Raytheon's Architecture Journey

Software Architecture Technology
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Customer Success Is Our Mission
The Journey...

• Why Architecture?

• Which Architecture?

• Initiatives

• Summary
Why Architecture?

Evolution of a Discipline

Customer/User Expectations & Requirements

Communication, Communication, Communication
Which Architecture?

- Software Architecture
- Systems Architecture
- Enterprise Architecture

All Of The Above
Architecture Review Board (ARB)

• Corporate Organizational Structure
  – ARB Chair Direct report to Corporate VP of Technology
  – Representatives From each core Business Area

• Focus On...
  – Architecture initiatives & guidance across Raytheon
  – Architecture reviews
  – Internal architect certifications
Raytheon Enterprise Architecture Process (REAP)

• Unification of Industry & Government Standards

• Systems & Enterprise Architecture-Focused

• 42 Subprocesses Within 5 Major Activities

• Established Corporately in November 2002
Architecture Training

• Different ‘Levels’ Required
  – Junior    Awareness
  – Mid-Level Introductory
  – Senior    In-Depth

• Corporate Training Programs

• Blend of Internal & External Courses

• REAP-Aligned
Raytheon Certified Architect Program (RCAP)

• Internal Certification for Senior Architects Across Raytheon World-wide

• Core Requirements
  – Training
  – External Certifications
  – Practitioner Experience / Demonstration of Application
  – Leadership
  – Certification Board Review

• Status
  – Five Waves Underway
  – Pursuing Independent Accreditation of Our Program
Architect Certifications

- Raytheon Certified Architect Program (RCAP)

- Software Engineering Institute
  - Software Architect, ATAM®

- Federal Enterprise Architecture Certification (FEAC) Institute
  - DoDAF, Federal

- The Open Group Architecture Framework
  - TOGAF-8

- Zachman International
  - (upcoming) Enterprise Architect

- Sun Microsystems
  - J2EE Enterprise Architect
Architecture Tools

- Vendor Products are Evolving
- Growing Support of Frameworks
- Consolidation Is Occurring
- Detailed Trade Study in 2005
  - Dozens of ranked criteria
  - In-depth analysis
  - Vendor dialogues
  - Common modeling
# Reference Architectures

<table>
<thead>
<tr>
<th>Reference Architecture</th>
<th>A high-level system design free of implementation details; an architecture template</th>
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- Corporate
- Business Area-specific
Architecture Technical Interest Groups

• Raytheon-wide Communities of Interest
  – Systems & Enterprise Architecture
  – Software Architecture
  – Net-Centric Architecture

• Sponsorship
  – Systems Engineering Technology Network
  – Software Engineering Technology Network

• Hundreds of members across Raytheon

• Activities include workshops, projects, architecture-centric webinars, and general collaboration
Architecture Repository

- Securely Store/Retrieve Architectural Artifacts

- Common Location for Architecture Styles & Patterns, Reference Architectures, Tool Templates, etc.

- Baseline taxonomy defined by corporate Architecture Review Board
Industry/Consortia Collaborations

- Software Engineering Institute
  www.sei.cmu.edu

- The Open Group Architecture Forum
  www.opengroup.org

- Object Management Group (OMG)
  www.omg.org

- International Council on Systems Engineering (INCOSE)
  www.incose.org

- Zachman International
  www.zifa.com

- Systems Architecture Forum
  www.architectingforum.org
Summary

• **Architecture**: The Way Forward for Complex System Development

• Institutionalization Takes…
  – Money
  – Talent
  – Time

• It Takes Many Pieces To Complete The Puzzle
Questions?

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## Acronyms

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ARB</td>
<td>Architecture Review Board</td>
</tr>
<tr>
<td>ATAM®</td>
<td>Architecture Tradeoff Analysis Method® [SEI]</td>
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<tr>
<td>DoDAF</td>
<td>Department of Defense Architecture Framework [US]</td>
</tr>
<tr>
<td>FEAC</td>
<td>Federal Enterprise Architecture Certification [US]</td>
</tr>
<tr>
<td>FEAF</td>
<td>Federal Enterprise Architecture Framework [US]</td>
</tr>
<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
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<tr>
<td>INCOSE</td>
<td>International Council on Systems Engineering</td>
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<tr>
<td>J2EE</td>
<td>Java 2 Platform, Enterprise Edition</td>
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<tr>
<td>OMG</td>
<td>Object Management Group</td>
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<tr>
<td>RCAP</td>
<td>Raytheon Certified Architect Program</td>
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<tr>
<td>REAP</td>
<td>Raytheon Enterprise Architecture Process</td>
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<tr>
<td>SEI</td>
<td>Software Engineering Institute [Carnegie-Mellon University]</td>
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<tr>
<td>TOGAF</td>
<td>The Open Group Architecture Framework</td>
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<tr>
<td>TIG</td>
<td>Technical Interest Group</td>
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<tr>
<td>US</td>
<td>United States</td>
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Rolf Siegers is an Engineering Fellow and Chief Architect of the Garland Engineering Center in Raytheon’s Intelligence and Information Systems. He joined Raytheon in 1984 and leads the corporate Raytheon Enterprise Architecture Process (REAP) Initiative, Raytheon’s standardized, company-wide architecting process. Rolf sits on Raytheon’s corporate Architecture Review Board (ARB), leading and supporting a variety of architecture-related initiatives.

Rolf’s program experience includes leading several multi-discipline software architecture teams for large-scale, software-intensive national and international systems since 1997. He is a certified TOGAF-8 architect (The Open Group), ATAM® Evaluator (SEI), and Software Architecture Professional (SEI). He has previously presented at conferences by the US Department of Defense, Integrated Defense Architectures, The Open Group, and INCOSE.

Rolf holds bachelor degrees in Computer Science and Mathematics from Huntingdon College and is a member of IEEE and INCOSE. He resides in Dallas, Texas with his wife Anita and children Hannah, Emily, and Dylan.