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A Research Agenda for Service-Oriented Architecture (SOA): Maintenance and Evolution of Service-Oriented Systems

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Abstract- Regardless of recent reports that it has failed, the truth is that Service-Oriented Architecture (SOA) remains the best option available for systems integration and power of bequest systems. The technical knowledge to implement SOA will surely evolve to tackle emerging needs, but its view will remain. The Software Engineering Institute has implemented an SOA Research Agenda with involvement from a wide range cross-section of the research community. The central part of the agenda is an organization that classifies topics into the big business, engineering, and procedure aspects of service-oriented systems, along with a set of cross-cutting aspects. Based on this organization, the agenda outlines explore areas, each of which is identified with its underlying principle, of current research, and description of research challenges and gaps. This information provides outlines the SOA Research list of items. It as well as provides details on detailed research challenges linked to the maintenance and evolution of service-oriented systems.

Keywords-SOA, SEI, legacy system, taxonomy, agenda.

I. INTRODUCTION

Service-Oriented Architecture (SOA) is a method of designing, developing, deploying, and managing systems that are categorized by coarse-grained services and service consumers. The services represent reusable business functionality; through criterion interfaces, service consumers compose applications or systems using those services.

Despite a highly publicized report that claimed that "SOA is Dead,"1 the actuality is that SOA is at present the best option available for systems combination and influence of legacy systems. According to a 2007 Gartner Group report, 50% of new mission-critical working applications and business processes in 2007 were intended around SOA, and that quantity was

Projected to be extra than 80% by 2010. In May 2009, Forrester Research reported that 75% of IT executives at Global 2000 organizations plan to be using SOA by the end of the year, and that less than 1% report having a negative SOA experience.2 this suggests

That SOA adoption surplus an important goal for IT product makers. The technology to execute SOA will the majority maybe change over time, but the concepts will remain.

This need is mainly important because of current concerns that SOA is potentially being firm ahead of its limits. What was primarily an draw near for asynchronous document-based message replace that applied primarily to business-oriented applications now has stretched to a big set of distributed systems with larger prospect for routine, accessibility, reliability, safety measures and other value attributes.3 As a result, the basic insecurely together, stateless, standards-based environment of the affiliation between service clients and service providers in service-oriented systems is changing.

This statement presents a synopsis of the current state of the SOA study Agenda and focuses explicitly on preservation and evolution, a rising concern as more and more service-oriented systems are deployed. The details of other areas of the study agenda will be the focus of future reports.

II. A RESEARCH AGENDA FOR SERVICE-ORIENTED ARCHITECTURE

The Software Engineering Institute SOA study Agenda was firstly developed in 2007 on the foundation of a broad fiction review of topics linked to SOA, with the principle of identifying the state of the practice including multiple case studies of doing well SOA approval interviews with practitioners and researchers to recognize both enablers of and barriers to SOA taking up.

Case studies, even however mostly vendor-sponsored and product-specific, in particular be liable to have a general theme: a strong link between business tactic and SOA strategy. With this in brainpower, we developed a research agenda that includes these fundamentals: an identification of the SOA difficulty and solution space a anticipated service-oriented systems growth of life cycle to support deliberate SOA adoption and execution a categorization of SOA research areas related to business, trade, operational, and crosscutting concerns to concentrate on the proposed life cycle The rest of this division presents the three essentials of the research agenda.

2.1 SOA Problem and Solution Space

The phrase service-orientation implies a distinctive set of concerns and actions to different audiences. For example, to software engineers it is all about functional desires, apparatus, integration techniques, messaging, equipment, development environments, and middleware. To business persons, it is all about developing production strategies, enabling leaners of IT departments, facilitating agile process models, and dynamic new provision for delivery processes.

