Workshop Summary and Next Steps

Grace A. Lewis
Software Engineering Institute, USA

NO WARRANTY

THIS CARNEGIE MELLON UNIVERSITY AND SOFTWARE ENGINEERING INSTITUTE MATERIAL IS FURNISHED ON AN “AS-IS" BASIS. CARNEGIE MELLON UNIVERSITY MAKES NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, AS TO ANY MATTER INCLUDING, BUT NOT LIMITED TO, WARRANTY OF FITNESS FOR PURPOSE OR MERCHANTABILITY, EXCLUSIVITY, OR RESULTS OBTAINED FROM USE OF THE MATERIAL. CARNEGIE MELLON UNIVERSITY DOES NOT MAKE ANY WARRANTY OF ANY KIND WITH RESPECT TO FREEDOM FROM PATENT, TRADEMARK, OR COPYRIGHT INFRINGEMENT.

Use of any trademarks in this presentation is not intended in any way to infringe on the rights of the trademark holder.

This work was created in the performance of Federal Government Contract Number FA8721-05-C-0003 with Carnegie Mellon University for the operation of the Software Engineering Institute, a federally funded research and development center. The Government of the United States has a royalty-free government-purpose license to use, duplicate, or disclose the work, in whole or in part and in any manner, and to have or permit others to do so, for government purposes pursuant to the copyright license under the clause at 252.227-7013.

Discussion on SOA Research Agenda

Do we really need completely new maintenance processes? Can we augment or adjust existing models? Can we leverage maintenance processes from the business and network world?

As far as ROI, why is there not a lot of formal work in this area?

- Lots of research is informal
- Move to look at measurement of business value over time as opposed to calculating ROI
- People are not leveraging the work in engineering economics

How does the existence of so many free services change the model?

- It does, both from the consumer as well as the provider perspective
- The service consumer gets access to free functionality and faster development cycles that can increase business value
- The service provider will have to find creative business models

Presentation on Maintenance Characteristics of Service-Oriented Systems [1]

Service-oriented systems are maintenance-intensive systems

Findings related to successful SOA

- Good management and maintenance linked
- High success SOA characteristics
  - Tacitly embrace doing software maintenance
  - Up play on changing needs and the needers, e.g. Six Sigma organization are better prepared for SOA projects because they are used to process improvement and managing change
  - Down play on SOA technology
  - Do incidental properties maintenance
  - Emphasize doing enhancive maintenance

Presentation on Maintenance Characteristics of Service-Oriented Systems 2

Research Challenges

- Results when managed as maintenance projects?
- How much has change agility improved with SOA?
- What affects agility improvement efforts?
- Enterprise profile size, with and without SOA?
- Cost of maintaining SOA systems in use?
- Cost of SOA maintenance by maintenance type?
- Changes in personnel maintenance time use with SOA?

Presentation of an Automated Evolution Tool (ASESM)

Accommodation of unanticipated changes in service-oriented solutions in an agile way is key

Proposed an automated model-based method for evolution of service-oriented systems

Central to the approach is that changes are located in a CRUD matrix and then propagated into the service model through transformation

Research challenges

- Common software evolution platform
- Supporting model evolution
- Supporting model co-evolution
- Improved predictive models

Please send Pooyan Jamshidi any comments or questions: pooyanjam@yahoo.com

Presentation on Portugal Telecom Case Study

Problems

- Maintaining two BPEL engines because of long-running processes already running on the old engine
- Low level communication with legacy systems—different names for the same data element because the systems were never meant to work together
- Finding deployed services efficiently—experimenting with a semantic registry

Research challenges

- Recent legacy due to incremental evolution—it's actually easier to deal with old legacy
- Socio-technical issues—governance is just one aspect
  - Use of semantics and ontologies
  - Support from upper management
- Adapters
  - Some services expose too much of its internals
  - Not a standard way of calling all applications
  - Problems with rollbacks, especially in long-running processes
- Technology and business
  - For example, what is the business cost for runtime discovery

Presentation on Electronic Records Archive System

Challenge due to double evolution

- Dealing with the evolution of the ERA system
- Dealing with the evolution of the systems that provide the source data

Challenge due to different timelines between the ERA system and the source system

- The gap between creation time and archive time can be years
- Technologies used to create files can be completely obsolete at archive time

Created a service decomposition and composition process to help with evolution

- Define services granularity based on tool availability
- Take full advantage of BPEL for services composition

Presentation of SOA Governance and Evolution of Service-Oriented Systems

Most SOA governance methodologies do not cover maintenance and evolution challenges systematically

Service-oriented systems, like control systems, have feedback loops

- Policies and processes are continuously measured and controlled by a SOA governance controller to validate existence, compliance, etc.

SOA governance mechanisms

- Autonomic systems and concepts (feedback loops)
- Levels of indirection

Research challenges

- Models for feedback loops
- Managing and leveraging uncertainty
- Making control loops explicit

Questions

- Is maintenance for service-oriented systems easier than for traditional systems?
- Is software co-evolution harder or easier?

