge

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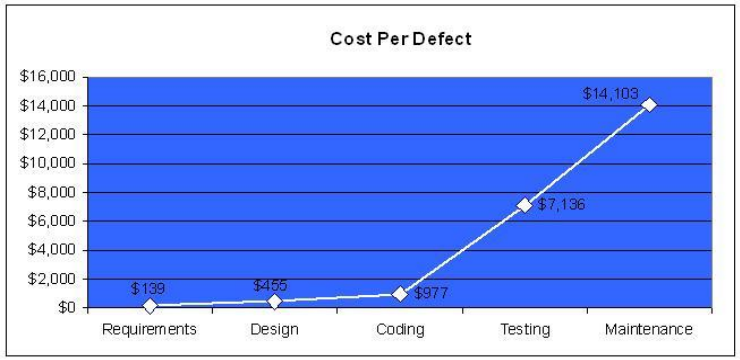
Managing the cost of software errors

	Smart Washing Machine	Commercial Aircraft	Luxury Automobile
Lines of Code	100k	6.5 Mil	10 Mil
	10-20 defects produced per 1,000 lines of code*		
Defects	1k – 2k	65k - 130k	100k – 200k



* The Economists.May 16th, 2010. *Tech.View: Cars and software bugs. www.economist.com*

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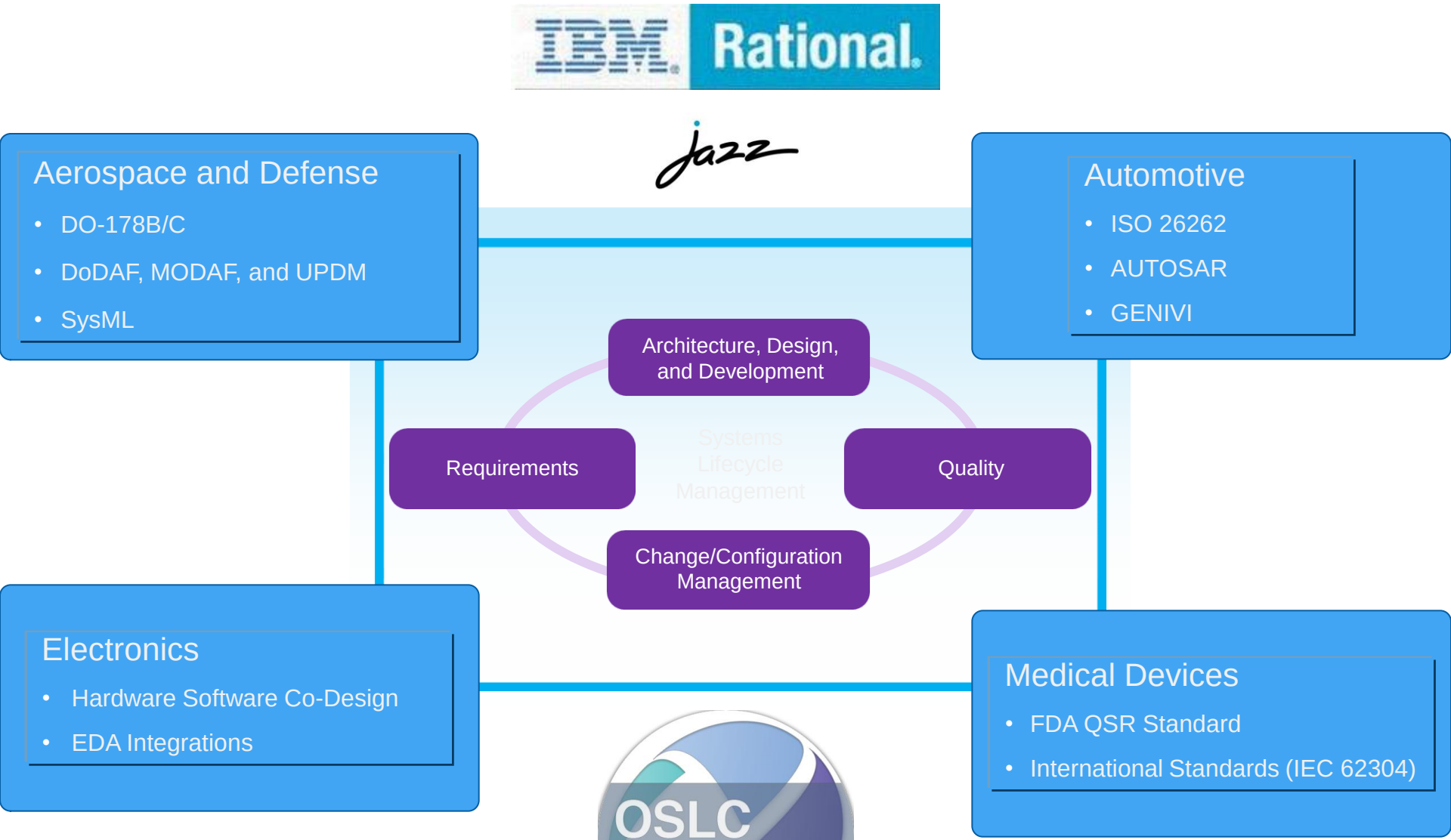
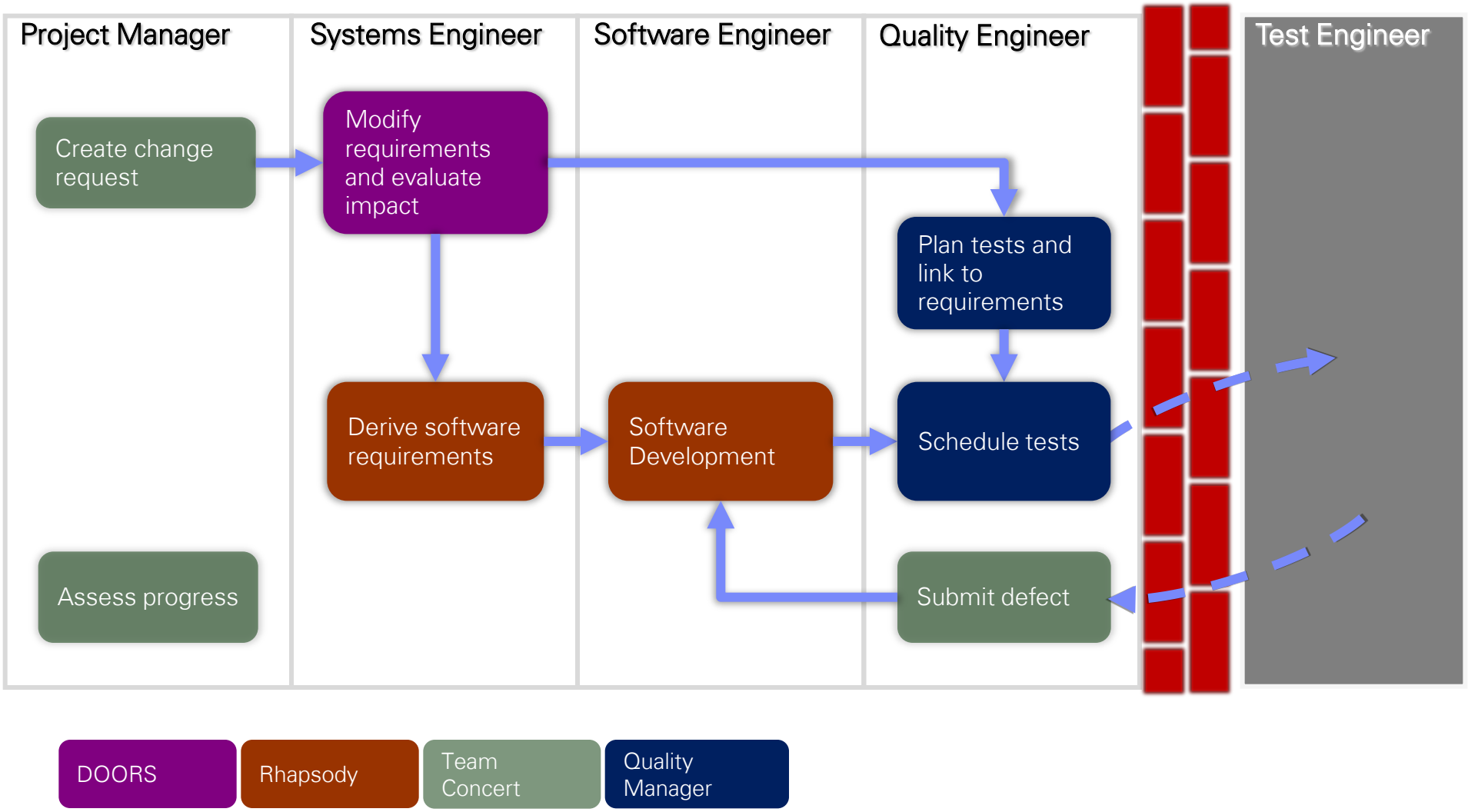
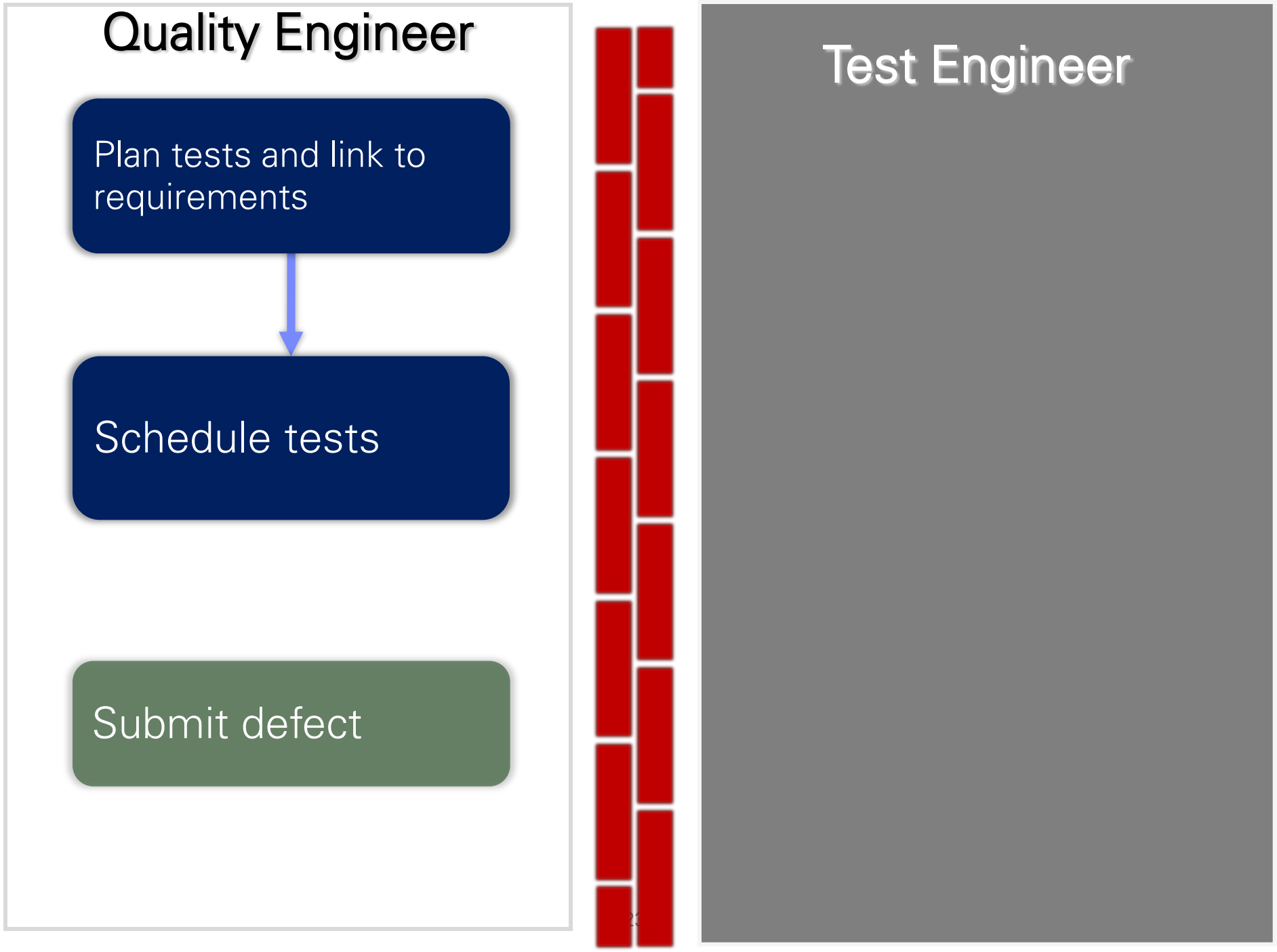
Challenges in Systems and Software Engineering