In a service-orientation adoption setting, an association should build up a service policy that takes into description of the organization's business drivers, perspective, and application province. In order to achieve its service strategy, the organization has to make plans to achieve the goals and objectives outlined by the strategy. The implementation of these plans requires engineering, business, and operations decisions to be prepared by the groups identified previously, taking into deliberation cross-cutting concerns such as governance, security, risk management, social and legal issues, and training and education. These interactions are shown as problem, planning, and result spaces in Figure 1.

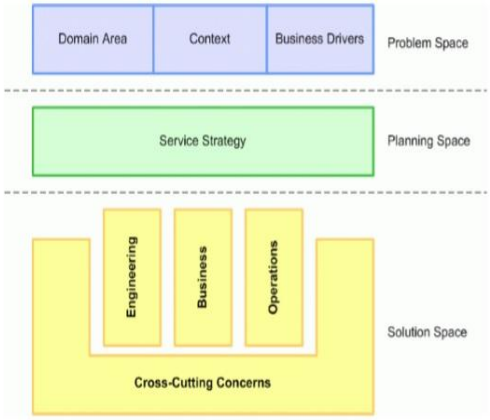

Figure 1: Overview of the SOA Problem Space and Solution Space

Problem Space

The problem space corresponds to the features of the adopting organization as well as the problems that SOA is expected to tackle. The problem space shapes and places constraints on the strategy but can also make possible the execution of the strategy. The essentials of the problem space become the drivers for the strategy.

Domain Area: This is the areas in which the organization operates, such as manufacturing, health, administration, education, or consulting. It is an important element of the problem space because some domain areas have more speedily adopted SOA or have created principles or relations to facilitate SOA adoption. Developed organizations that in the earlier period have used Electronic Data Interchange (EDI) for integration with trade partners or Enterprise Application Integration (EAI) techniques for systems assimilation have an easier time adopting SOA because their business processes maybe have already been planned around exchanges between different systems. Health Level 7 exists in the physical condition domain to create values for health information substitute standards. The E-Government program provides management and tools for system integration and SOA to U.S. federal administration agencies.

Context: Context is the location in which the business operates and in which services will be deployed. It includes governmental issues such as business dimension, budget, legislation, competitors, market, business processes and systematic issues including systems, system users, skill, compute platforms, and available communications.

Business Drivers: The business drivers are the big business reasons why the organization is adopting SOA. Different business drivers will direct to different strategies. Illustrations of business drivers are increase information available to clients integrate with industry partners get better business processes respond quickly to business changes reduce development costs by increasing reprocess.

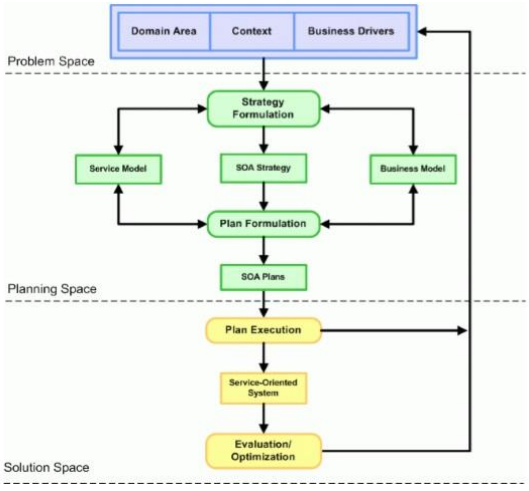

Figure 2: Flow Diagram of the Expanded View of the SOA Problem Space and Solution Space

Solution Space

In the solution space, the SOA plans are executed to produce a service-oriented system that includes a set of services that provide reusable business functionality, service clients that use the functionality available from the services, commonly agreed upon service definitions, and an infrastructure that enables discovery, composition and service implementation. During the implementation of the plans, changes or wrong assumptions regarding SOA technology may invalidate the plans and cause the organization to reformulate their SOA strategy, as shown in

Figure 2. Once the service-oriented system is deployed, measurements are gathered to maintain any metrics designed to check the effectiveness of the SOA plan and the system itself. This data will help to 4 Even though business processes are part of an organization's circumstance; these are not always represented in a way that supports service recognition decisions. The Business Model is such a demonstration