Presentation on Longer-Term Challenges 1

Solution target

- Simplified development of business services
- Simplified assembly and deployment of business solutions built as networks of services
- Increased agility and flexibility
- Protection of business logic assets by shielding from low-level technology changes
- Improved testability

SOA programming models

- Collection of models, techniques, methodologies and tools for implementing services and assembling them into solutions, e.g. IBM's SCA, Indigo, JBI
- Issues related to simplification and standardization
- Perhaps the biggest challenge at the moment

Presentation on Longer-Term Challenges 2

System Management and Runtime Infrastructure

- Root cause analysis
- Business process view of logs
- Compliance and governance issues
- Assurance and security
- What will be the challenges for the next generation of SOA runtime infrastructures?

SOA Maintenance and Evolution

- Evolution patterns
- Round-trip engineering
- Reengineering processes
- Tools and environments to support maintenance activities
- Multilanguage and multi-platform system analysis and maintenance
- Tools for the verification and validation of compliance with constraints

Presentation on Longer-Term Challenges 3

SOA Requirements Engineering and Project Management

- Modeling dynamic configurations
- Modeling and managing conflicting non-functional requirements (NFRs)
- Understanding design decisions and tradeoffs for NFRs
- Risk assessment and mediation
- Infrastructures for change control and management

Top Research Areas (in no particular order)

- Service versioning—diversity and complexity
- Property tracing—from design time to runtime
- Smart service infrastructures
- Logging, monitoring and diagnostics
- Data access, data handling and data validation services
- Tools for supporting the SOA life cycle

Panel on Maintenance and Evolution of Deployed Service-Oriented Systems [1]

Liam O' Brien (NICTA, Australia)

- Service version management
- Service testing
- SLA management

Carl Worms (Credit Suisse, Switzerland)

- Services are mostly mainframe application encapsulations
- IT governance is critical—keep it simple enough
- 20-25% of employees are in IT in financial industries
- A key is the identification of small chunks that can be managed and maintained easier
- Parallel versions of a service in production (restricted to 3 versions, oldest has to be phased out in a year)
- Getting skilled people is a challenge

Panel on Maintenance and Evolution of Deployed Service-Oriented Systems 2

Scott Tilley (Florida Institute of Technology, USA)

- Engineering
  - Managing complexity
  - More hands-on experimentation (SLA, ESB, monitoring systems, …)
  - Better techniques for SOA system documentation and understanding
  - SOA testing
- Business
  - ROI
  - Evolution patterns
  - Case studies
- Operations
  - Longitudinal case studies—go several versions or releases of a project
  - Placing SOA-based systems in the broader context of cloud computing
- Cross-Cutting
  - Governance
  - Security
  - Education

Panel on Maintenance and Evolution of Deployed Service-Oriented Systems 3

Kostas Kontogiannis

- Maintenance and evolution techniques across different levels of abstraction: application, infrastructure and business processes
- Lack of skilled developers—need knowledge of technologies and platforms that are moving targets—proper abstractions could be a solution to this problem
- Dependency models and dependency analysis techniques—e.g. between applications and infrastructure components
- Multi-language and multi-platform system analysis
- Maintenance and evolution of components other than source code
- Effects of cloud computing (service ecosystems)
- Challenges in particular industry domains

Panel on Maintenance and Evolution of Deployed Service-Oriented Systems 4

Hausi Müller

- Automated root cause analysis—take traceability to a new level to include dynamic aspects, e.g. events
- Need a different SOA research agenda going forward—bring out importance of SOA governance, currently very technology-centric, too comprehensive
- Need to focus on “things to come”
  - Dynamic attributes
  - User context (context-awareness)
- Ignore cloud computing for this research agenda

Common Challenges

Service versioning

Training and education

Testing

Integration and leverage of cloud computing (mixed opinions)

Root cause analysis

Panel Discussion

Governance-driven development

- Governance is not new
- Unique challenges and opportunities to do it right: design-time and runtime
- Need more work with industry to see how they do it and what they really need
- From an engineering and industry perspective it is the way to enforce your architecture
- Not all organizations need the same amount of governance—however, what is the threshold for determining how much is enough?

Lean SOA

- Leverage from industrial engineering
- Clear, concise, to the point, less expensive
- What technologies support lean development, e.g. REST
- Put controls where it is really needed

Next Steps

Presentations will be available on the MESOA web site by the end of the week

- http://www.sei.cmu.edu/workshops/mesoa/2009
- If you do not want your presentation on the web site or would like to have a different version on the web site, please let me know

Proceedings will be published by the end of October as an SEI Special Report

- I will send e-mail when the report is published
- Please make sure that your name is on the sign-in sheet

We are working on the publication of the full SOA research agenda

- So far it has been opportunistic and partial

We will continue organizing workshops and other events on the topic and growing the community of interest

Thank You!

Software Engineering Institute | Carnegie Mellon