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Software. Everywhere.

19- July, Sydney, Australia

21- July, Melbourne, Australia





IBM Software Delivery Platform for Energy

Improved Profitability and Growth for Electric Power Utilities

Kurt Solarte & Dusa Shah
IBM Software

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Smarter Power
for a Smarter Planet



Agenda

- **Software Issues with Industry & SmartGrid**

- IBM Software Delivery Platform for Energy

- IBM Rational System Architect

- IBM Rational Software Architect

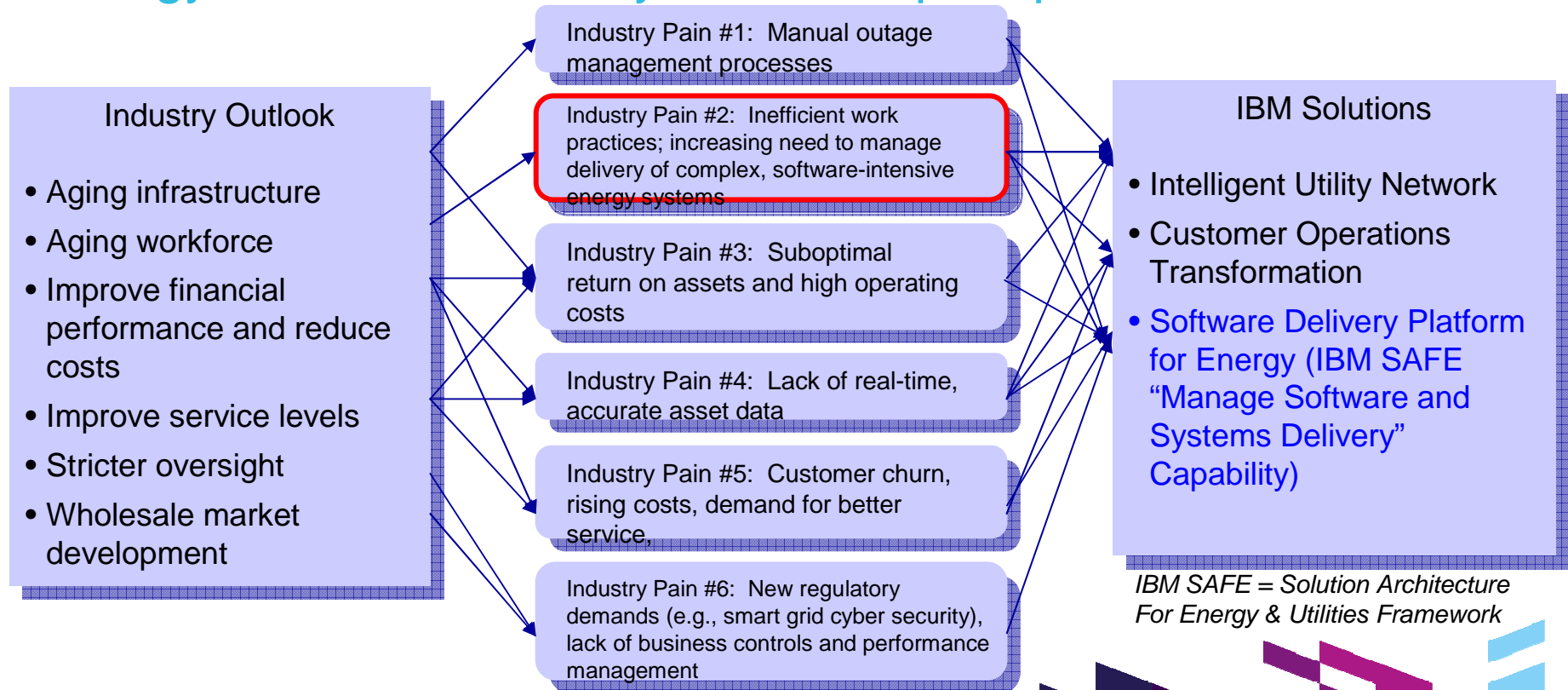
- IBM Rational AppScan

- IBM Rational Insight

- Customer Results

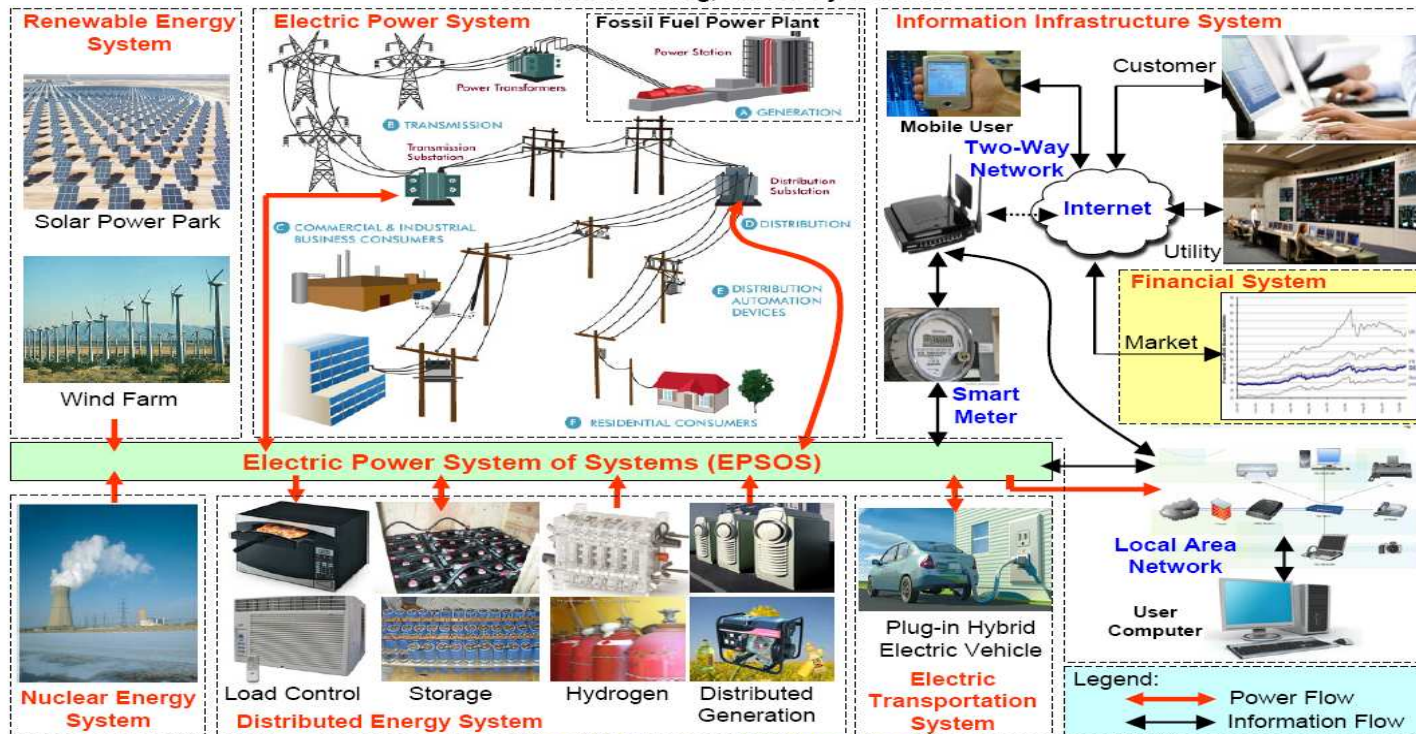


IBM has developed three solution areas to address our Energy & Utilities industry customer pain points



The Smart Grid is a Complex, Software-Intensive System of Systems