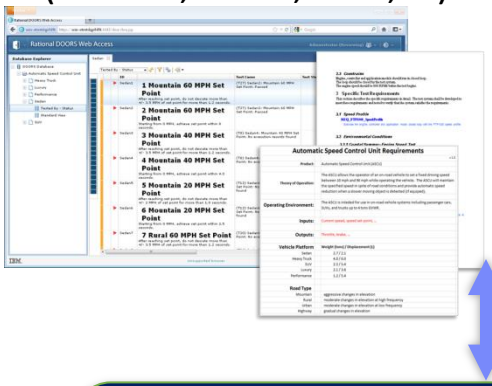
NATIONAL INSTRUMENTS

Traditional Development Process



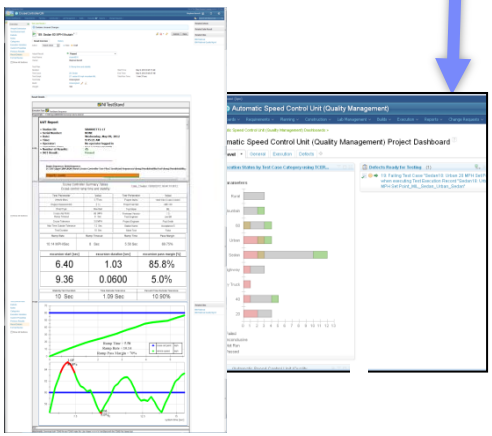

Quality Engineer
Plan tests and link to requirements
Schedule tests
Submit defect
Test Engineer

Requirements Documents
(DOORS, .docx, .xlsx, …)



IBM Rational Quality Manager

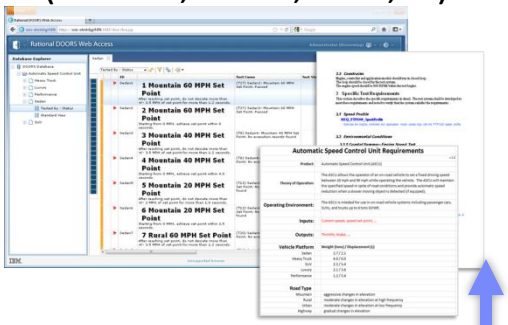
Test Plans	Execution Records
Test Cases	Requirement Links
Test Schedules	Quality Dashboards



Execution Records, Defect Management, Test Plan Documentation

Test Engineer

Requirements Documents
(DOORS, .docx, .xlsx, …)



IBM Rational Quality Manager

Test Plans	Execution Records
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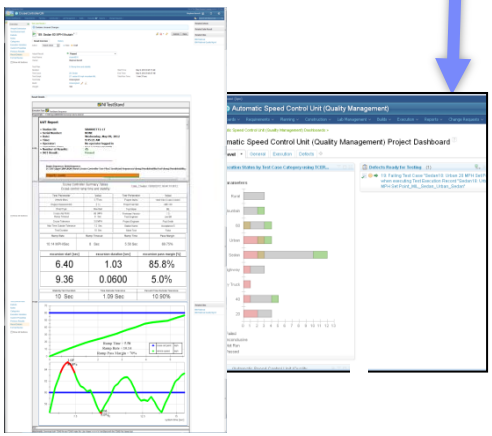
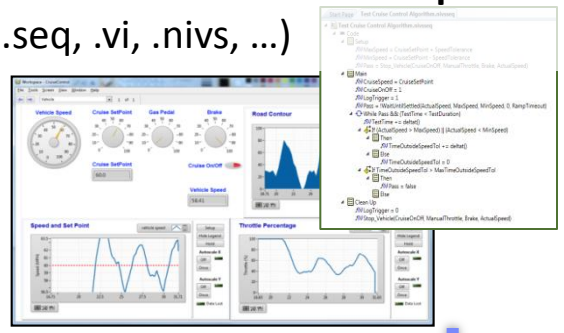


Execution Records, Defect Management, Test Plan Documentation

National Instruments Test Components
(.seq, .vi, .nivs, …)

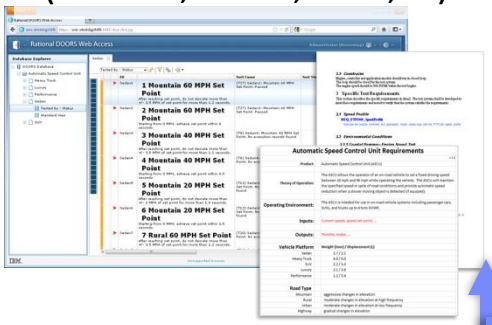


NI TestStand

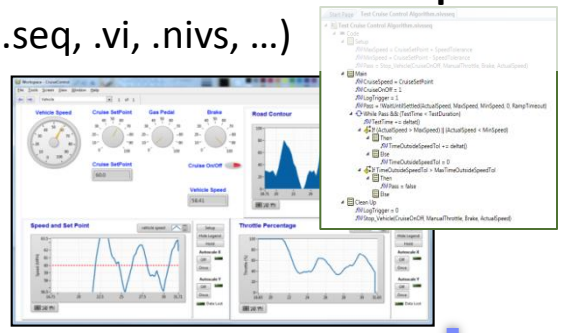
Sequences	Execution Records
Parameter Files	Requirement Links
Code Modules	Quality Dashboards

