

# APSEC

*Changes in the Software Development Profession to meet the need for innovation from businesses and government*

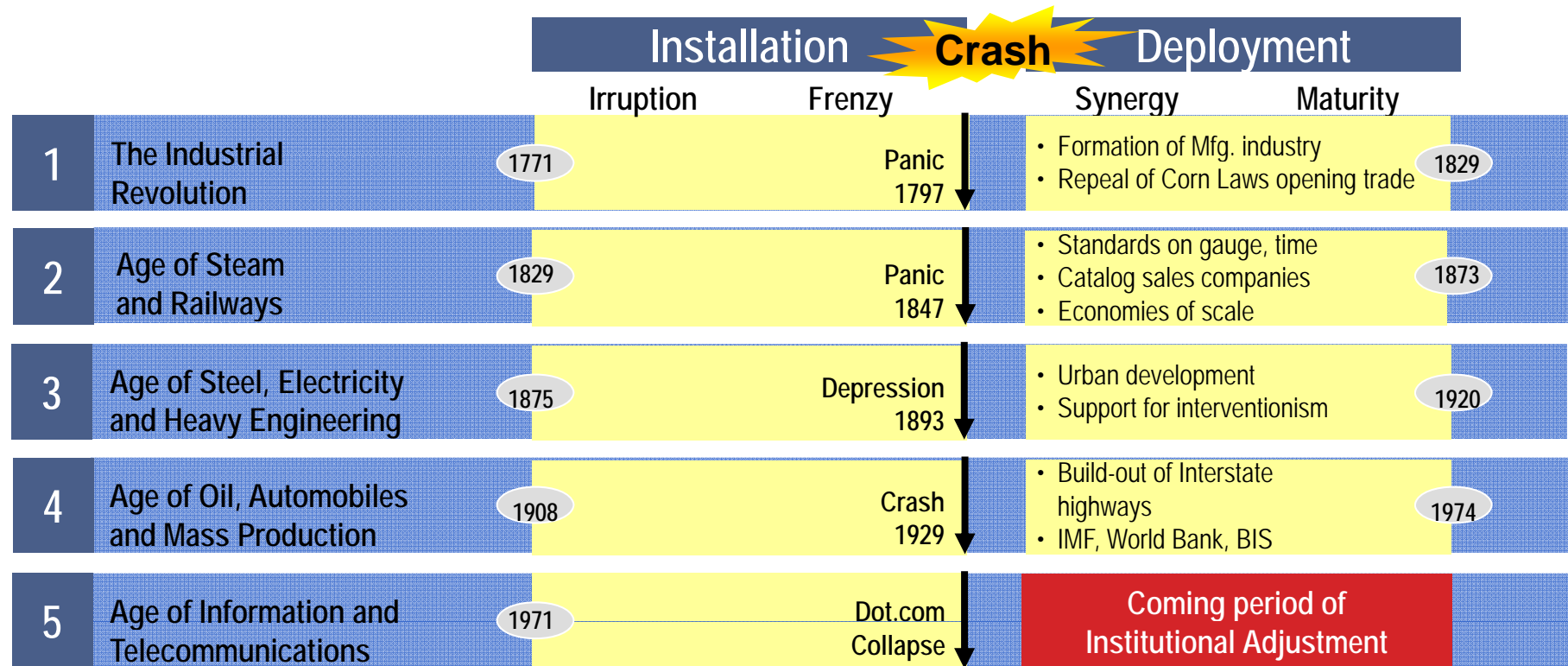
Martin Nally, VP & IBM Fellow  
CTO, IBM Rational



Let's **build** a smarter planet

IBM

# Five Historical Waves of Economic & Social Transformation



Source: Perez, C., *Technological Revolutions and Financial Capital*, 2002

Let's build a smarter planet



IBM

Millions of units shipped

2,000,000

1,000,000

500,000

10,000

5,000

1,000

1960

S/360

1965

1970

1975

IBM PC

1980

1985

World Wide Web

1990

1995

2000

2005

2010

2015



“Internet of Things”

Source: IDC, SSR and IBM Market Insights

Let's build a smarter planet



# IBM - Smarter Planet



Instrumented

Companies, Institutions, Industries



Interconnected

Man-Made Systems



Intelligent

Nature's Systems

**Economist Nov 6-12, 2010**  
– “It’s a smart world”

**CISCO**  
– “Smarter-connected  
Communities”

**HP**  
– “Central Nervous System  
for the Earth”

Let's **build** a smarter planet



# Perspectives

- **Technology**

- Convergence of IT and Systems

- **Vision and Journalism**

- Convergence of physical and virtual
  - E.g. Shopping, travel

- **Business and Government**

- Huge potential fiscal and societal impact
  - Energy & climate change, traffic, environment, healthcare, ...

## Smarter Energy and Utilities



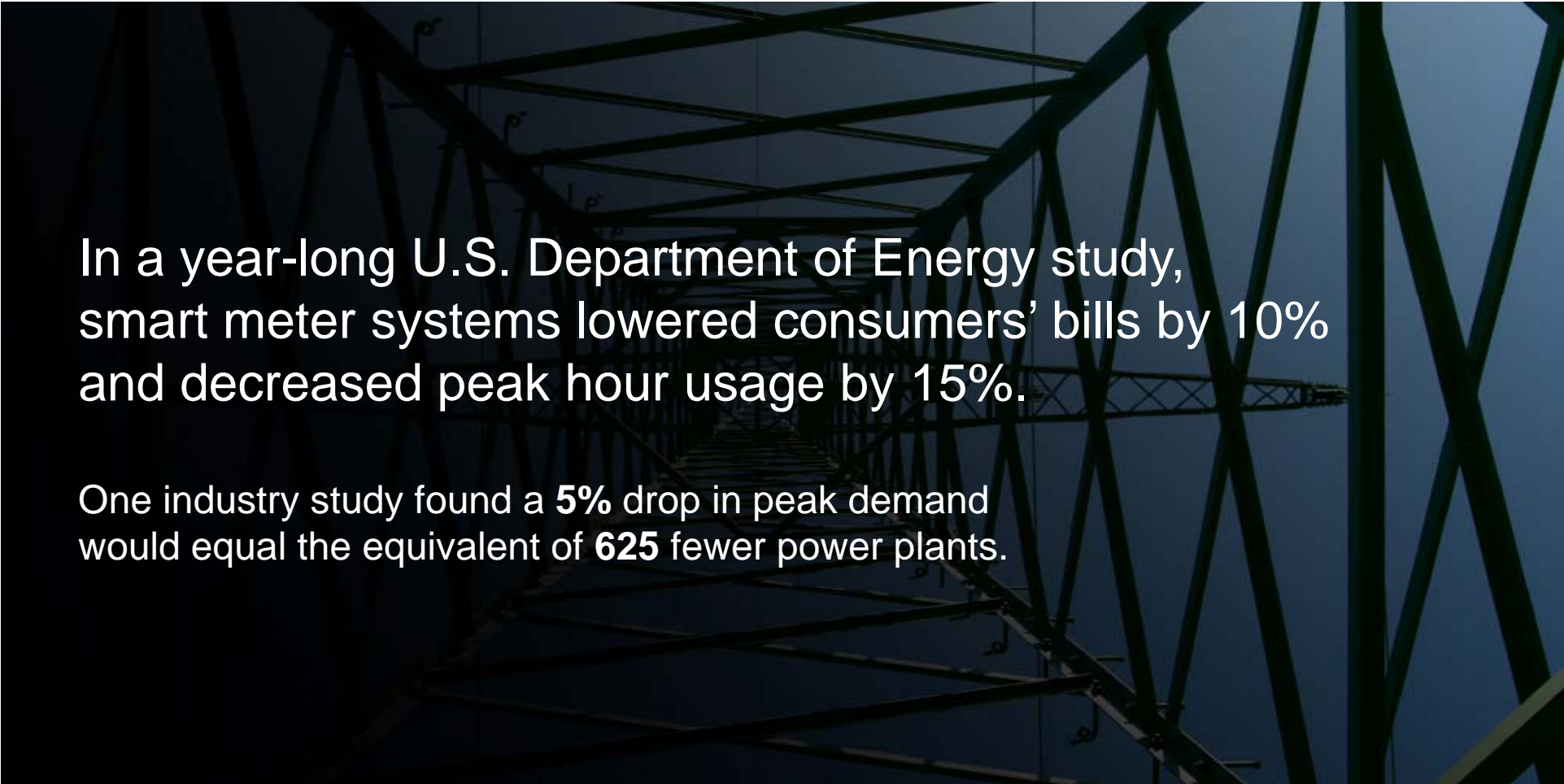
CenterPoint Energy in Houston is installing over 2 million smart meters and in some cases an energy controller for household devices



DONG Energy in Denmark installed monitoring devices across their distribution network. The increased insight into the grid's performance will potentially lessen outage times by up to 50% and reduce maintenance investments by up to 90%.

Let's **build** a smarter planet

**IBM**




In a year-long U.S. Department of Energy study, smart meter systems lowered consumers' bills by 10% and decreased peak hour usage by 15%.

One industry study found a 5% drop in peak demand would equal the equivalent of **625** fewer power plants.

Let's **build** a smarter planet



IBM



In a study of 439 cities, the implementation of ramp metering, signal coordination and incident management resulted in **700,000** fewer hours in traffic and **\$15 million** in savings.

In four cities where IBM has helped deploy congestion management solutions there has been a **14%** reduction of CO<sub>2</sub> emissions, **18%** less traffic volume and **7%** increase in public transit ridership.