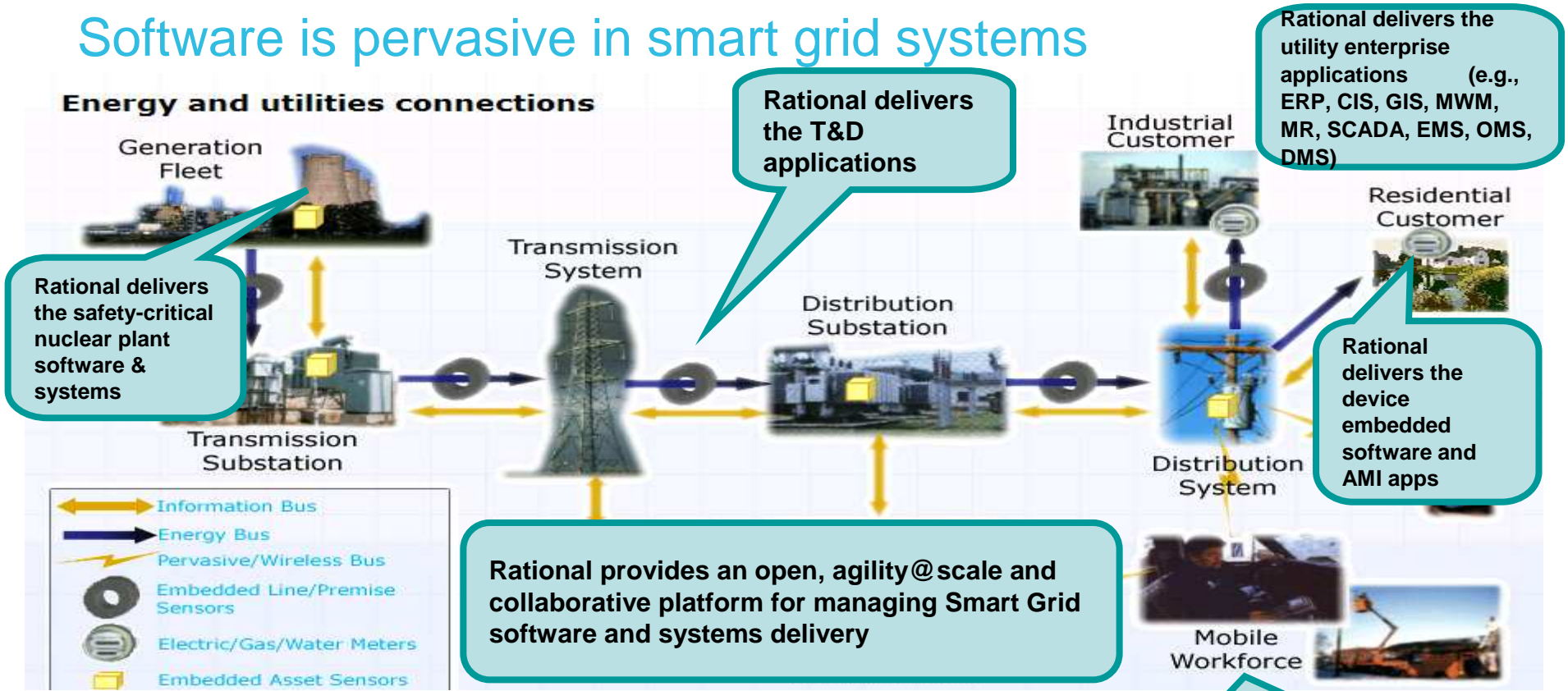
Dr. Zhenhua Jiang, University of Miami



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Software is pervasive in smart grid systems

Energy and utilities connections

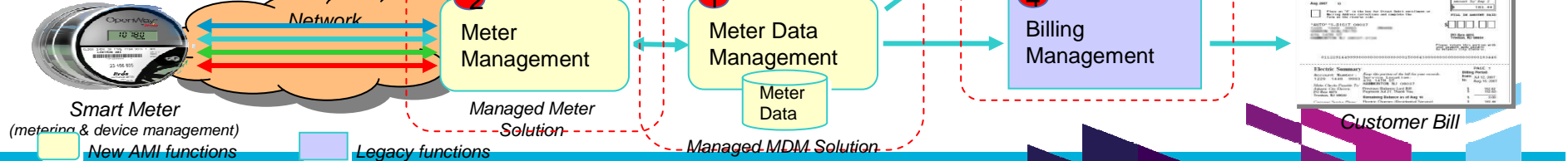


Smart meter projects start the smart grid journey Advanced Metering Infrastructure (AMI)

AMI (smart meter) systems are software-intensive and have a pervasive impact across all utility grid operations, back-office processes and systems (OT/IT convergence)

**Where do we start?
How do we ensure the integrity and success of our transformation through the lifecycle?
An “agility@scale” approach to managing software and systems delivery becomes key.**

Residential and C&I



Typical IT inhibitors prevent Energy & Utilities companies from realizing the enormous potential of the smart grid