Test Results
(.html, .pdf, .tdms, .jpg, …)

Requirements Documents
(DOORS, .docx, .xlsx, …)



National Instruments Test Components
(.seq, .vi, .nivs, …)



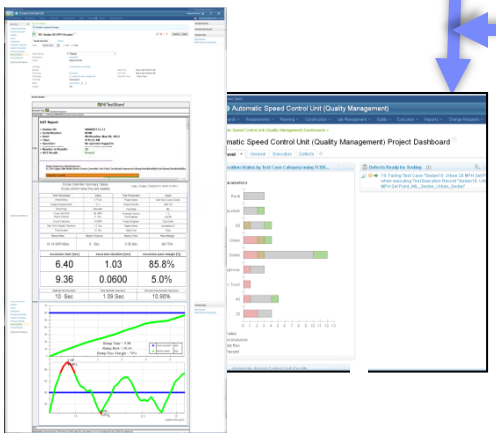
National Instruments Test Integration Adapter for IBM Rational Quality Manager

IBM Rational Quality Manager

Test Plans	Execution Records
Test Cases	Requirement Links
Test Schedules	Quality Dashboards

NI TestStand

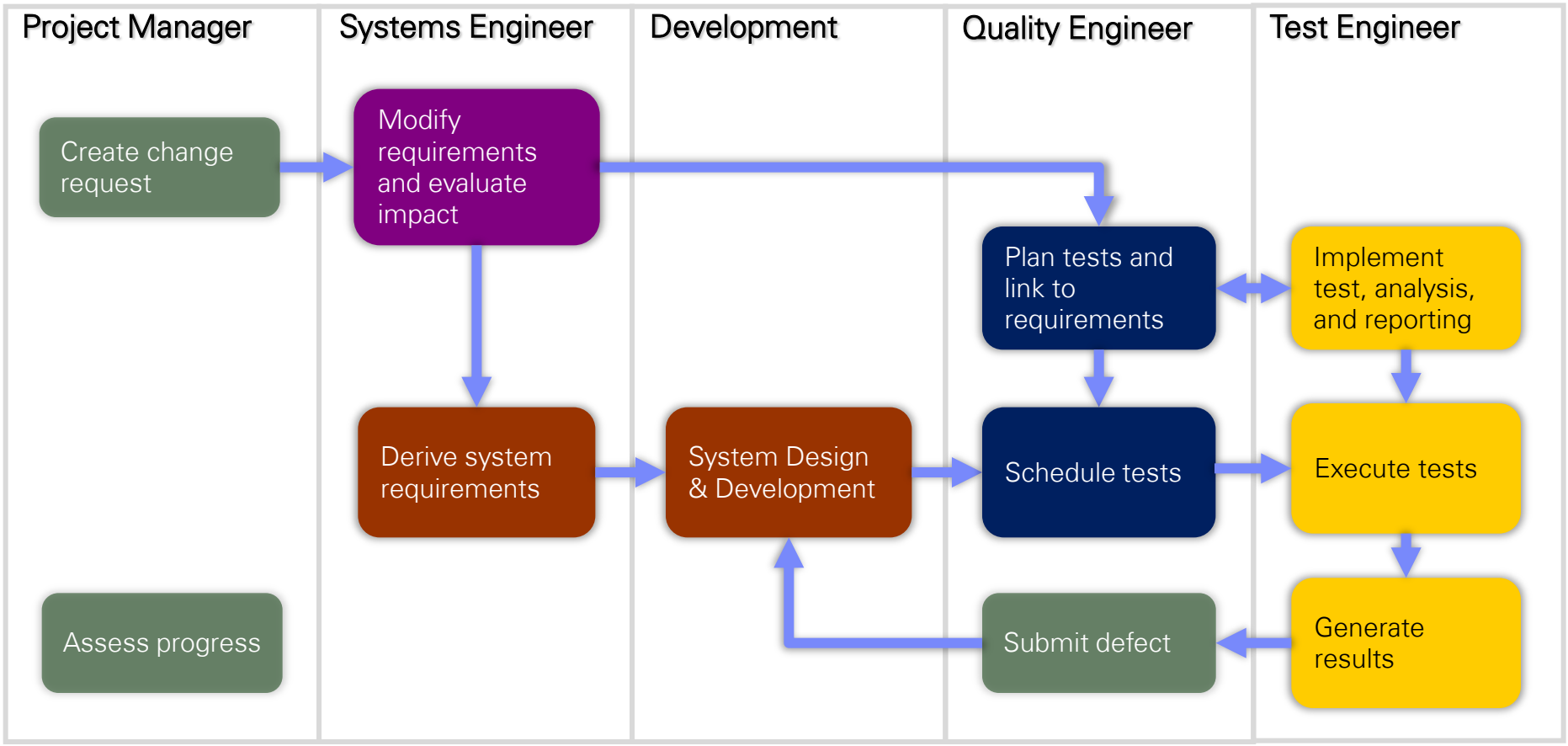
Sequences	Execution Records
Parameter Files	Requirement Links
Code Modules	Quality Dashboards



Execution Records, Defect Management, Test Plan Documentation

Test Results
(.html, .pdf, .tdms, .jpg, …)