Let's **build** a smarter planet

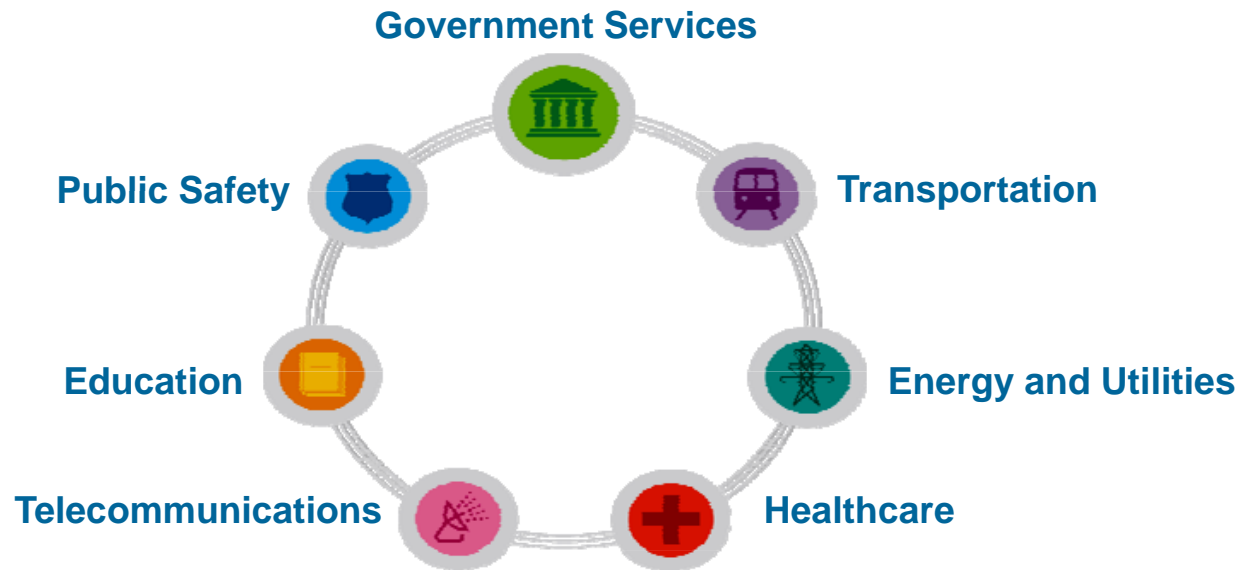


IBM



# Smart Cities: A System of Systems

- The city is a microcosm of the major challenges and opportunities facing the planet today—intensified and accelerated.
- Here, all man-made systems come together and interact with one another.



Let's **build** a smarter planet.

IBM



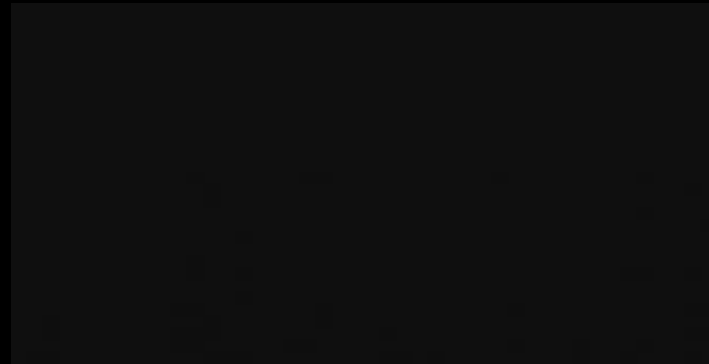
By analyzing buying behaviors, aligning merchandise and building end-to-end supply chain visibility, four leading retailers lowered supply chain costs **30%**, reduced inventory levels **25%** and increased sales **10%**.

Let's **build** a smarter planet



IBM

# Inventory management is not new

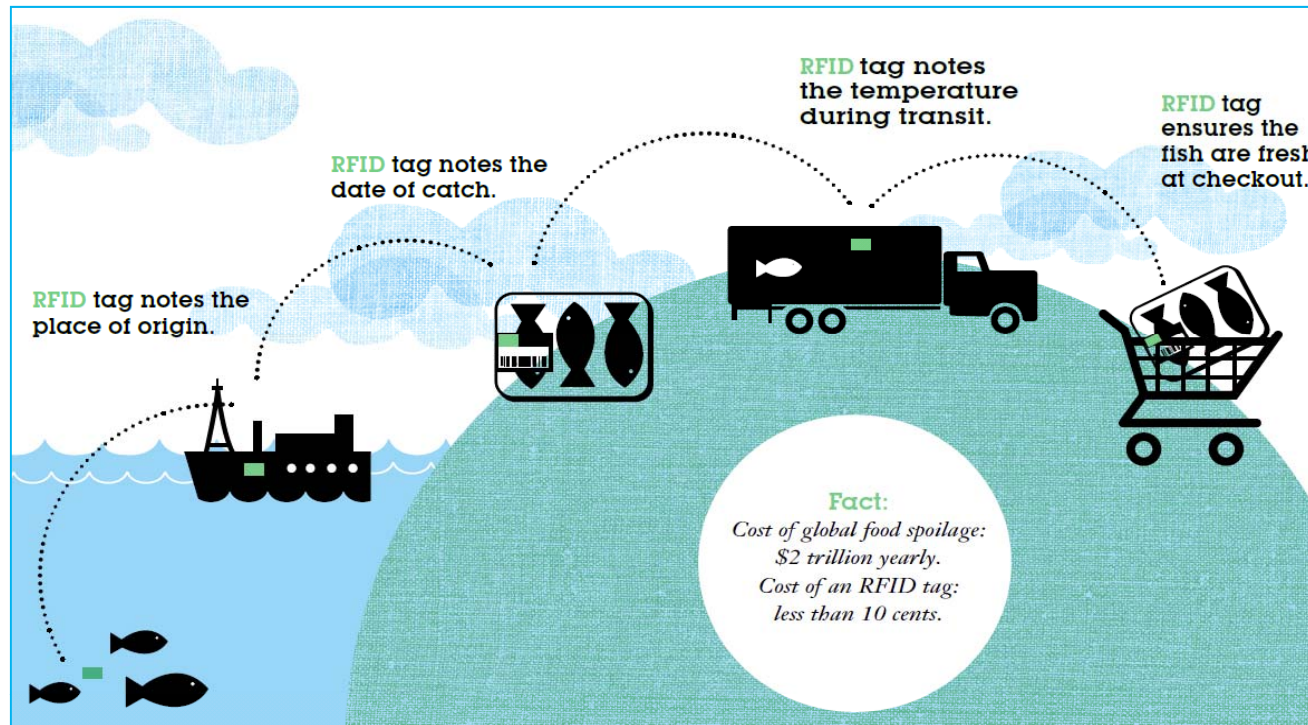


Let's **build** a smarter planet



**IBM.**

# Vietnamese retailers made fish safer by making them smarter



Let's **build** a smarter planet



# Improving Care for Premature Infants



## Toronto's Hospital for Sick Children

- Processes and analyzes >1,000 readings per second
- Identifies potential dangers up to 24 hours earlier
- Provides real-time analysis
- Eliminates the need to collect and review massive hardcopy reports and documents

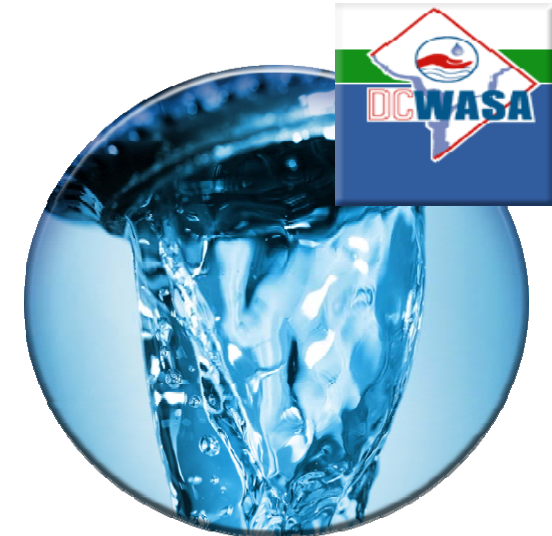


Let's build a smarter planet

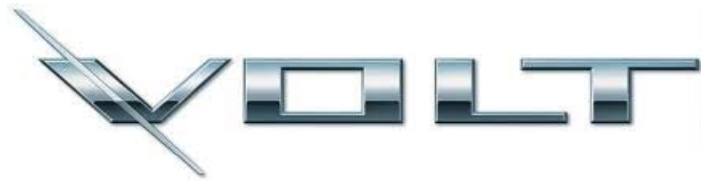


# DC Water and Sewer Authority

- Predictive analytics models estimate the risk of infrastructure failure – enabling “fix before break”
- Spatial Schedule Optimization enables “while in the neighborhood” schedule generation
- Data Analytics enable the identification of usage patterns, forecasting of water usage and detection of usage anomalies



<b>Water Pipes</b>	<b>1,200 Miles</b>	<b>Water Meters</b>	<b>130,000</b>
<b>Sewer Pipes</b>	<b>1,800 Miles</b>	<b>Waste Water Capacity</b>	<b>370M Gallons / day</b>
<b>Hydrants</b>	<b>9,000</b>	<b>Water Customers</b>	<b>600,000</b>
<b>Valves</b>	<b>24,000</b>	<b>Sewer Customers</b>	<b>1,600,000</b>
<b>Catch Basins</b>	<b>36,000</b>		



The Volt has over 10 million lines of code that control virtually every function in the car.

In response to customer demands for advanced features, there is a rapid increase in the content and complexity of Electrical, Controls & Software (ECS). Current product architecture, processes, and tools were developed in the 1990s, when ECS content was lower. Today, the ECS content in vehicles is 30% to 40% of vehicle costs. The future trend shows an explosive growth and complexity of embedded software.