2.2 Service-Oriented Systems Development Life Cycle

A strategic approach to SOA adoption requires an iterative approach to systems development and evolution that reflects the strong link between business strategy and development strategy. SOA adoption is not "all or nothing." As a matter of fact, one of the benefits of SOA adoption is that systems and system components can be deployed progressively. What follows is an anticipated development life cycle for service-oriented systems, where each goes by through the life cycle corresponds to iteration like loop in Figure 2. The core differences with other iterative development frameworks, such as the IBM Rational Unified Process, are an highlighting on activities to launch and analyze the bond with business goals at the beginning of the cycle, an emphasis on estimation at the end of the cycle, and the requirement/review of business objectives at the end of the cycle so that the requirements for each iteration follow business objectives and process.

2.2.1 Overview of the Service-Oriented Systems Development Life Cycle

The life cycle consists of five phases (tactical alignment, planning, construction, transition, and production) that include interconnected sets of activities and milestones to support major SOA development and expansion goals nine activities that support the goals of the phases. Because the life cycle is iterative, activities support multiple life-cycle phases. Four types of indicators for evaluating the success of SOA adoption and consequential systems against the goals. Table 1 shows examples of the connection among phases, activities and indicators. The development phases are planned across the top and the activities that are carried out to expand the service oriented system for the period of these phases are on the left, along with indicators to evaluate the effectiveness of the service-oriented system against SOA adoption goals. These are each discussing in additional aspect in the subsequent of three parts. The quantity of "plusses" indicates the importance positioned on the activity or indicator in each phase.

Activities A1: Business Context Appreciative +++ ++a A2: Business Objectives Requirement +++ ++ + A3: Risk Analysis and Preliminary Requirements Assembly +++ +++ ++ + A4: Prototyping and Requirements Modification ++ + A5: Design and Execution + +++b ++ A6: Integration and Testing ++ +++ ++ A7: Deployment +++ ++ A8: Maintenance + + +++ A9: Organization ++ +++ Indicators E1: Financial Display Measurements ++ +++ E2: Technology Display Measurements + ++ ++ + ++ E3: User Rating Dimensions ++ +++ E4: Compliance Indicators + ++ + ++ +++

Table 1: Mapping Between Phases, Activities, and Indicators

Phases	P1. Analysis	P2. Planning	P3. Construction	P4. Transition	P5. Production
Activities					
A1: Business Context Understanding	+++				++[a]
A2: Business Objectives Specification	+++	++	+		
A3: Risk Analysis and Initial Requirements Gathering	+++	+++	++	+	
A4: Prototyping and Requirements Tuning		++	+		
A5: Design and Implementation		+	+++[b]	++	
A6: Integration and Testing			++	+++	++
A7: Deployment				+++	++
A8: Maintenance			+	+	+++
A9: Management				++	+++
Indicators					
E1: Financial Indicator Measurements	++	+++			
E2: Technology Indicator Measurements	+	++	++	+	++
E3: User Rating Measurements				++	+++
E4: Compliance Indicators	+	++	+	++	+++

[a] Indicates a state of "perpetual beta"—requirements are not fixed; requirements for each iteration follow business objectives

[b] Implementation, Integration, Deployment, Maintenance, and Management are followed according to the development process used (RUP, Agile, etc.)

2.2.2 Phases

This part focuses on the five phases of the life cycle that are example show in Table 1. As stated prior, each pass through this life cycle corresponds to an iteration of the run shown in Figure 2. Triggers for an iteration consist of pilot projects new services (or new versions of services) new service clients (or new versions of service clients) service client variation to use newly organized services business evolution business process changes (or a business process reengineering exertion) legacy system changes that affect deployed services legacy system adaptation to in shape into the SOA location SOA infrastructure changes (or SOA infrastructure initial business) major difficulty reports. Some of these iterations will be big in range than others. Each iteration is tranquiled of the phases that are shown as the column headers in Table 1. These phases are P1. Analysis P2.Planning P3.Construction P4. Transition P5. Production.