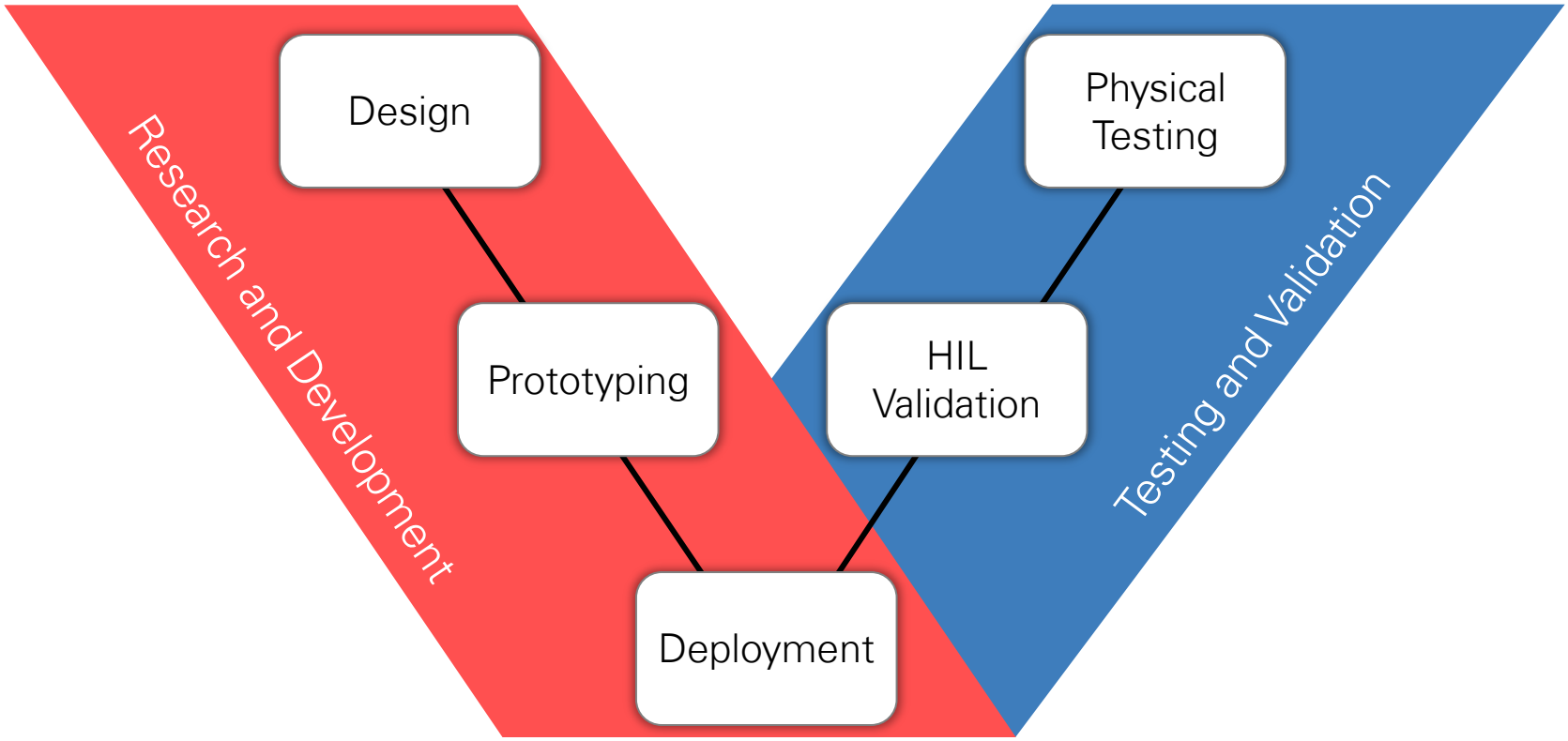
Next Generation Development Process



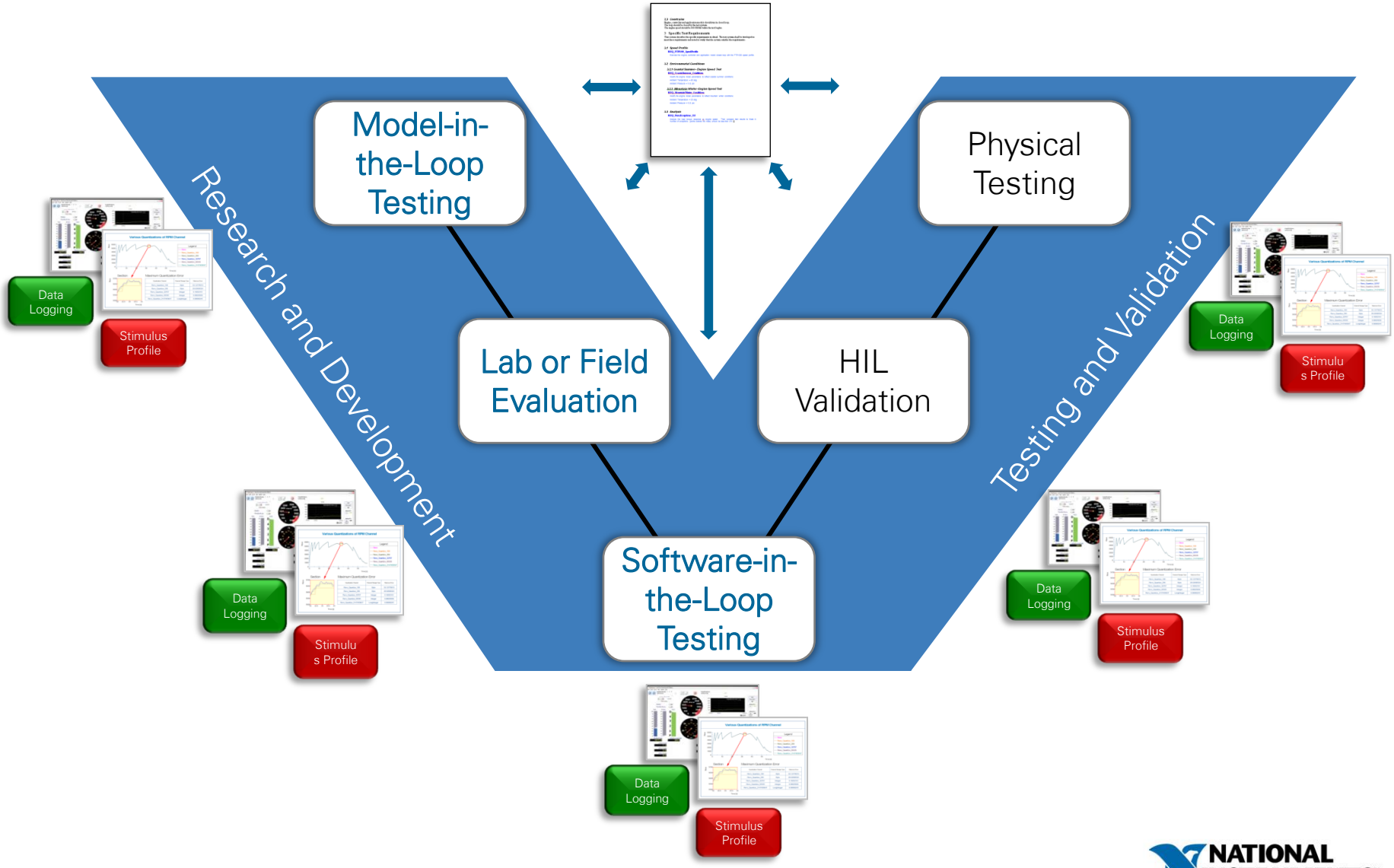
DOORS | Rhapsody | Team Concert | Quality Manager | NI TestStand | LabVIEW | NI VeriStand | DIAdem