IT “Reality” as smart grid inhibitors

- ➔ Lifecycle (define, design, code, integrate, test, deploy, operate and reuse) software delivery performance is too slow, too costly and lacks sufficient quality to successfully implement the secure, interoperable, reliable, safety-critical system of systems required for a smart grid new growth platform
- IT capabilities not aligned with the various needs of the business components
- Difficult for business components to access critical IT skills
- Slow process transformation due to high degree of interdependencies and complex Network and IT responsibilities
- End-to-end process management not possible due to many IT frictions
- Distributed, unclear and overlapping data responsibility leading to inconsistent data
- Slow and complex IT planning processes with unclear responsibilities

Source: IBM Institute for Business Value

Typical Smart Grid Project Team Failures:

1. Focus the end-to-end delivery process on the **architecture first**
2. Attack risks early with an **“agility@scale” lifecycle**
3. Emphasize formalized **requirements management**
4. Practice **change management** of all artifacts
5. Unify the team **across roles, geographies, and companies**
6. Use rigorous, **model-based design notation & asset-based development**
7. Instrument the process for **continuous, objective quality control**
8. Emphasize **demonstration-based progress assessment**
9. Plan releases with **evolving levels of detail**
10. Establish a **common, scalable, and repeatable** lifecycle process

Aligned with IEC TC45 WGA3 - “Software for Computers in the Safety Systems of Nuclear Power Plants”

*The full lifecycle **IBM Software Delivery Platform for Energy** enables smart grid project teams to avoid these wasteful, common pitfalls.*

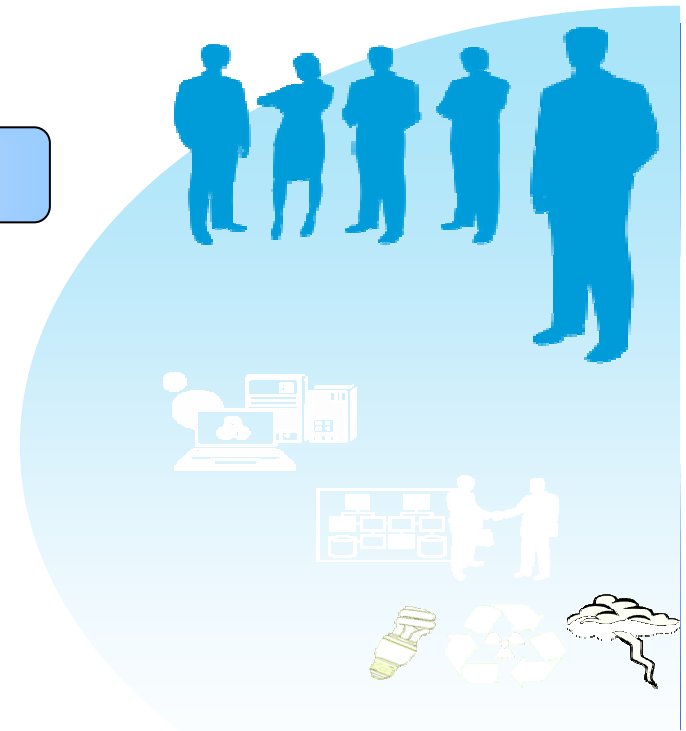
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▪ IBM Software Delivery Platform for Energy

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- IBM Rational Software Architect
- IBM Rational AppScan
- IBM Rational Insight

- Customer Results



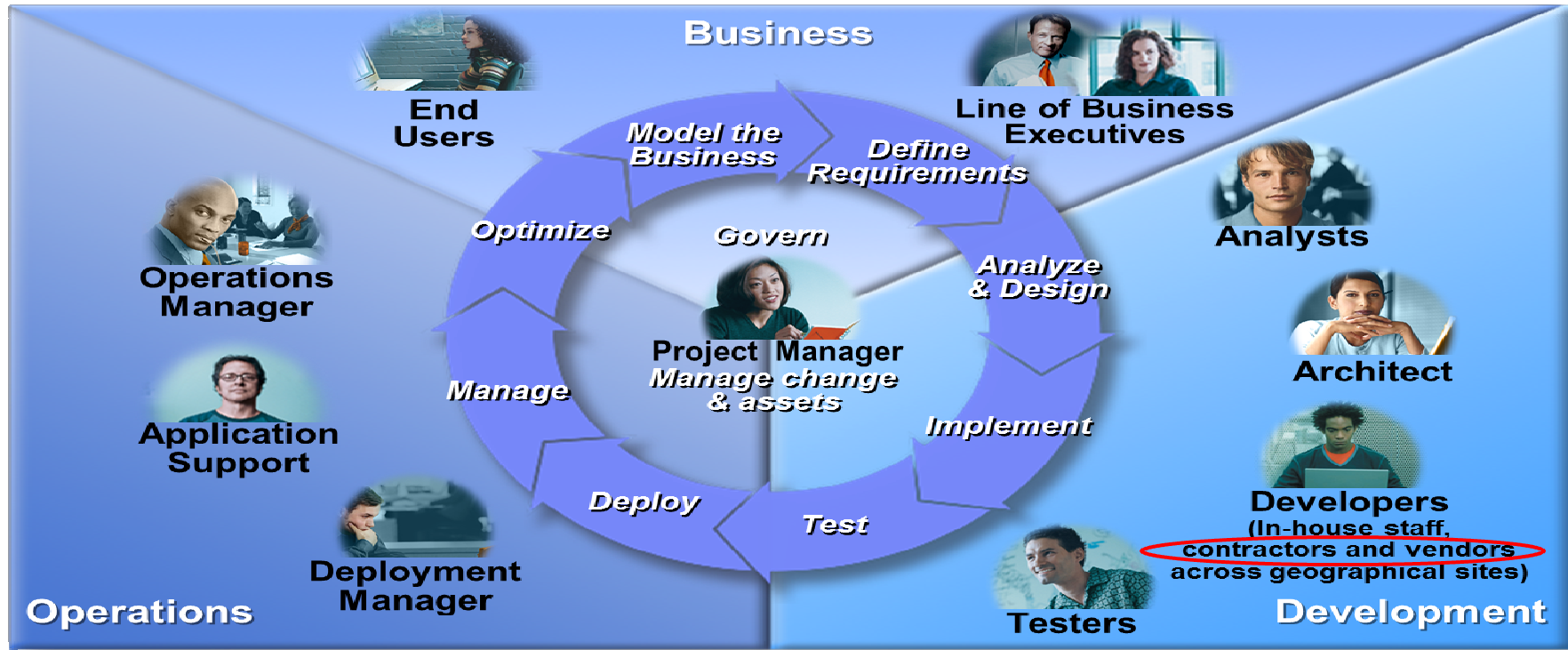
IBM enables a business-driven software and systems delivery lifecycle...