Strategic Analysis Phase

This phase is made up of three sub-sections of SOA requirements: testing, size, and consideration.

Analysis (P1)

In the early hour's iterations, the main focus of the analysis sub-phase is to know the business requirements for SOA adoption and how SOA fits inside the organization. In a while iterations, this thoughtful needs to be review as the business drivers and perspective change. Other focus domains in this phase are business process appreciative: This includes the connection to business needs and the identification of points of computerization that would advantage the most from SOA adoption (no need to reproduce things that are done well physically). Initial identification of risks and opportunity examination of the competition in the business processes recognized for the iteration identification of goals for the iteration.

Planning Phase (P2)

The focal point of the Planning phase is to originate the plan to achieve the goals for the present iteration. Outcomes of this phase are real plans for the certain strategy requirements specifications, workforce allotment of technology selection communications setup, tool selection and setup definition of SOA authority elements, including policies, metrics, etc.

Construction Phase (P3)

The focus of the Construction phase is the functioning of the service-oriented systems components distinct in the plan. The SOA infrastructure is set up to hold new requirements as outlined in the strategy and plans. Provisioning approaches for services could be to construct, buy, and rent/payper-use, reprocess, or wrap legacy systems. If within scope, service clients such as applications, portals, or internal/external systems would have to be custom-made to make use of the infrastructure and existing services.

Transition Phase (P4)

The focus of the Transition phase is the integration of service-oriented system apparatus that have been developed into the existing infrastructure and focus domains are research, control elements of the system organization infrastructure.

Production Phase (P5)

The focus of the manufacture phase is system process and administration. Other areas are mainly of dimensions that as defined by the provision plans, system modification to meet up defined metric objective and service stage agreements supervision of difficult information start for the next loop.

2.2.3 Performance

For the period of the above phases, actions are approved out to achieve the goals used for the iteration, as shown in Table 1. Numerous of the activities will be accepted out in quite a lot of phases. In all-purpose the advanced level activities support the before phases of the existence cycle.

Business Context Understanding (A1)

The objective of this action is to appreciate the situation in which the production operates. Internal business processes are acknowledged and analyzed against production goals, the promote, and trends. Detailed tasks include Business Process Management (BPM) presentation market research business intelligence and information gathering trend analysis identification of key performance indicators (KPIs) for the commercial domain

Business Objectives Specification (A2).

The objective of this action is to make official business objectives and survey of the impact of SOA approval on the achievement of these goals. Specific tasks include recognition of business goals identification of SOA implementation driver's evaluation of SOA approved goals against business objectives assortment of suitable KPIs and evaluation metrics to conclude the level of attainment of business goals.

Risk Analysis and Initial Requirements Gathering (A3)

The objective of this action is to operate risk analysis and to begin get-together the needs for the iteration. Usual risk analysis techniques apply to this location: identification of threats, identification of impacts of each risk, assignment of probabilities and related cost, and cost analysis. Multiple expert and vendor firms have written about top risks, reasons for failure, or pitfalls of SOA approval, based on their knowledge. While a lot of the risks and problems that apply to systems development projects in general, there are some that are specific to, or exasperated in, SOA environments.

Prototyping and Requirements Tuning (A4)

The objective of this activity is to fine-tune and prioritize needs based on prototyping grades as well as to merge multiple stakeholder perspectives. Rapid prototyping for appropriate technology estimation is a key element of service-oriented systems growth because of the up-and-coming features of technologies that support SOA execution. Prototyping results will also serve to check whether iteration requirements are practical and additional funds in infrastructure are requisite.

Even though needs tuning is easy as well, there are characteristic linked to various stakeholders that can make it more complicated, such as contradictory requests between multiple industry processes that used the same services, conflicting requirements between direct clients of a bequest system and clients of the services showing by the legacy system and conflicting quality of service (QoS) requirements.