NATIONAL INSTRUMENTS

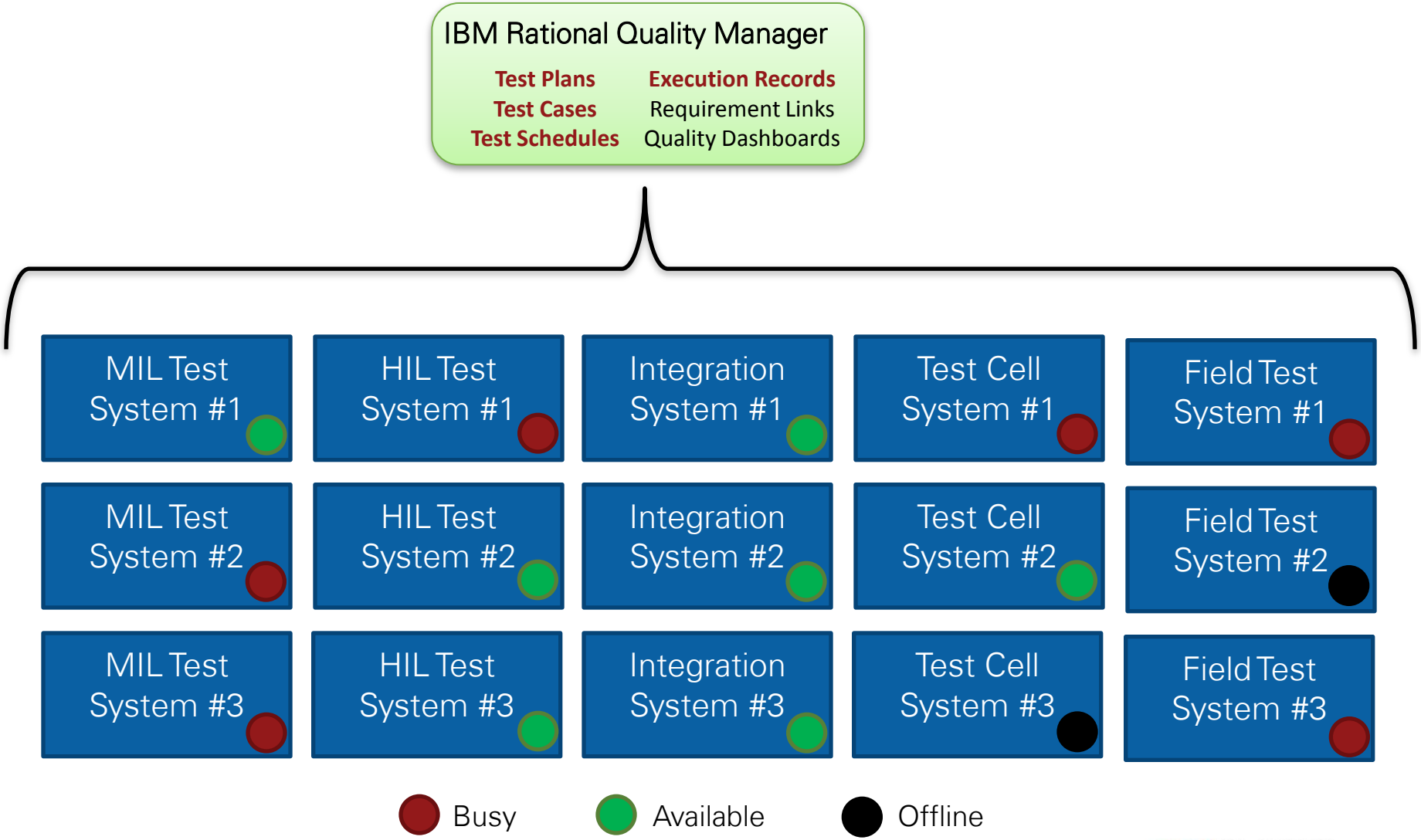
Embedded Software Development Process



Test Continuity and Test Component Re-use



Test Asset Management and Automation

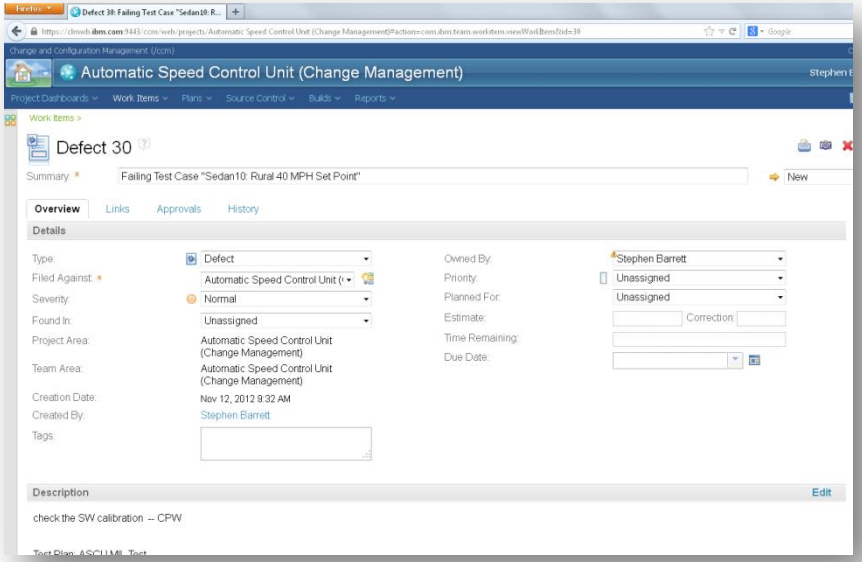


Defect Management

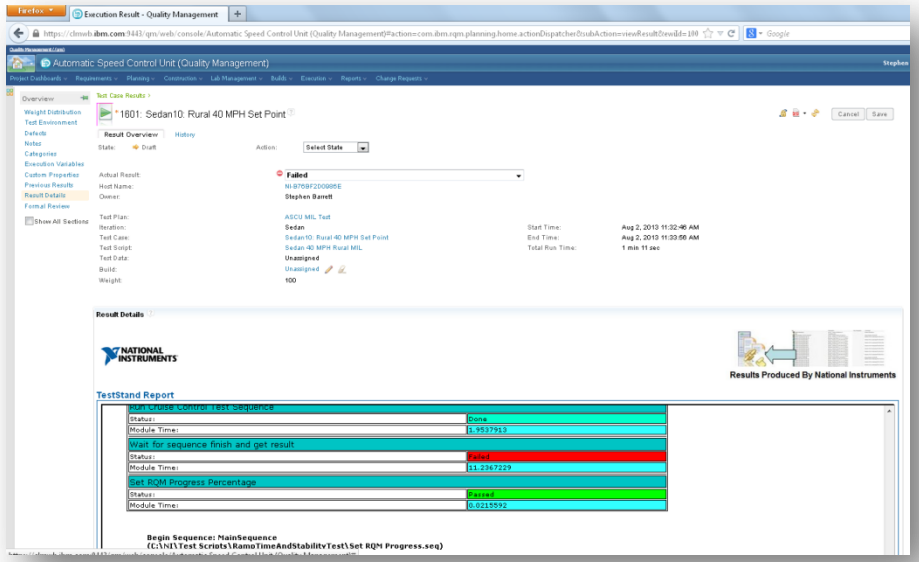
IBM Rational Quality Manager

Test Plans	**Execution Records**
Test Cases	**Requirement Links**