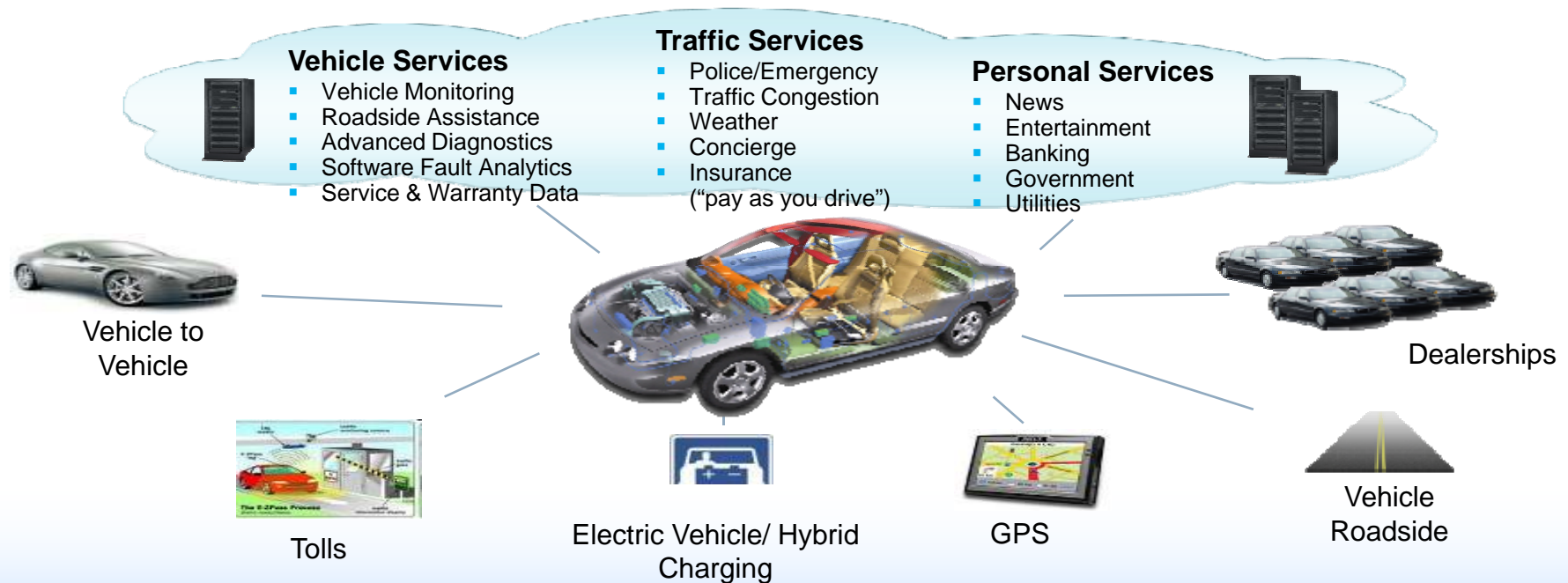
GM's goal is to coordinate the new tooling platform for the next "Major EE Architecture" of GM Vehicles. This will address new paradigm shifts driven by AUTOSAR activities and correspond to new processes, methods and tools, which are crucial in managing the software complexity challenge.



Let's **build** a smarter planet



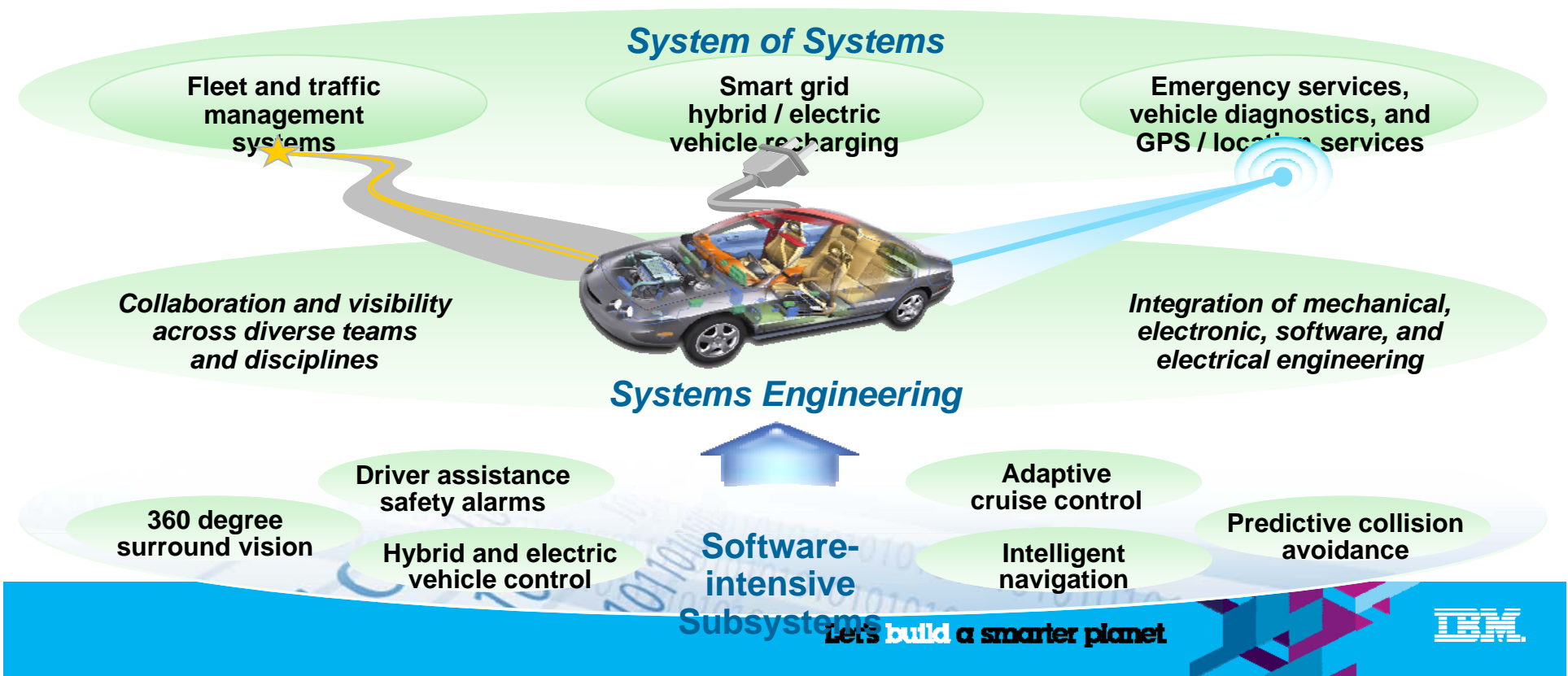
# Innovation is further created by the **interconnection** of dozens of other Smart Products & Services



**45%** of vehicles already offer connected services which will result in **2 Billion** interconnected nodes in car networks by 2014



# Software is the *“Invisible Thread”* of Today’s Innovation



# Software failures cost billions and even loss of life

## Some topical stories

- November 25, 2010 - according to [Herald Sun](#), the [] computer glitch "... meant payments into most National Australia Bank accounts - and services including [EFTPOS](#) and ATMs - were frozen and did not occur."
- November 24, 2010. Winn-Dixie, a grocery chain in the SE of the USA, double-charges credit card customers
  - Read more: <http://spectrum.ieee.org/blog/riskfactor>
- October 2010, JP Morgan Chase online banking unavailable for multiple days. 3<sup>rd</sup>-party authentication software blamed
- BP Deep Horizon spill in gulf of Mexico in 2010 may have been caused by software errors

## Some classic stories

- October 2004, the giant British food retailer J Sainsbury PLC had to write off its US \$526 million investment in an automated supply-chain management system
  - Read more: <http://spectrum.ieee.org/computing/software/why-software-fails>)
- 2005, FBI “virtual case file” system abandoned after \$170m investment
- 2003 North-east USA blackout
- 2008 - Microsoft Zune New Year bug
- June 4, 1996 -- Ariane 5 Flight 501
  - Read More: <http://www.wired.com/software/coolapps/news/2005/11/69355>

# Best-in-class product & service companies are those that build a strong competency in software

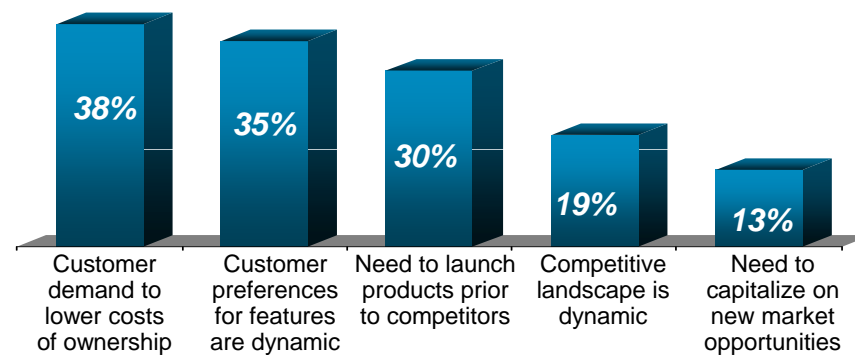
## Best-of-class produce results:

- **19%** more likely to meet revenue targets than the industry average
- **4.4x** more embedded software than competitors
- **50%** fewer defects in embedded software
- **25%** decrease in product development time