Design and Implementation (A5)

The objective of this action is to plan and put into practice the elements of the service-oriented system that are sketch in the iteration plan: services, service clients, and communications. Method from any iterative and incremental software growth method goes after by the organization, such as RUP, XP, or SCRUM5 should work in this environment.

Integration and Testing (A6)

The objective of this activity is to integrate all industrial components and to test the classification end-to end. A chief need for accomplishing this goal is to get used to the existing infrastructure for join-together. 5. SCRUM is set of rule, derived from Agile methods, which aspire to correct common failures in the distinctive development method.

Deployment (A7)

The objective of this activity is to formulate the system available for use. During operation, system limitation requires to be polish up to optimize KPIs. Also, the system supervision infrastructure is set up to collect capacity to support defined metrics, service-level agreement (SLA) stricture, monitoring, logging, and runtime adaptation.

Maintenance (A8)

Maintenance of the service-oriented system and of the SOA- maintains business procedures make up this activity. In each of these safeguarding areas, there will be regularly requests such as modify in report formats, increase in presentation, or bug fixes. But, there could also be major requests that could trigger iteration, such as a new service or a major change in a business process.

Management (A9)

The goal of this activity is system management—that is, to make sure that the system functions according to hopes. Throughout this activity, KPIs are monitored and measurements are gathered based on metrics and limits are set up during the Deployment activity. This activity could trigger upkeep requests that result in a new iteration (e.g., system not performing to prospects, security problems, and the like).

2.3 Classification of SOA Research

The improvement of a service-oriented system needs business, engineering, and operations decisions to be made, as well as further cross-cutting decisions. The taxonomy for the agenda, shown in Figure 3, orders research focuses into these conclusion areas. The study topics agree to areas where new, different, or supplementary research is needed to support a strategic approach to ser. 6 As mentioned in Section 1, these are known as superiority attributes. 7 The original term taxonomy refers to sorting of biological organisms. However, the term is now commonly used much more broadly to refer to classifications of themes or topics with a vital structure. This is how we use the term here: to position SOA research topics into categories vice-oriented systems development. The proof of identity of topics supports the goal for the SOA Research Agenda of proposing topics for manufacturing or academic research that can make a difference for strategic SOA adoption.

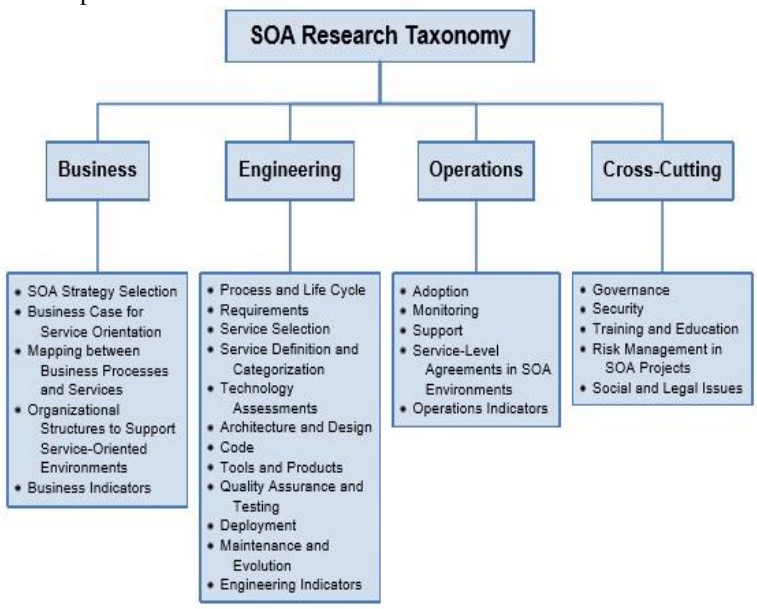

Figure 3: SOA Research Taxonomy

This section classifies the determination of each conclusion area of the taxonomy. In the following debate, we describe the conclusion area, list the major sets under each one, and show a select amount of specific exploration topics.