Test Schedules	Quality Dashboards

Defect Resolution Collaboration



Defect Results and Verification Items



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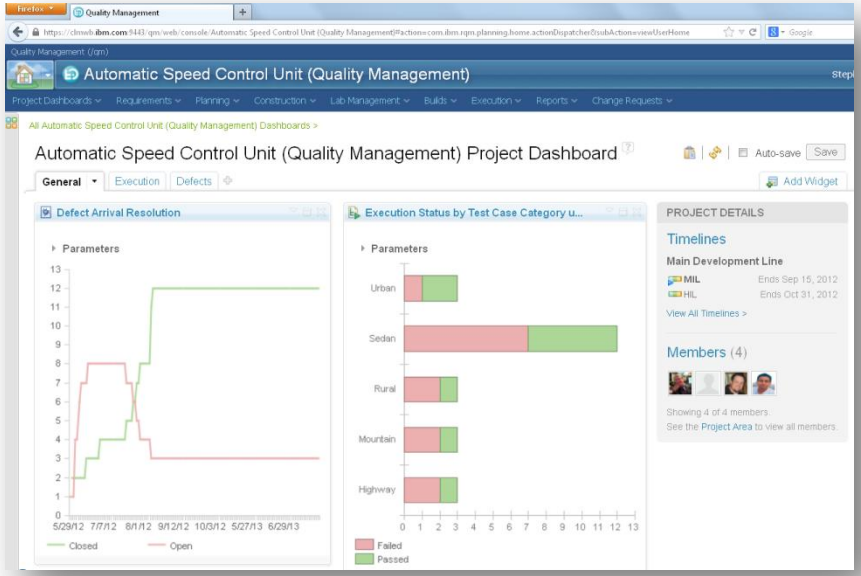
Project Documentation and Tracking

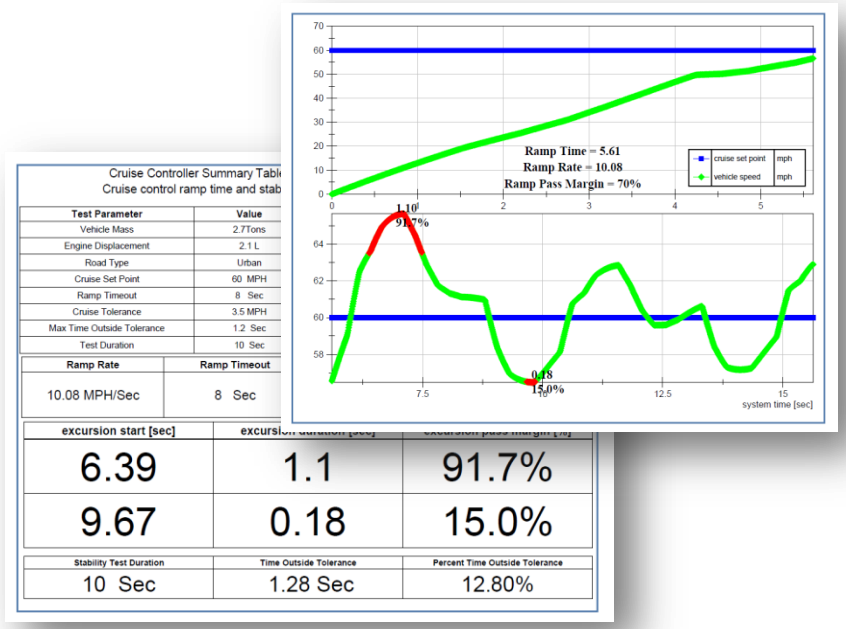
IBM Rational Quality Manager

Test Plans	Execution Records
Test Cases	Requirement Links
Test Schedules	Quality Dashboards