***“Software has evolved to become the keystone of product differentiation and end-user experience.”***



## Top 5 pressures driving improvements in embedded product / IT software



Source: "Embedded Systems Development", Aberdeen Group, March 2009

Let's build a smarter planet



# Smarter Planet Challenges

## Much discussed in the press

- Privacy
- Security
- Reliability

## The rest of this talk

- Selecting investments that will bring returns
- Building them

# Building a Smarter Planet is a high-risk Endeavour

**Innovative, first-of-a-kind**

**Technology**

**Business models**

**Building systems of systems is terrifically hard**

**Behavior emergent, rather than designed**

**Testing before deploying is hard-to-impossible**

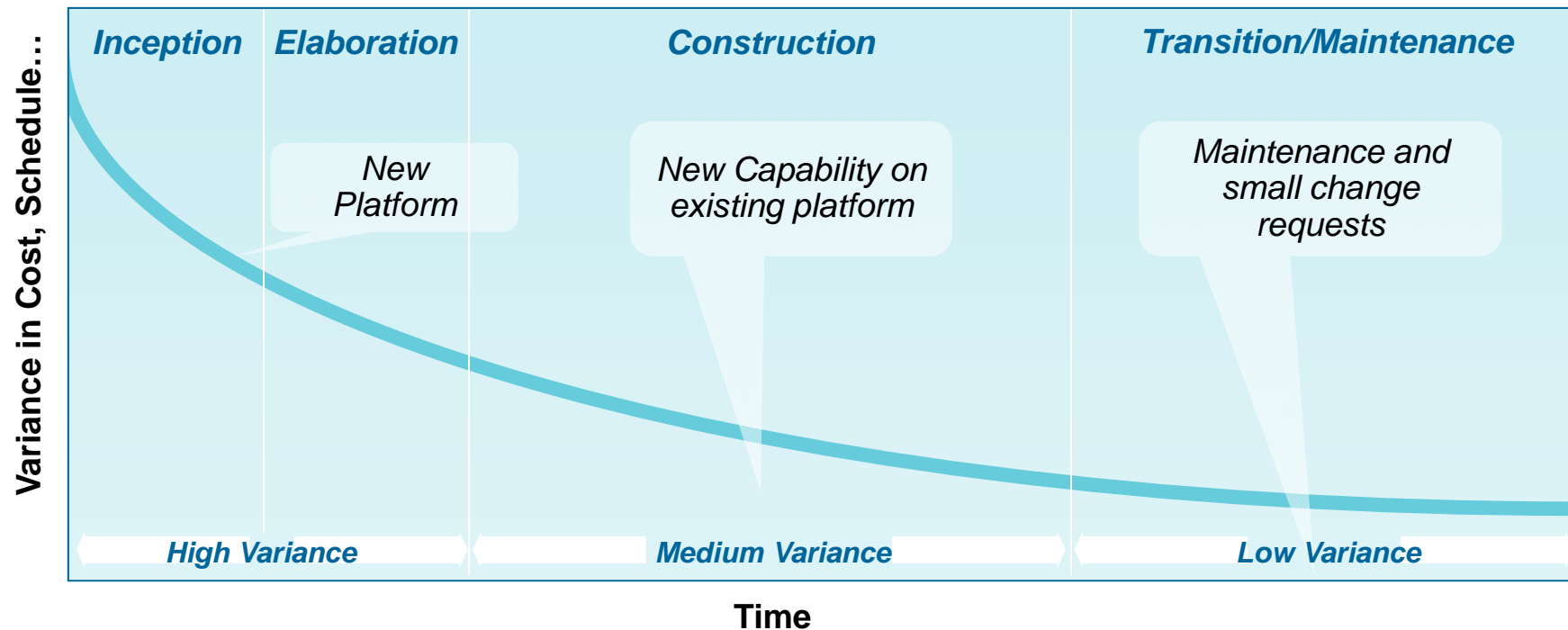


Let's **build** a smarter planet

**IBM**

# Different projects need different governance

*Risk/uncertainty are the key discriminators*



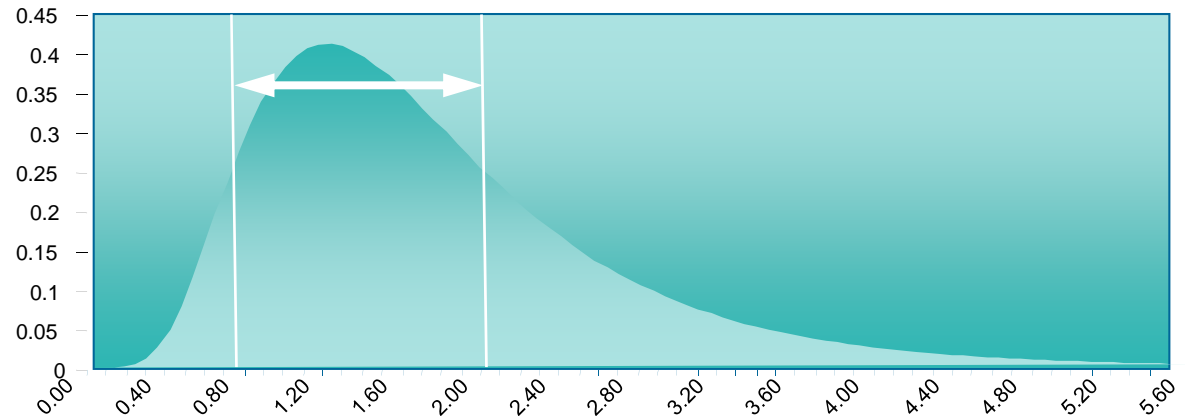
# Managing variances in scope, solution, plans

## Sources of uncertainty and variance

- Lack of knowledge
- Lack of confidence
- Lack of agreement

## Reduction of variance reflects

- Increased predictability of outcome
  - Client needs
  - Technology capability
  - Team capability
- Good decisions