Prioritize

Plan

Manage

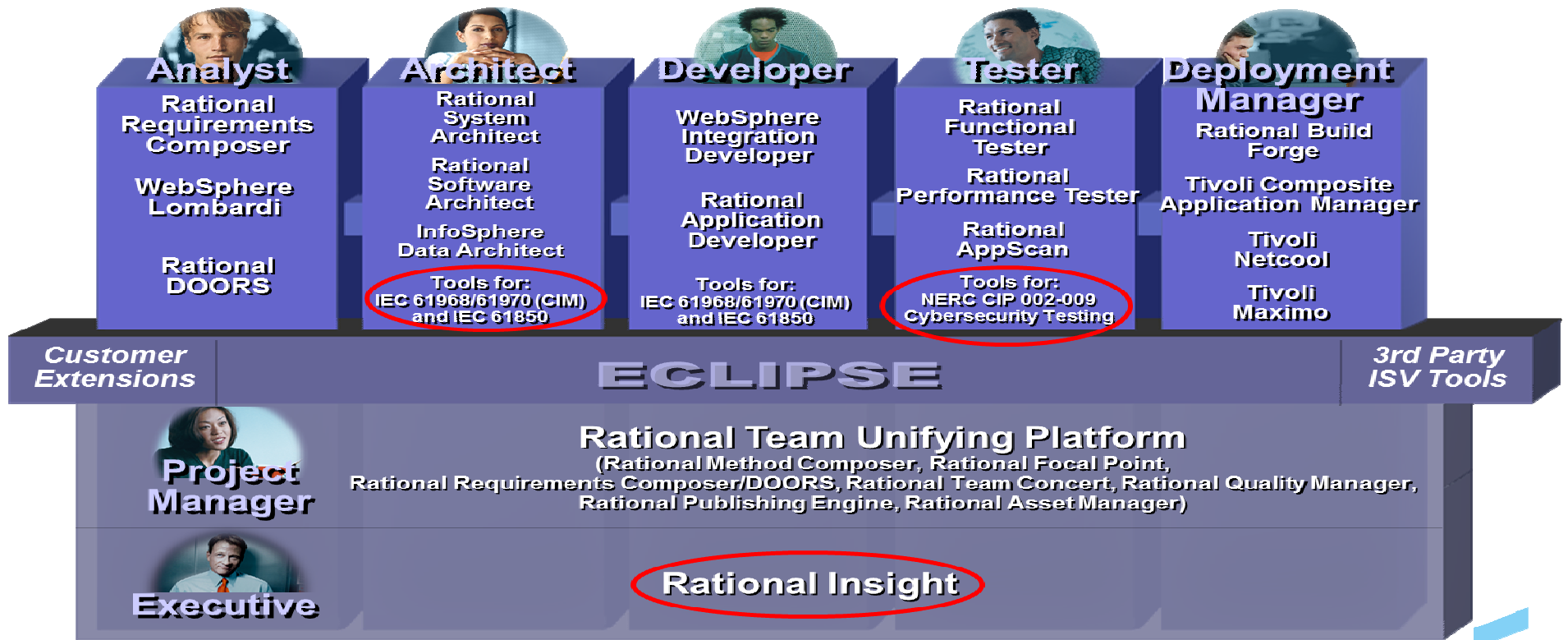
Measure



Optimize

Iterate

...with the IBM Software Delivery Platform for Energy

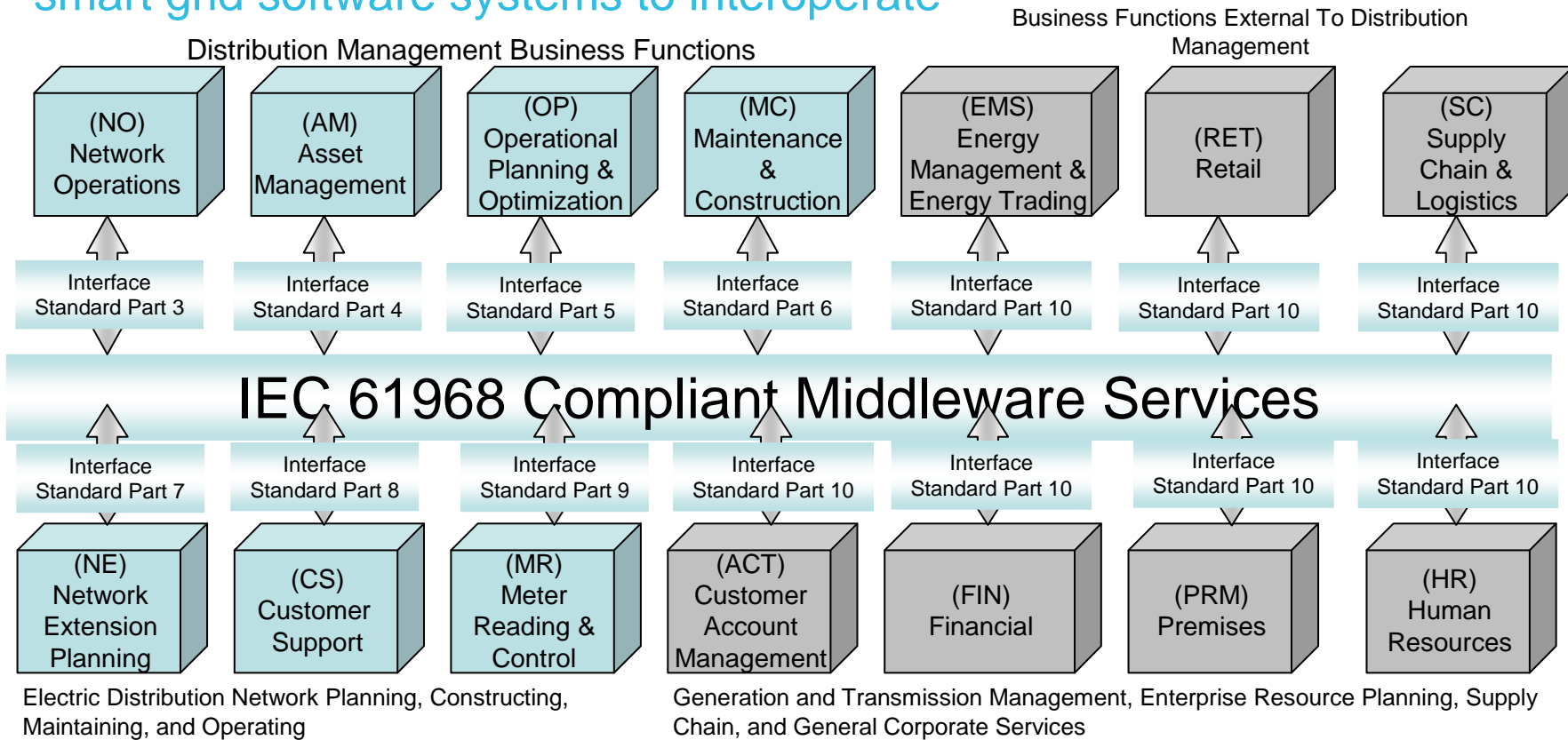


The IEC 61850 Standard



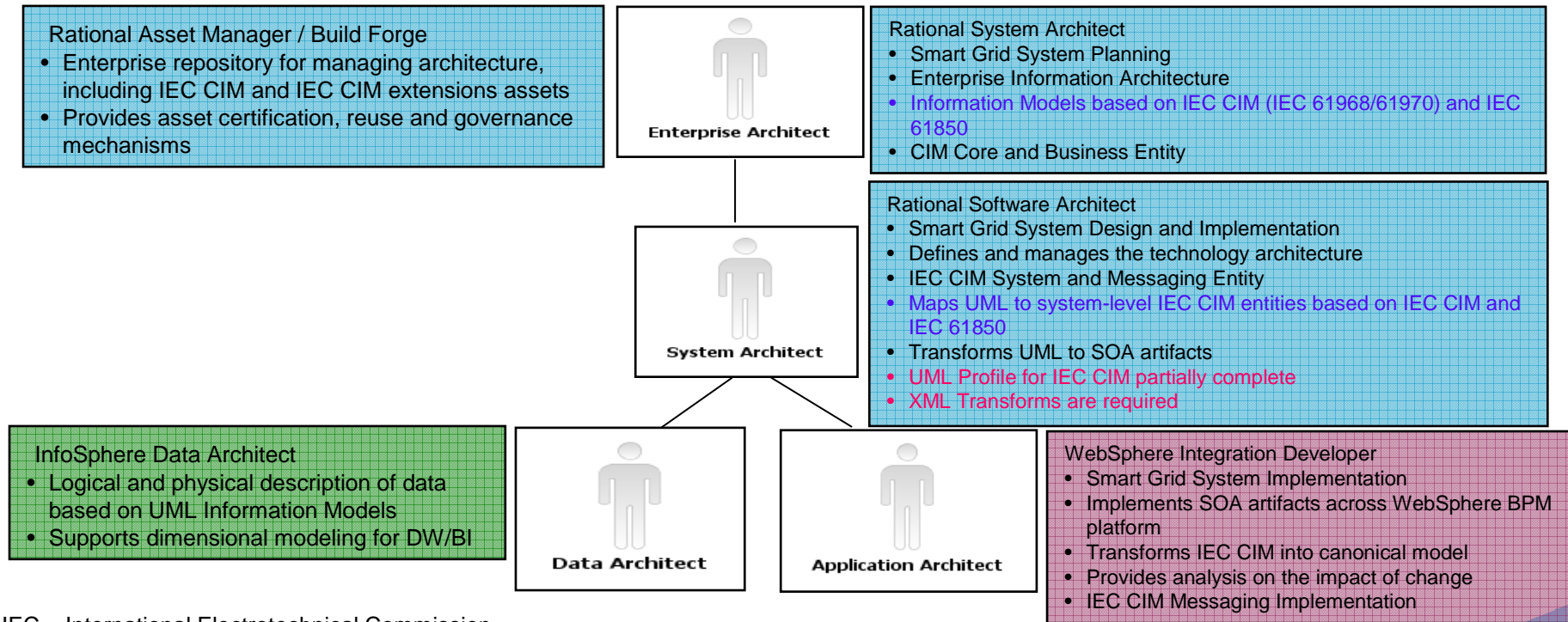
- **Interoperability** between equipment (standardization of exchanged data)
- **Offers a high-speed Ethernet interface** to Advanced Metering Infrastructure (AMI), Supervisory, Control and Data Acquisition (SCADA) and comparable systems
- **Global Configuration** of the communication network and applications loaded into the equipment and smart meters
- **Innovative Maintainability** by separating the base communication infrastructure with the rest of the grid

IEC CIM provides an industry standard information model enabling smart grid software systems to interoperate



Standards-based Smart Grid Architecture Management Tooling

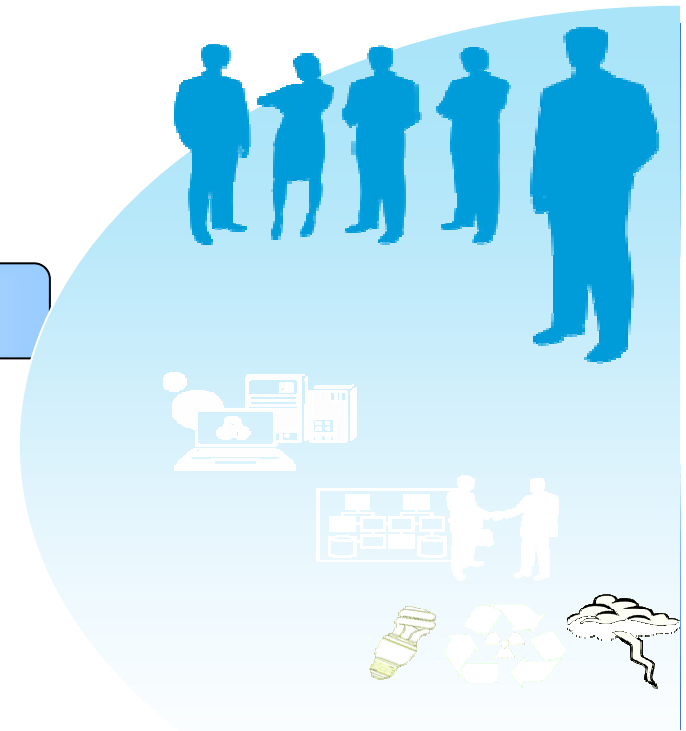
The Approach - Provide a pragmatic, model-driven approach to implementing and enriching IEC CIM and IEC 61850



IEC = International Electrotechnical Commission
 CIM = Common Information Model

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Leverage resources for innovation, improve organizational performance

Realize business benefits from technology solutions

- Make architecture actionable
 - ▶ New integrations drive transformation and traceability of artifacts from business and IT strategy to solution development and delivery
 - ▶ Pinpoint how and when to leverage services and technologies
 - ▶ Improve efficiency and agility – change architectures to respond to business change

- Reduce cost and improve solution quality
 - ▶ Achieve increased asset reuse and governance
 - ▶ Assure new applications and services are driven by business needs



"The challenge in any company is to do more with less, [our enterprise architecture] continues to enable us to achieve our goals at relatively low cost."