Project Dashboards

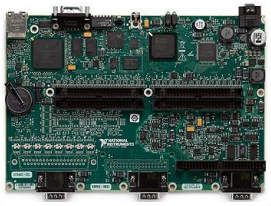


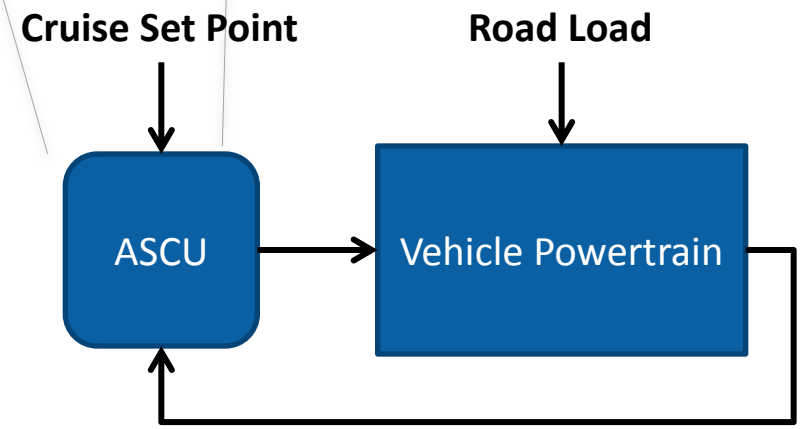
Test Results

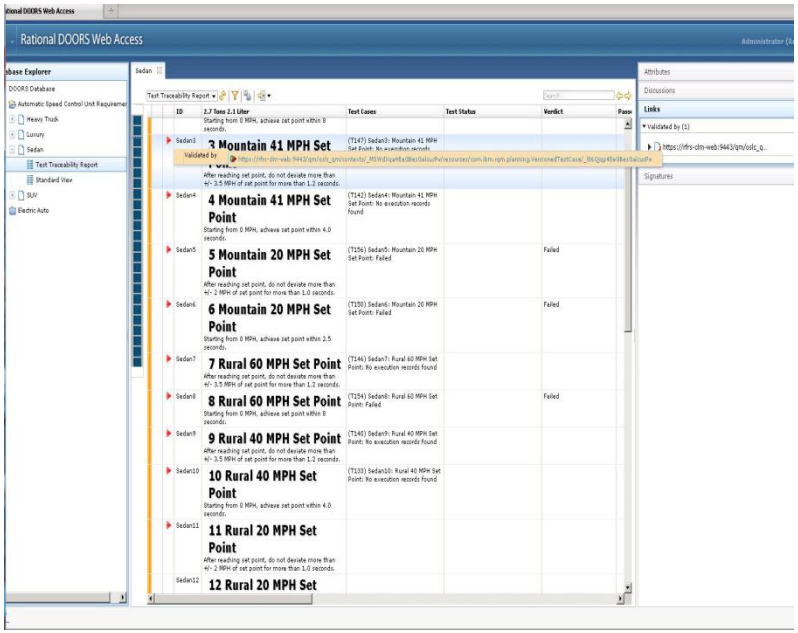


Demonstration Overview

- Validation of **A**daptive **S**peed **C**ontrol **U**nit (ASCU)
  - Intended operation in multiple Vehicle Powertrains (Truck, SUV, Luxury, …)
  - Validate performance in all systems against multiple driving scenarios (Cruise Set Points / Road Loads)







Demo

NATIONAL INSTRUMENTS™

1. Test Plan

2. Test Case

3. Test Script

4. Execution

5. Results and Defects

6. Dashboard

Breaking the Quality Management Silos with Enhanced Collaboration and Traceability

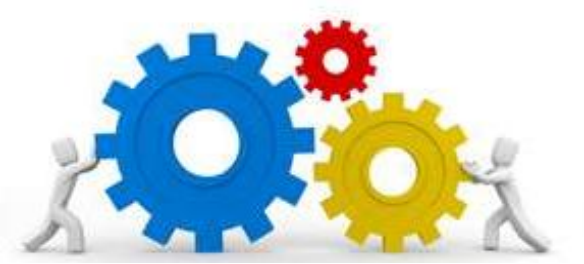
IBM Rational and National Instruments are teaming together to provide an **end-to-end quality management solution**.

Traceability all the way to test and back with **Collaboration** between ALL teams, including test

- Test components and assets linked to and managed with quality plan test cases
- All test results available to all teams and linked to test cases and requirements

Promotes quality and test consideration from the outset, not an afterthought, **reducing cost and risk** of identifying and correcting defects

Enables **test component re-use** throughout project phases and between projects providing operational efficiency and accuracy



NATIONAL INSTRUMENTS

Questions?

Learn More:

- Web pages:
  - IBM.com: IBM Rational and National Instruments
  - NI.com: Integrating Test Into Development Cycle
  - NI Test Integration Adapter Product page
- References:
  - Solution Brief: Break down engineering silos to improve quality
  - Article: To Build a Smarter Product, Stop Separating Design & Test Ian Cannings, Danfoss Power Electronics
  - Blog: Design News blog
- Media:
  - Webinar: Integrating National Instruments testing with RQM (demo starts at min 24)
  - Video: Interview Innovate 2013- Chris Washington, National Instruments...
  - Video: Innovate 2013 Interview and Demo at NI Booth
  - Video: NI Week 2012 Keynote: Embedded Software Quality Management
  - Webcast: Taming the Complexities of Software Driven Innovation to Reduce Project Cost and Risk
  - Podcast: Integrate testing into the development lifecycle