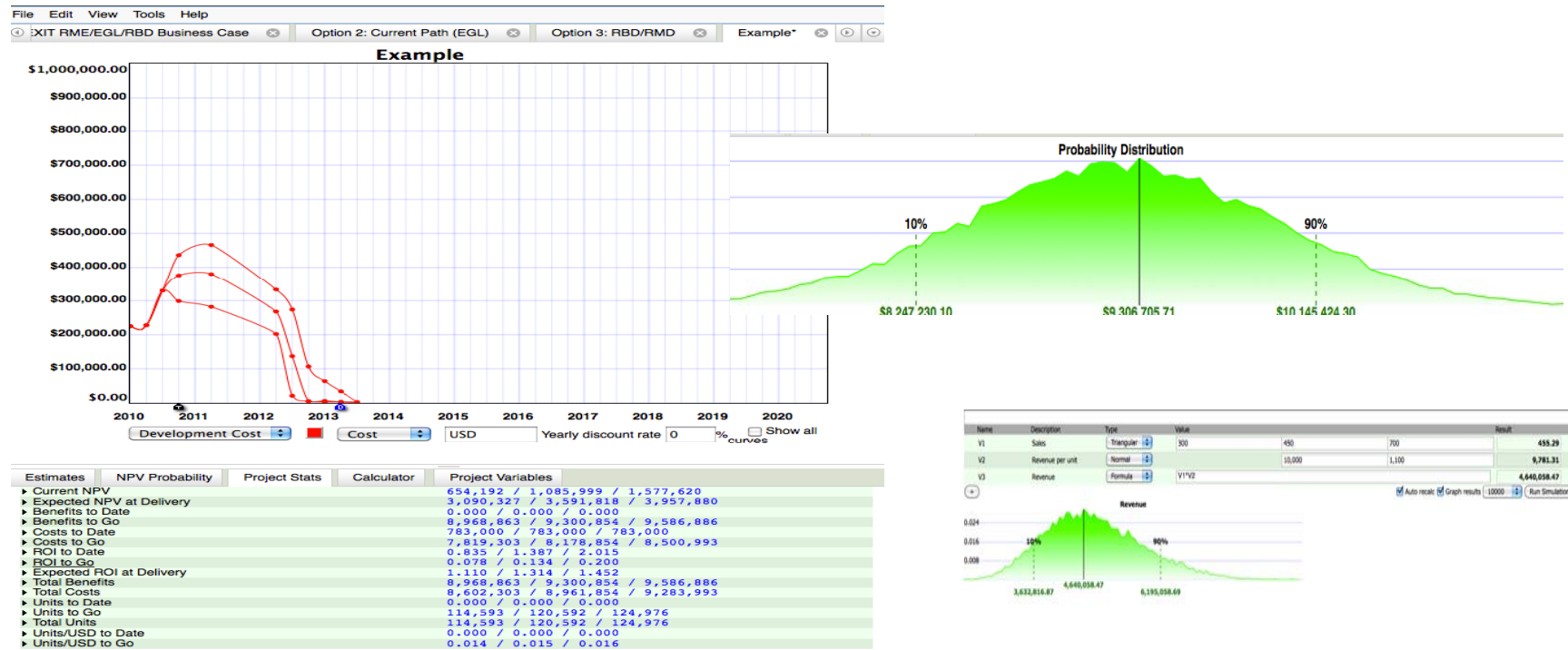


Let's **build** a smarter planet

IBM



# Financier – using probability distributions to evaluate project value



Let's build a smarter planet



# Ways to improve software development outcomes

**Improve skills**

**New software development technologies**

**Don't develop software at all**

- Outsource development
- Use packaged applications

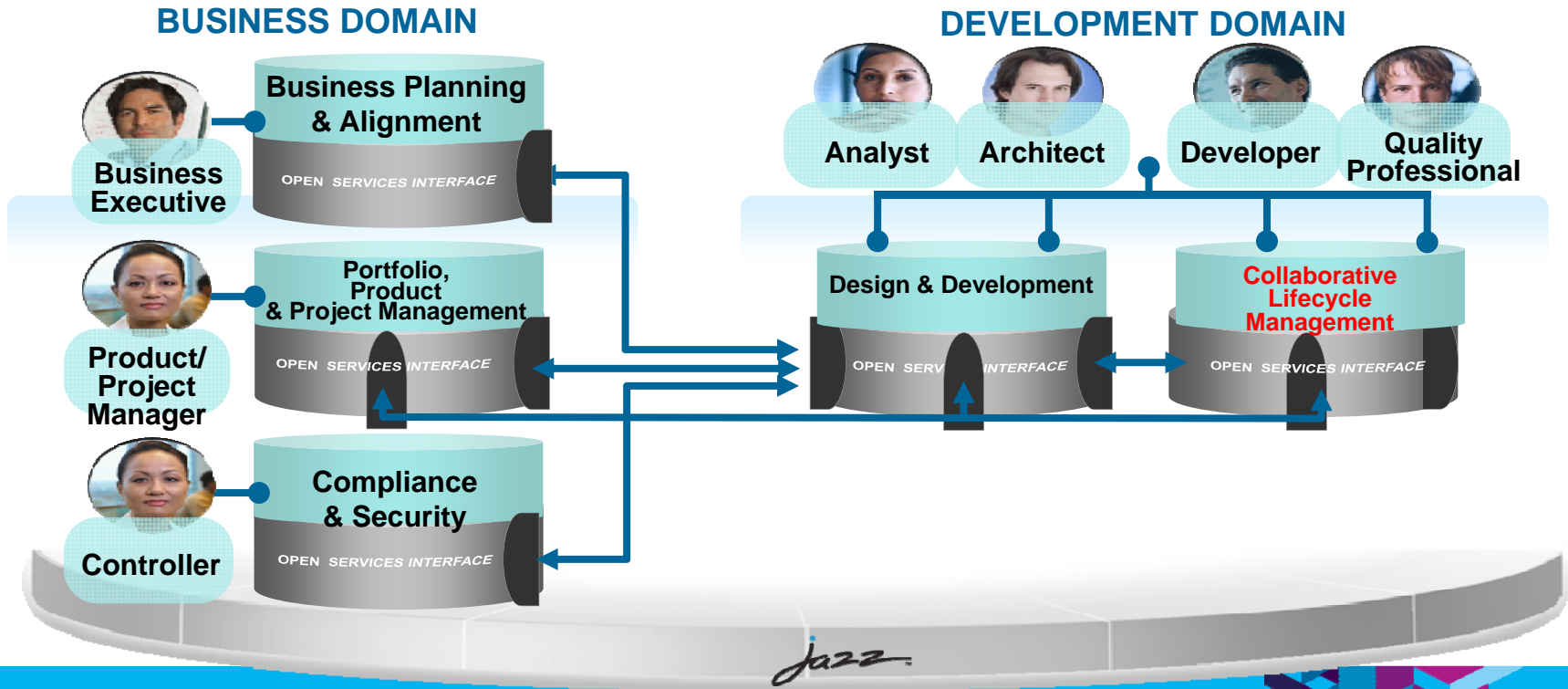
**Improve processes**



Let's **build** a smarter planet

**IBM**

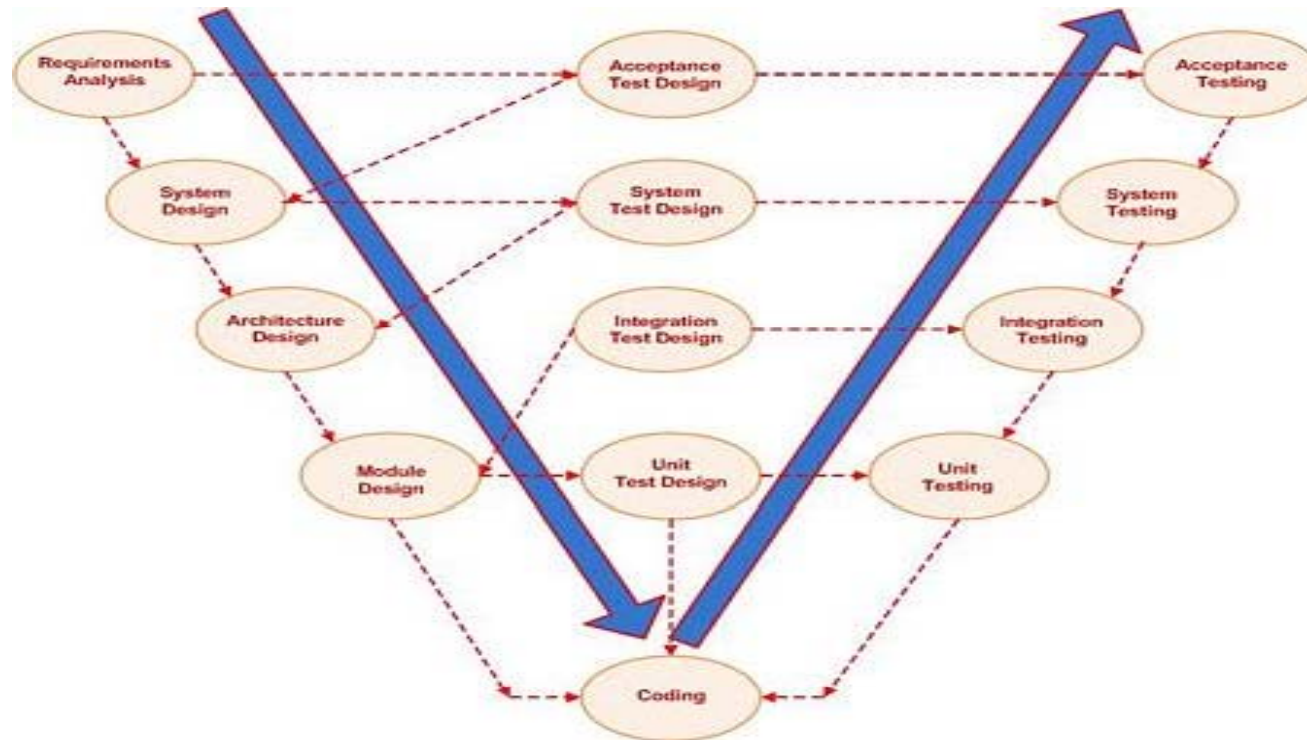
# Successful software delivery requires alignment of business and technology domains...



Let's build a smarter planet



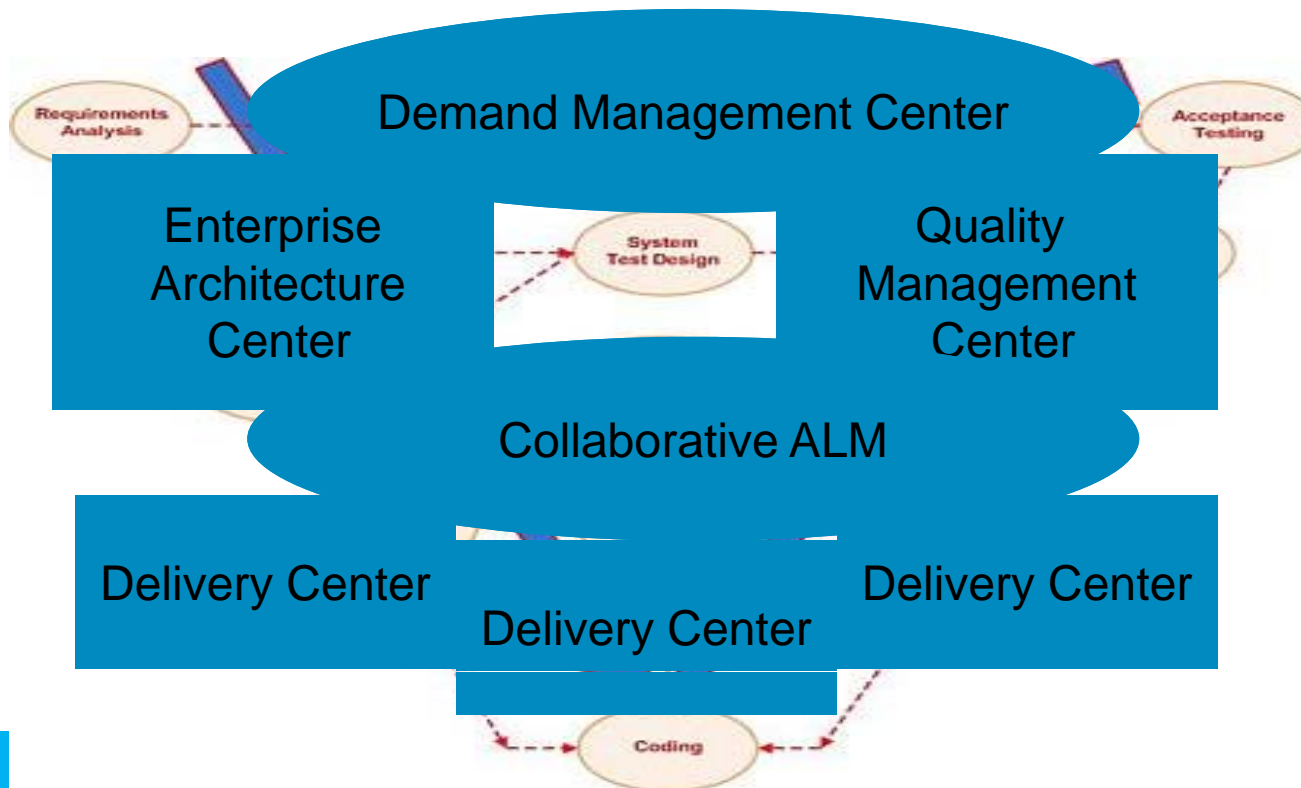
# Implications for Organizations



Let's build a smarter planet



# Implications for Organizations



# Process Improvement depends on the integrations



What can we do in tools and methods to address these?