**Wayne Pales, Head of Strategy & Architecture,
AGL Energy**

Rational System Architect

Multiple User Interfaces: Web portal, Web client, Visio interface, Thick client

- Decision makers
- Information consumers
- Operations
- ...



- Executives
- Business owners
- HR, finance, sales
- ...



- Business & Enterprise architects
- Business analysts
- IT Managers
- ...



SA Publisher
SA Process Integrator

- Enhanced web templates
- Improved interaction with Visio modelling

System Architect XT

- More powerful web client
 - Modeling
 - Search
 - Dashboard analysis

System Architect

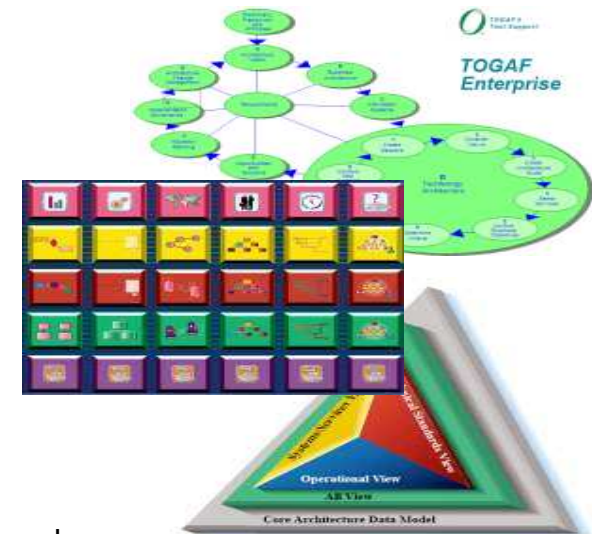
- Enhanced "work spacing" for integration planning
- Usability improvements
- New Heat Map reports

Simplicity in reporting and collaboration

Power of enterprise analysis and modeling



Capture and model all domains of the organization Utilize industry-standard modeling notations and frameworks



Multiple Modeling Notations and Standards

- Strategy Modeling
- Business Process Modeling (BPMN)
- Network and Infrastructure Modeling
- Data / Information Modeling

Industry Frameworks

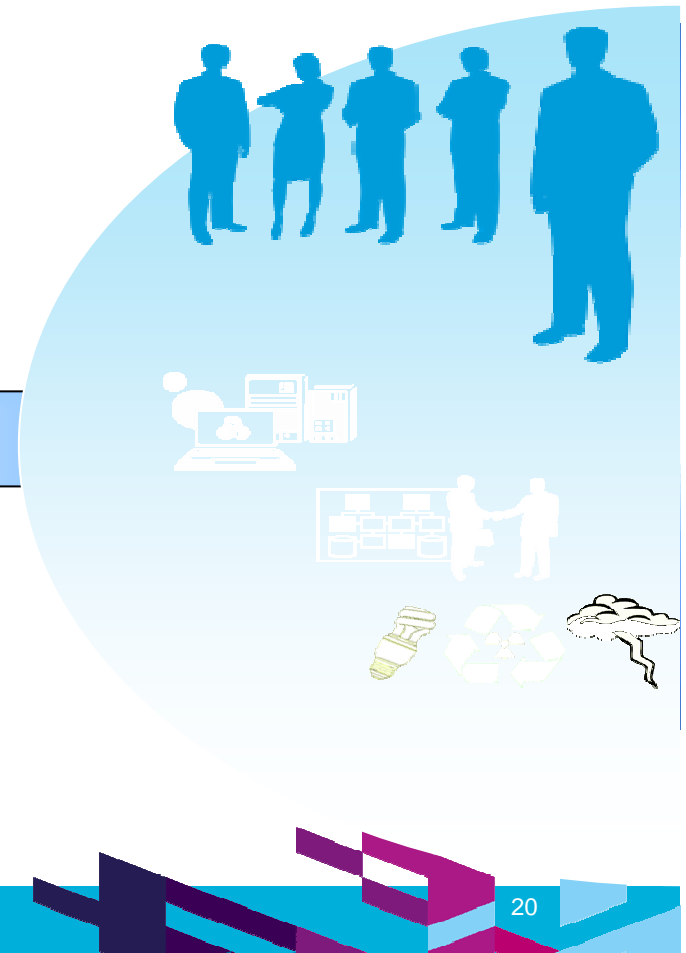
- TOGAF, Zachman
- DoDAF, DoDAF ABM
- MoDAF, NAF, FEA (iRMA)
- NGOSS (TM Forum)
- Custom Framework

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Rational Software Architect (RSA)

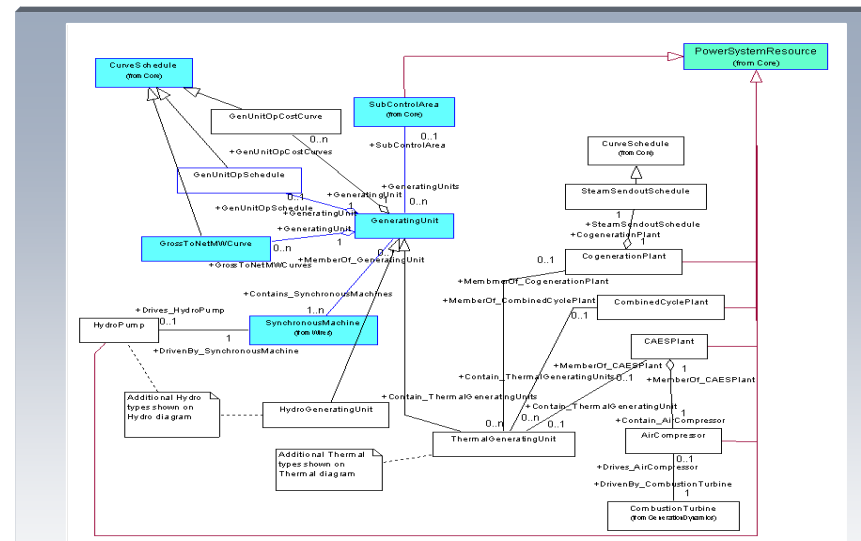
RSA employs *standards-based models* to translate project *requirements* into *architectural design*, enabling developers to:

- ▶ **Define** IT application infrastructure
- ▶ **Specify** application components and their interfaces
- ▶ **Automatically** create application source code and design documentation

RSA now includes:

EC Common Information Model (CIM)

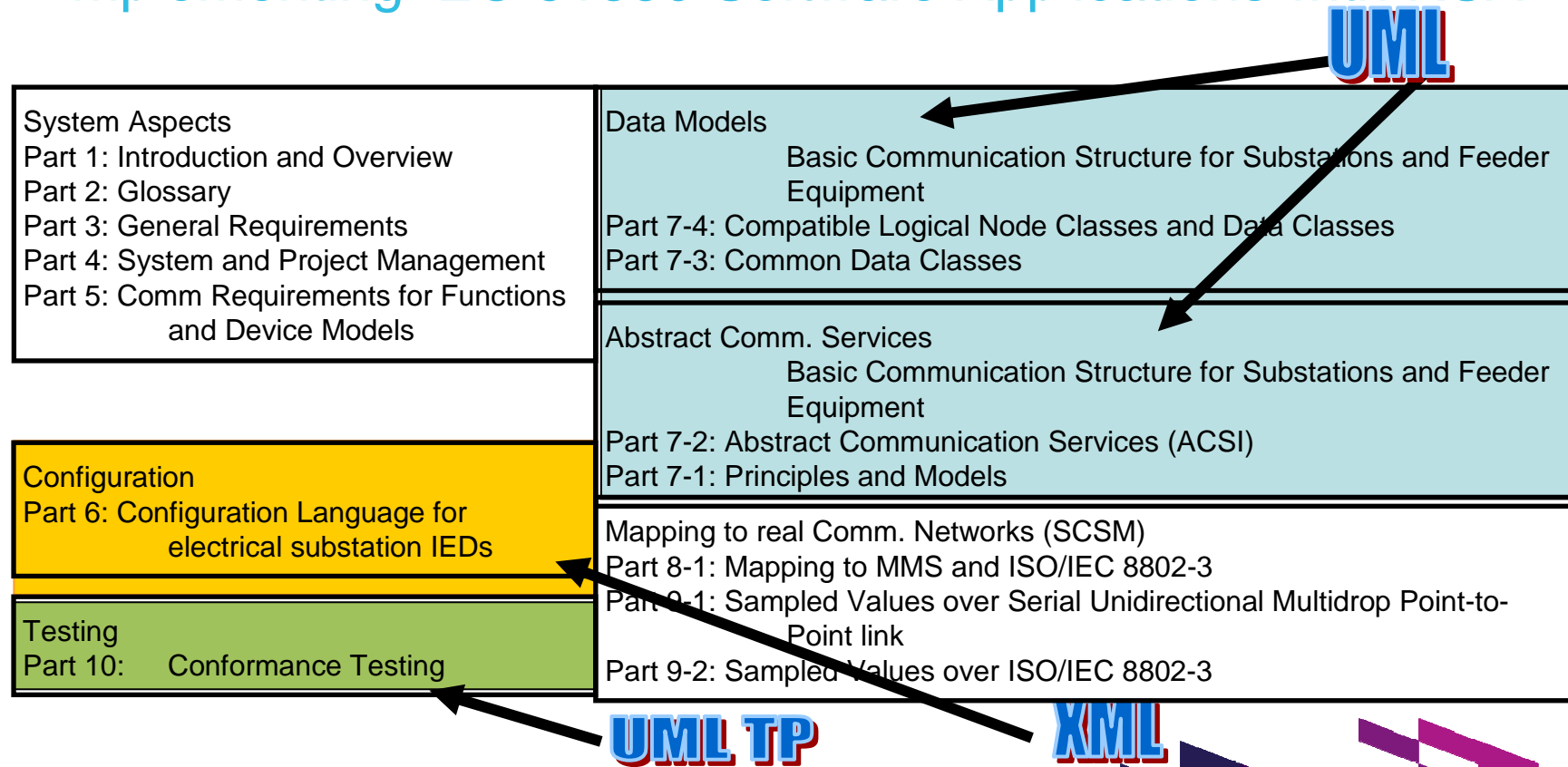
An object-oriented information model standard for the Smart Grid



IEC Technical Committee 57 (TC57) publishes the IEC CIM standard (IEC 61968/61970) in UML notation...

CIM v13 is now available for Rational Software Architect v8

Implementing IEC 61850 Software Applications with RSA



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Why smart grid application security is high priority

- **Web applications are the #1 focus of hackers:**
 - 75% of attacks at Application layer (Gartner)
 - XSS and SQL Injection are #1 and #2 reported vulnerabilities (Mitre)