Let's **build** a smarter planet

IBM

## Top 3 reasons Application Lifecycle Management (ALM) fails to deliver promise

**Distracted by day-to-day delivery pressures – 78%**

**Tools don't integrate properly – 62%**

**Lack the necessary internal expertise – 56%**

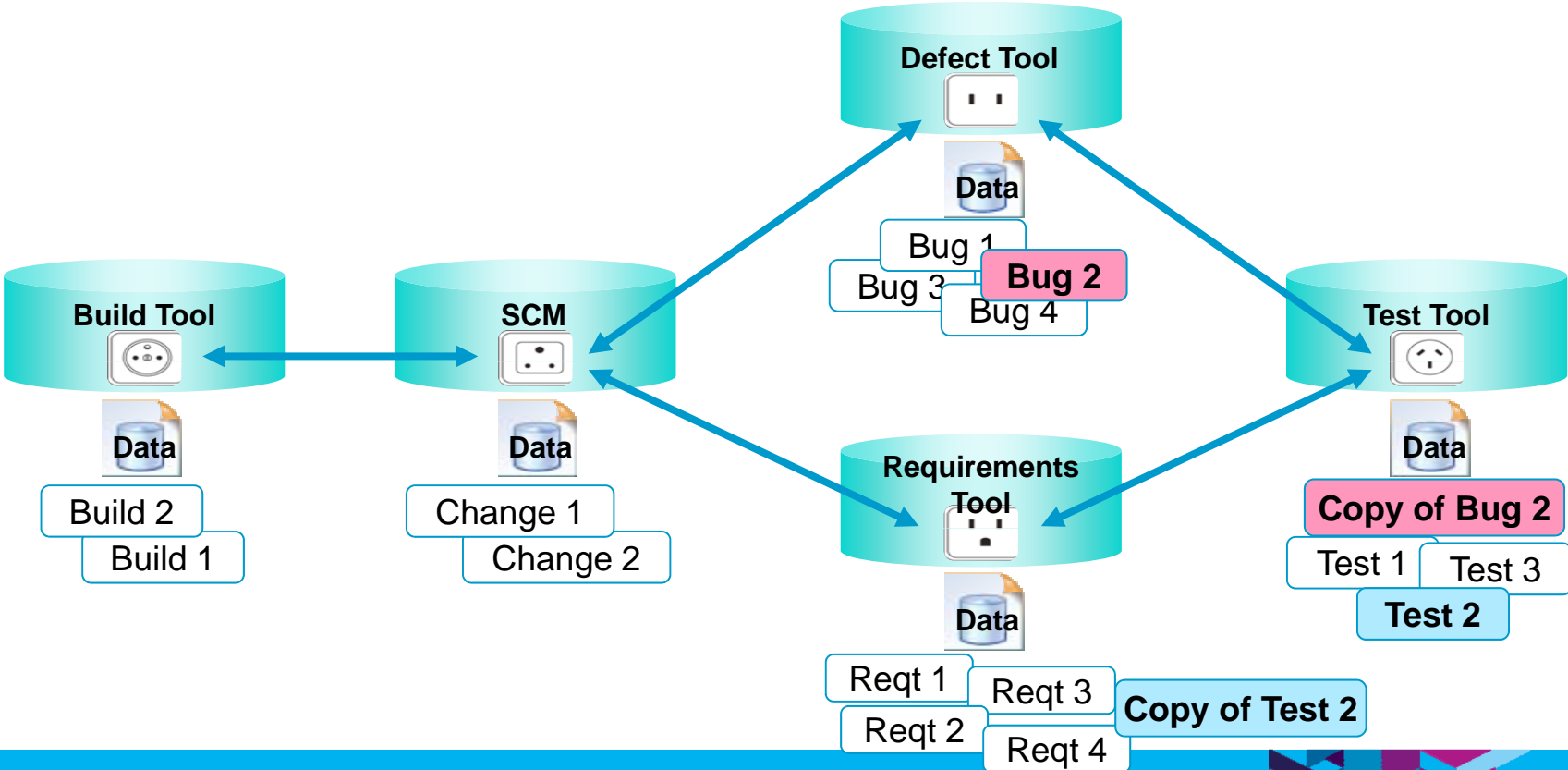


Source: Forrester study commissioned by Wipro, 2008

**Let's build a smarter planet**

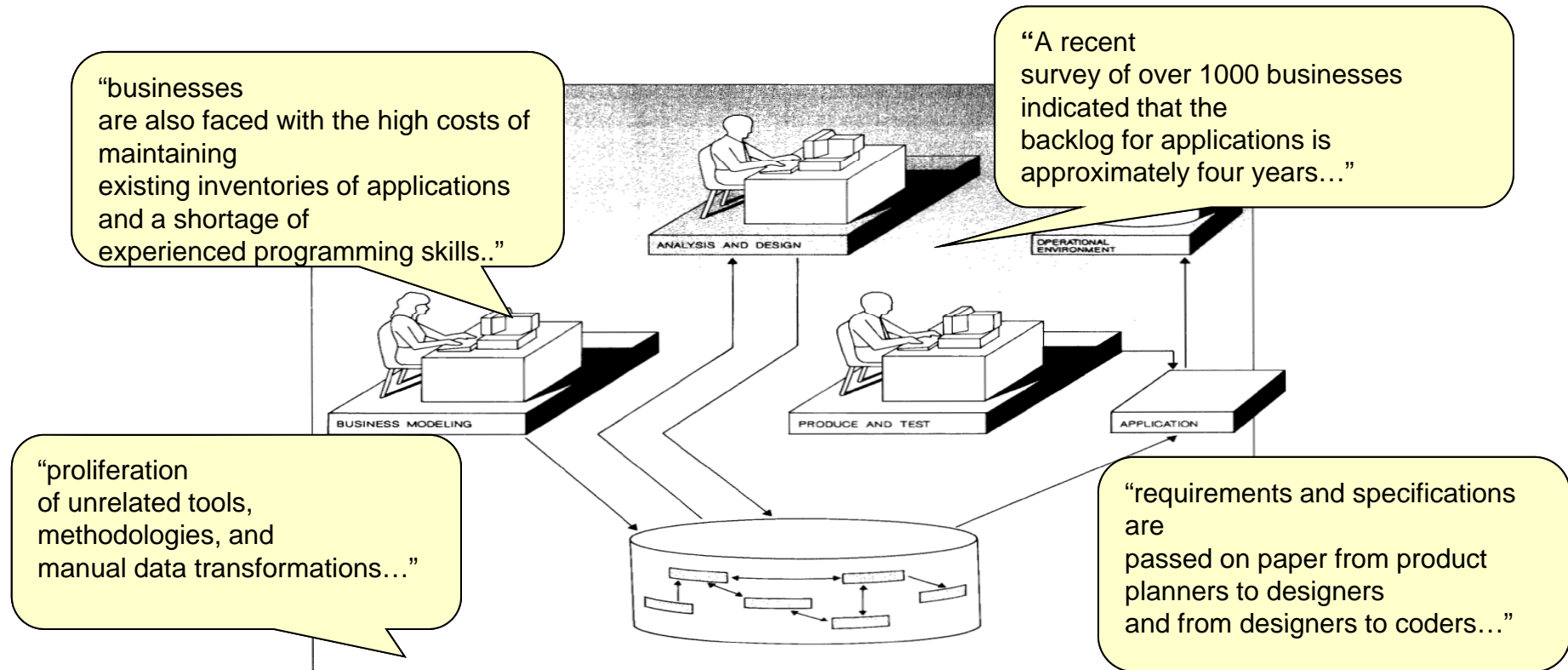
**IBM**

# Tool integration today





# What did we say about this 20 years ago?



Source: Presentation on IBM's AD/Cycle, circa 1990!

Let's build a smarter planet



## What is the state-of-the-art today?

**Most other vendors still trying to build AD/Cycle**

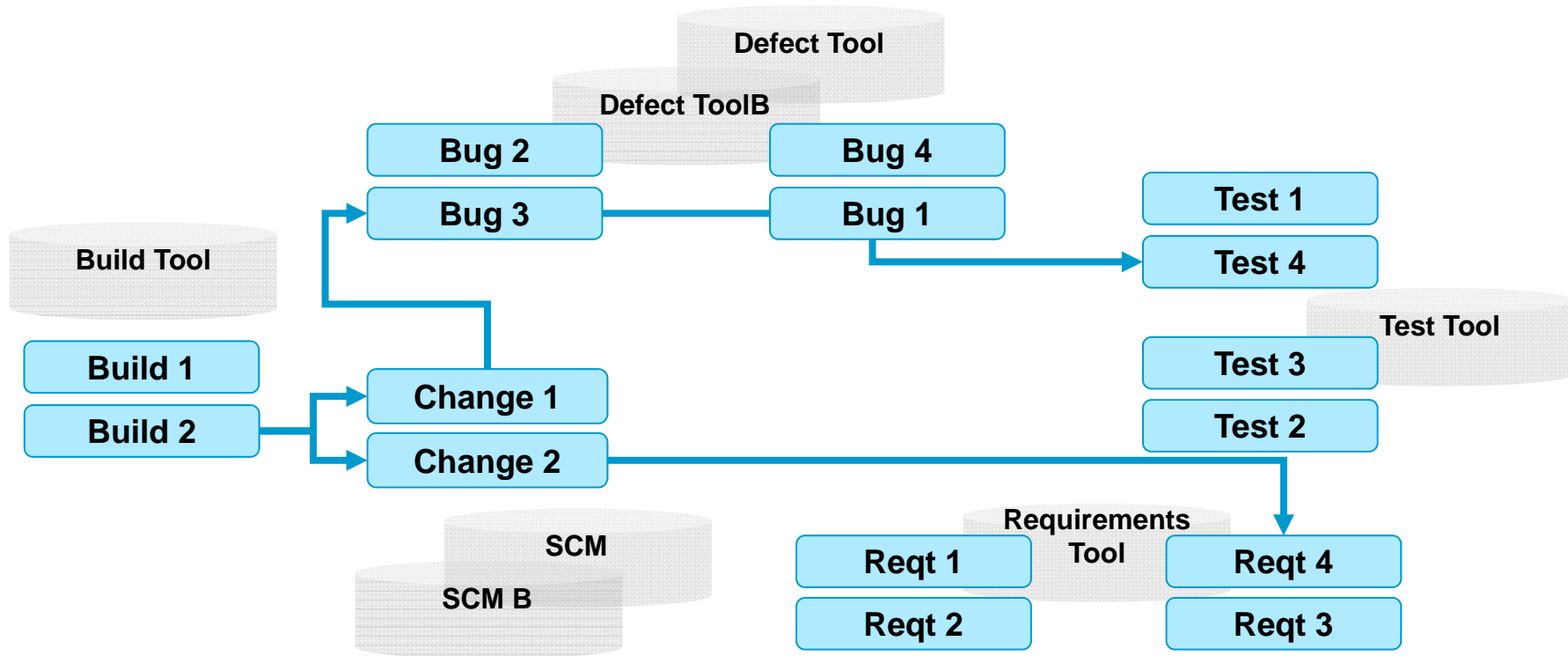
**Requires all tools to integrate around centralized repository**

- Data import (duplication) for foreign tools

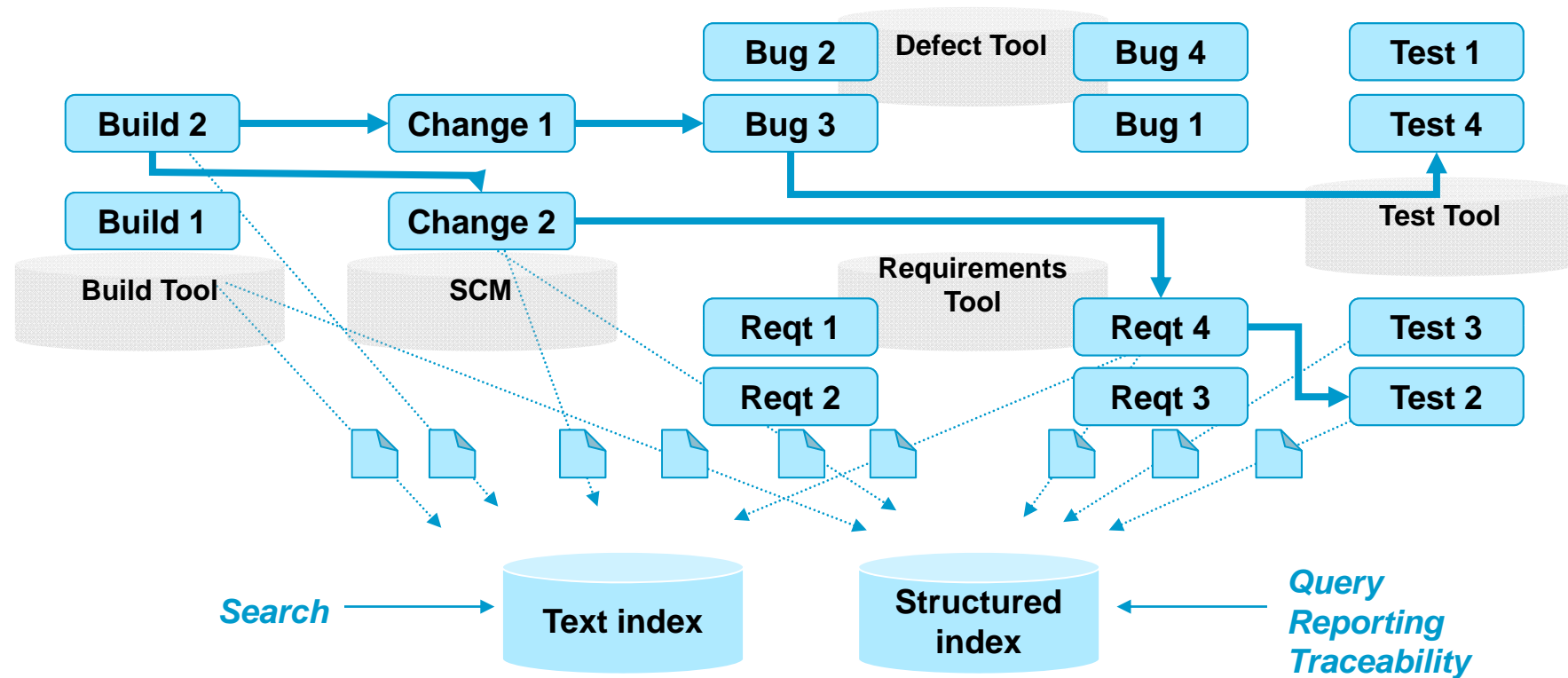
**Works as well as other centrally-planned economies have worked**

- Do your company's needs match a fixed, pre-planned solution, or is an open, integrated economy a better model?

## Another approach: Linked [Lifecycle] Data



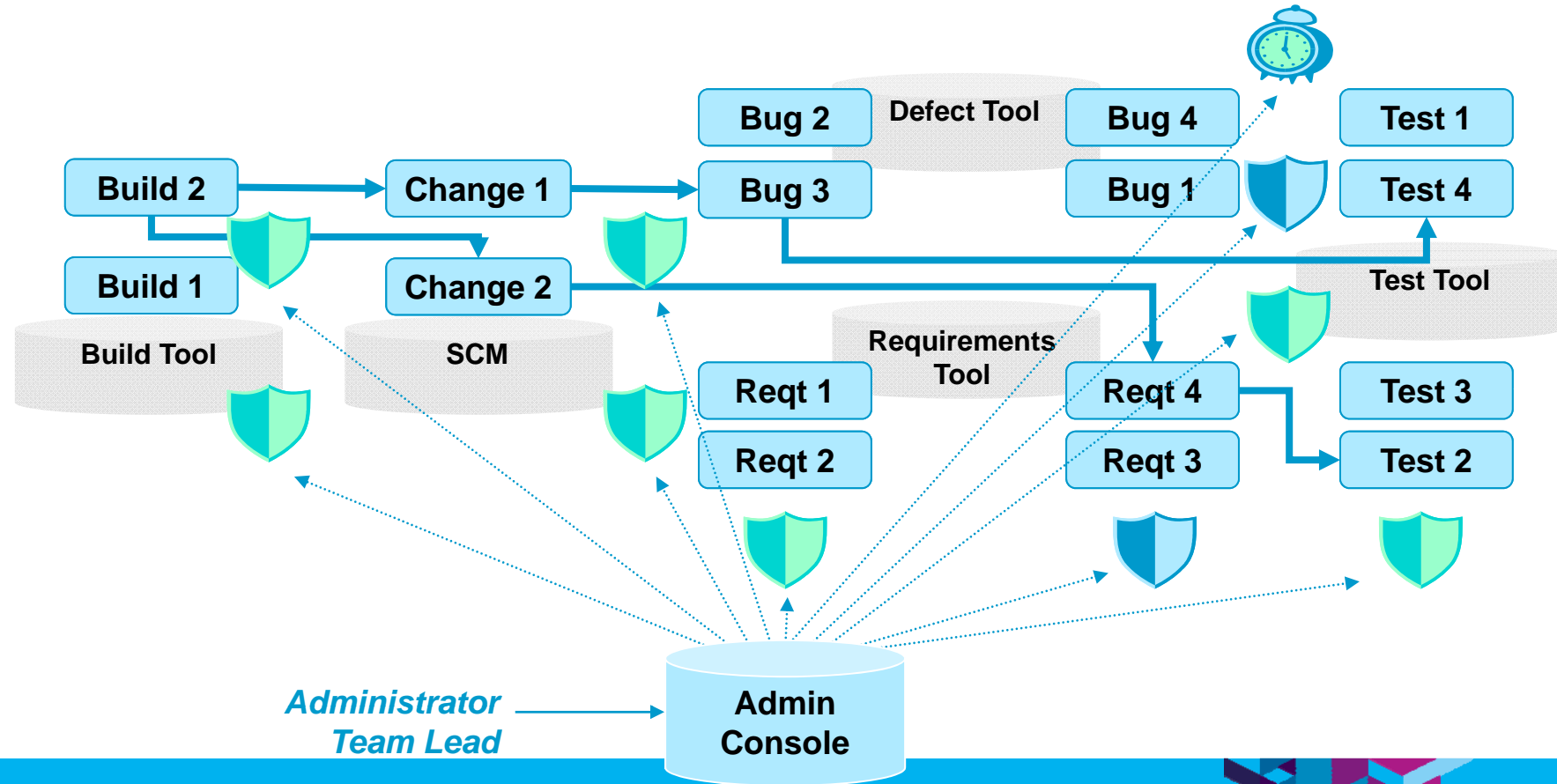
# Finding and analyzing data



Let's build a smarter planet



# Defining process rules



# Open Services for Lifecycle Collaboration

## Specifications for linked lifecycle data

[Home](#) [About](#) [Community](#) [Wiki](#) [Learn](#)



### Open Services for Lifecycle Collaboration

open community. open interfaces. open possibilities.

Open Services for Lifecycle Collaboration (also known as OSLC or Open Services) is a community effort to help software delivery teams by making it easier to use lifecycle tools in combination. The OSLC community is creating open, public descriptions of resources and interfaces for sharing the things that software delivery teams rely on, like change requests, test cases, defects, requirements and user stories.

By agreeing on common specifications for lifecycle resources and the services to access them, we can eliminate traditional barriers between tools and open the door to new forms of collaboration. OSLC can bring value to software delivery teams and tool providers alike, from the most Agile to the most ceremonial of projects, and for commercially-licensed, open source, and internally developed tools. [More](#).

*With OSLC's open and scenario-based approach, businesses benefit from the ability to tie disparate tools together. This collaborative approach gives our consultants the flexibility to make lifecycle tool choices based on specific client project demands.*

*Randy Vogel, Accenture*

---

**Learn more**

- [Presentation: ALM Integration in a Web 2.0 World](#)
- [Presentation: RESTful Work Items: Opening up Collaborative ALM](#)
- [Podcast: Open Services Bears first fruit. A conversation with Steve Abrams, Mik Kersten, and Carl Zetie](#)
- [Whitepaper: The Case for Open Services](#)
- [Podcast: John Wiegand and Steve Abrams introduce the OSLC initiative](#)

**News and events**

- [Implementations delivered for Change management 1.0 spec \(press release\)](#)
- [Change management 2.0 spec workgroup expanding participants.](#)
- [Requirements management and Asset management workgroups draft early specs.](#)
- [Primer authored for Software Estimation and Measurement](#)
- [New Reporting workgroup call for participation.](#)

**Quick links**

- [Wiki: Open Services specifications](#)
- [Mailing list: OSLC community](#)
- [Blog: Let's try something different - Carl Zetie's commentary on OSLC](#)
- [Twitter - follow us: @oslcNews](#)

---

[Terms of Use](#) [Privacy](#) [Feedback](#)

An open community of individuals from industry, commercial tools vendors, systems integrators, open source projects, and academia.

Focusing on sharing of lifecycle data (requirements, test cases, change requests) between tools and across the lifecycle.

Taking a technology-neutral approach based on Internet standards and protocols.

Operating at [open-services.net](http://open-services.net)

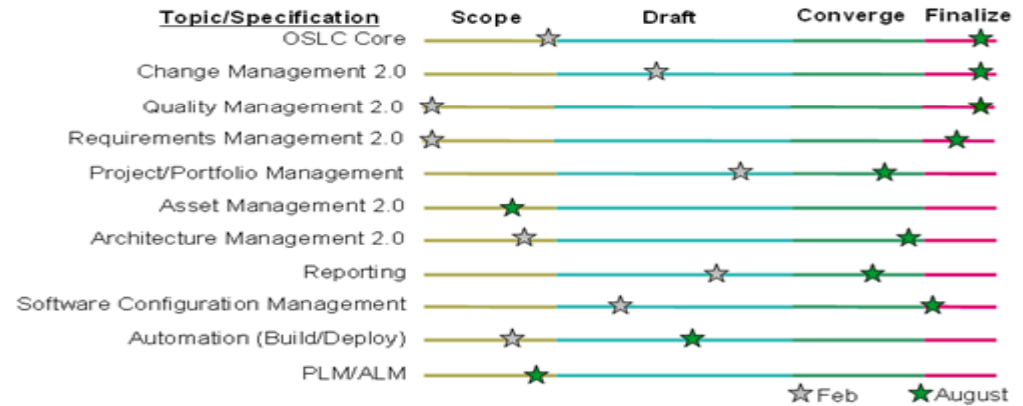
# OSLC Community

## Eleven workgroups operating at open-services.net

- Intensive focus in 2010 on Core and CLM related specs (CM, RM, QM, Arch Mgmt, SCM)
- PLM/ALM workgroup defining cross-cutting scenarios and driving a systems perspective