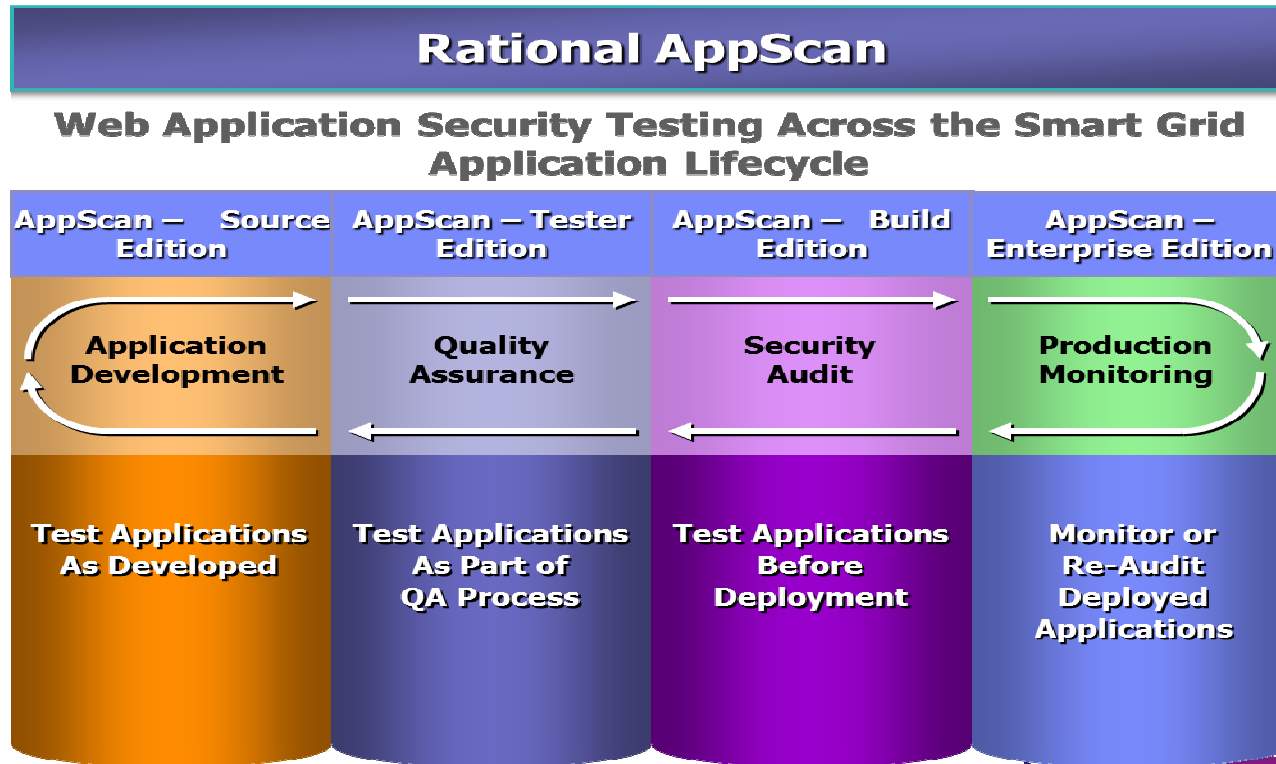
- **Most sites are vulnerable:**
 - 90% of sites are vulnerable to application attacks (Watchfire)
 - 78% percent of easily exploitable vulnerabilities affected Web applications (Symantec)
 - 80% of organizations will experience an application security incident by 2010 (Gartner)

- **Web applications are high value targets for hackers:**
 - IP/SIP communications servers can be inexpensively targeted for dramatic Denial of Service attacks
 - Customer data, credit cards, ID theft, fraud, site defacement, etc.

- **Compliance requirements and standards provide overall assurance of quality and business governance:**
 - NERC CIP 002-009, NIST Special Publication 800-53, NIST SP 800-82
 - Internal regulatory policies

Smart grid application security testing products

Automate key aspects of NERC CIP 005, 007 cyber security compliance



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IBM Rational Insight

Optimized Information by Role

- Raise enterprise visibility and transparency to reduce cost and risk, and make the right decision at the right time
- Measures the effectiveness of lifecycle processes and practices to improve organizational and business performance
- Gain insight into development project progress and product quality spanning organizational and geographic boundaries

Real-Time Dashboards

Improved Executive Decision Making



CxO

Continuously Improve Performance Outcomes



Process Lead

Improved Project Level Decision Making

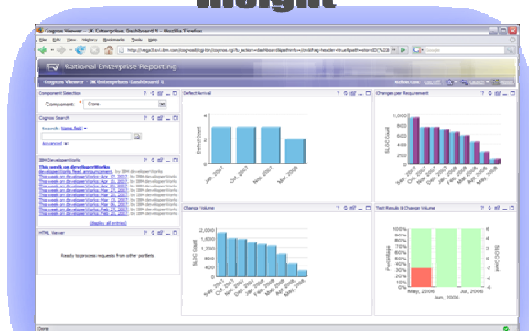


Project Manager

Smart Grid Software Delivery Performance Improvement

Smarter power for a smarter planet

Rational.
Insight



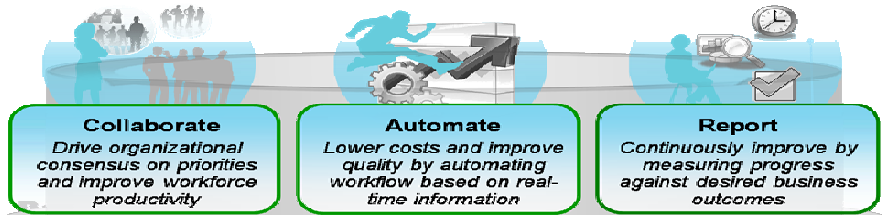
Single view into your organizational performance and that of your suppliers

Measurement *is* Management

Rational.
Measured Capability Improvement Framework (MCIF)

Rational. software

Jazz



A collection of repeatable, structured activities producing a desired business outcome

- Rational. **ClearCase**
- Rational. **ClearQuest**
- Rational. **Asset Manager**
- Rational. **Software Architect**
- Rational. **Requirements Composer**
- Rational. **DOORS**
- Rational. **Team Concert**
- Rational. **Quality Manager**
- Rational. **System Architect**
- Rational. **Focal Point**

- Quality Centre**
- MS Project**
- MS Excel**
- XML**

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▪ Customer Results

Customer Results: Software/Systems Delivery Performance Improvement

- Cross-industry customers, including E&U, using the combination of IBM Rational best practices, integrated tools, and expert implementation services report compelling return on investment (ROI) results. Example reported results include:
 - ▶ 50% faster end-to-end delivery cycles
 - ▶ 80% reduction in delivered bugs/defects/security vulnerabilities
 - ▶ 33% reduction in delivery costs
 - ▶ 66% reduction of development cycle time (reduced from 9 months to 3 months)
 - ▶ Two-month manual testing cycle reduced to 2 days
 - ▶ Test effort reduced from six testers taking several days to one tester taking a few hours
 - ▶ 66% reduction in release cycles
 - ▶ 90% reduction in bug backlog
- Customers report improved project management capabilities; for example, customers have reported that they:
 - ▶ Improved progress visibility, requirements traceability, schedule predictability, and product/project management metrics/dashboard
 - ▶ Effectively managed 125 project builds in one year
 - ▶ Successfully grew from 80 to 280 developers in two years
 - ▶ Successfully developed across three product versions in parallel
 - ▶ Effectively managed projects spanning three countries, four internal sites, and more than 300 developers and testers