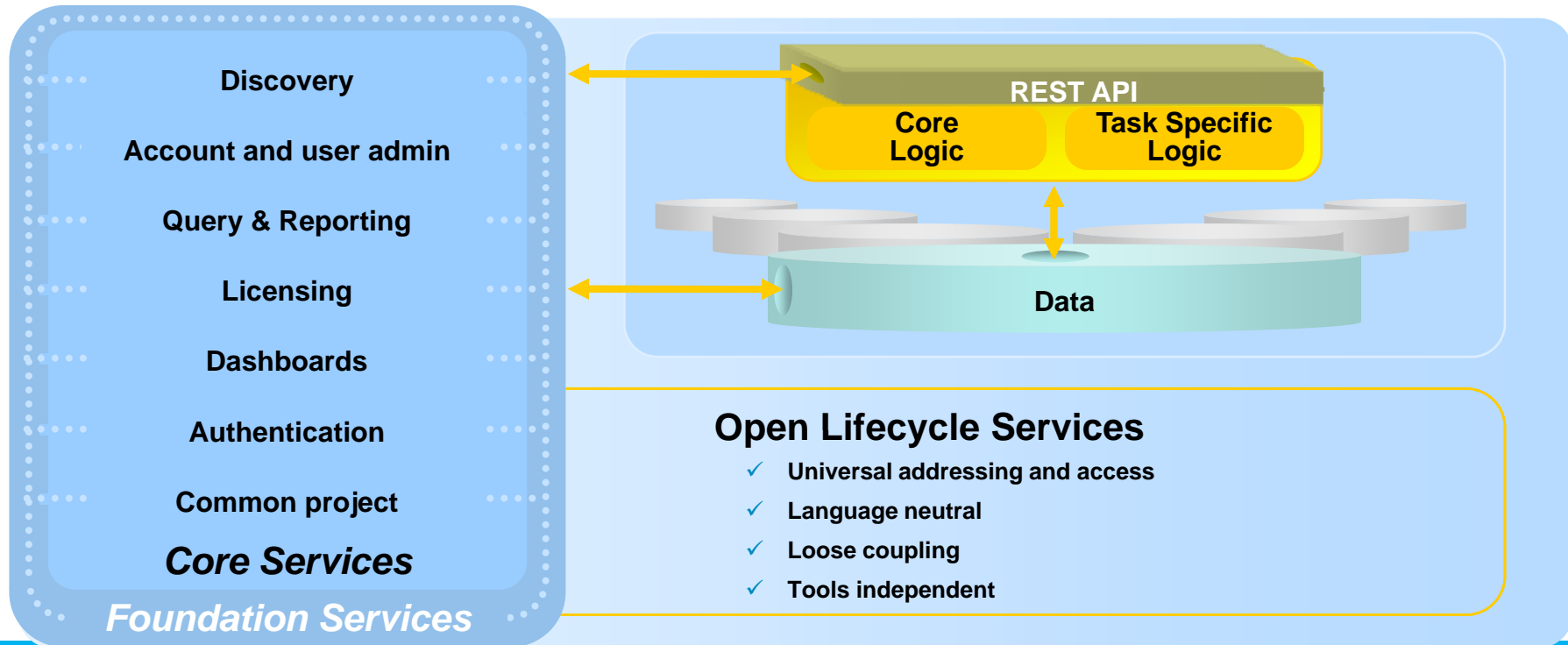
## Continuing to grow

- 345+ registered community members (up from 70 people at RSC 2009)
- Individuals from 34+ different companies have participated in OSLC workgroups (up from 5 companies at RSC 2009)



- |                           |                            |
|---------------------------|----------------------------|
| Accenture                 | Lender Processing Services |
| APG                       | Northrop Grumman           |
| Black Duck                | Oracle                     |
| Boeing                    | QSM                        |
| BSD Group                 | Rally Software             |
| Citigroup                 | Ravenflow                  |
| EADS                      | Shell                      |
| Emphasys Group            | Siemens                    |
| Empulsys                  | Sogeti                     |
| Ericsson                  | SourceGear/Teamprise       |
| Fokus Fraunhofer          | State Street               |
| Galorath                  | Tasktop (Eclipse Mylyn)    |
| General Motors            | Thales                     |
| Health Care Services Corp | Tieto                      |
| IBM                       | TOPIC Embedded Systems     |
| Institut TELECOM          | UrbanCode                  |
| Integrate Systems         | WebLayers                  |

# Jazz: Open, extensible, web-centric, integration platform



Let's **build** a smarter planet

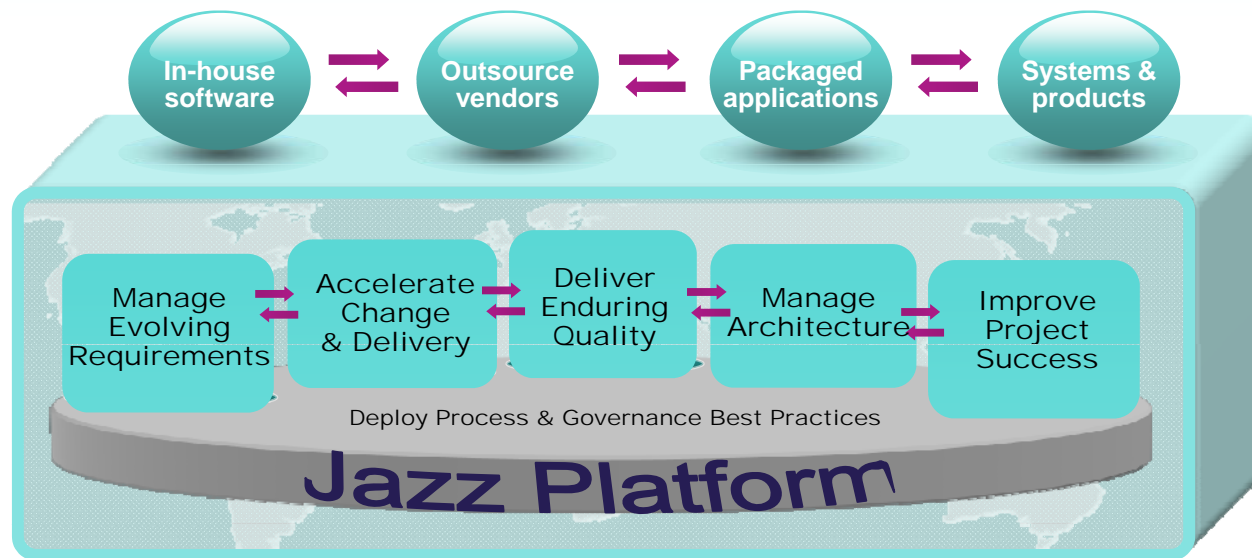




# IBM Rational Software Delivery Platform

**Rational.** software

***Solutions** to help customers achieve greater value and performance from their investments in delivering software*



- *Enterprise Modernization and Transformation*
- *Organizational Governance*
- *Skill Development and Community*
- *Implementation Services*

Let's **build** a smarter planet.

**IBM.**

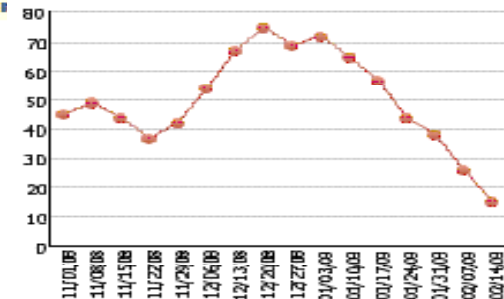
# Executive Dashboards

Region: United States

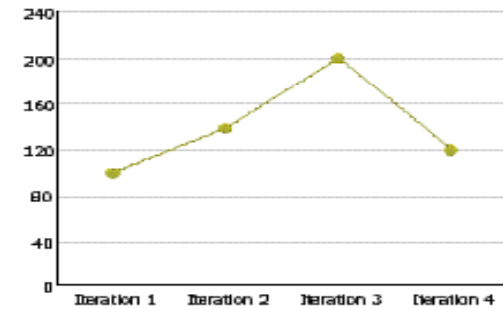
# of Head Count	Role						Total (Project)
	Architect	Developer	Doc	Marketing	Sales	Tester	47

Smarter Planet Online Auction

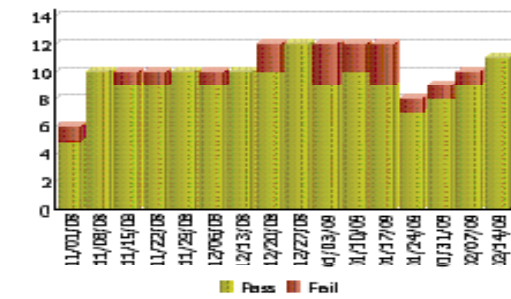
Outstanding Work



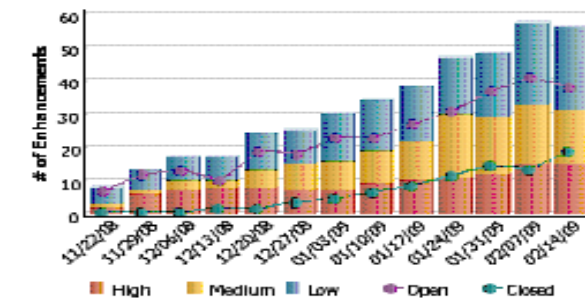
Iteration Velocity



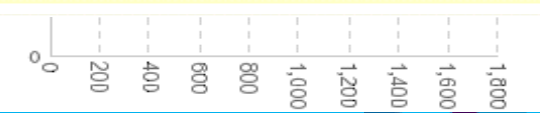
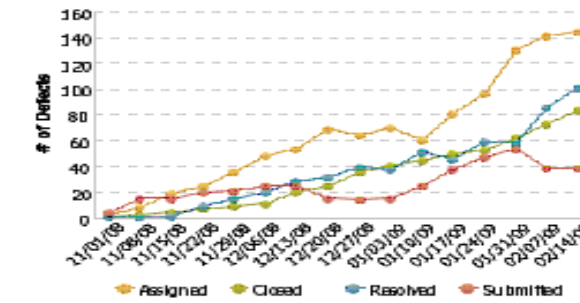
Build Health



Enhancement Request Backlog



Actual Defect Trends



# Governance and Control of Software Delivery



Let's build a smarter planet





© Copyright IBM Corporation 2010. All rights reserved. The information contained in these materials is provided for informational purposes only, and is provided AS IS without warranty of any kind, express or implied. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, these materials. Nothing contained in these materials is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software. References in these materials to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates. Product release dates and/or capabilities referenced in these materials may change at any time at IBM's sole discretion based on market opportunities or other factors, and are not intended to be a commitment to future product or feature availability in any way. IBM, the IBM logo, Rational, the Rational logo, Telelogic, the Telelogic logo, and other IBM products and services are trademarks of the International Business Machines Corporation, in the United States, other countries or both. Other company, product, or service names may be trademarks or service marks of others.

Let's build a smarter planet