III. INVESTIGATION TOPICS IN LOOKING AFTER AND DEVELOPMENT OF SERVICE ORIENTED SYSTEMS

Agreed that SOA acceptance is fairly recent, much of the current study has focused on the earlier phases of the life cycle. However, as service-oriented structures are deployed, major concern shifts to their preservation and evolution. To show tasters of how the SOA Research Agenda is used, this section affords more detail on carefully chosen topics in preservation and development.

Service-oriented organizations are significantly different from out-dated systems, subsequent in new research issues that need to be addressed. These differences include (1) the mixture of service consumers and service providers, (2) shorter release cycles because of the ability of rapidly adapting to changing commercial needs, and (3) the potential to leverage

legacy funds with potentially minimal change to current systems. An important question is, therefore, what does preservation and development look like in this dynamic, heterogeneous, and potentially distributed growth and maintenance location? We have identified a set of research topics that we believe would help to find answers to this query. The references listed under current efforts are illustrations of work being done in each area.

IV. CLOSES AND FUTURE WORK

Many distributed articles and case studies have focused mostly on SOA executions within enterprise IT systems, in which applications interact with standard web service station in a traditional request-response arrangement, predominantly to contact data that resides in legacy systems [such as Cetin 2007, Chawla 2007, Kajko-Mattsson 2008, Sneed 2007].

As the use of third-party service area becomes the new business model, there needs to be maintenance for SLAs, runtime one-to-one care, end-to-end testing involving third parties, pricing models for thirdparty services, and service usability from a design and an adoption standpoint. In addition, nonvendor studies and trials are needed to produce concrete guidance, rather than other basic research. Some examples of these areas are SOA governance, business situation for SOA adoption, ROI for SOA adoption, and growth processes and practices for service-oriented systems improvement.

Also, if SOA is to be used in advanced ways, important research topics need to be addressed in areas as design for context awareness, service usability, federation, computerized governance and runtime one-to-one care and adaptation, dynamic service discovery and configuration, real-time applications, and multi-organizational putting into practice.

In addition, we found several matters, such as use of semantics for provision discovery and composition, in which there are significant efforts in the research unrestricted, but no support from industry to test thoughts. There needs to be more collaborative research between industry and academia to create real put into practise.

For the preservation and progression of service-oriented systems, our research agenda shows that in the short term, preservation and evolution practices will have to adapt to support this active and changing environment, taking into thought the emergence of third-party services over which there is less regulator and visibility. Tools and methods to support preservation and growth activities in these environments, reengineered procedures that combine business as well as technical aspects, and capabilities for multi-language analysis are a good starting point.

The exploration programme has so far been used primarily to monitor the study community on the up-to-date status of the state of the art, gaps in existing work, and prospective areas of needed study. It also offers an irritating potential set of focus for governments, organizations, and standards organizations in attentive the state of the art and locale their research priorities.

The resulting stages for this development are the journal of the details of other subjects in the SOA Study Agenda. In addition, the Study Agenda will continue to develop to account for new study as well as for emerging challenges as SOA continues to push further than its original asynchronous document-based communication exchanges.

REFERENCES

[1] [Apache 2009] The Apache Software Foundation.Apache Axis 2. http://ws.apache.org/axis2/ (2009)

[2] [Arsanjani 2008] Arsanjani, A., Ghosh, S., Allam, A., Abdollah, T., Ganapathy, S., & Holley, K. "SOMA: A Method for Developing Service-Oriented Solutions." IBM Systems Journal 47, 3 (2008): 377.

[3] [Bass 2008] Bass, Len, de Niz, Dionisio, Hansson Jőrgen, Hudak, John J., Feiler, Peter H., Firesmith, Donald, Klein, Mark H., Kontogiannis, Kostas, Lewis, Grace, Litoiu, Marin, Schuster, Stefan, Sha, Lui R., Smith, Dennis B., &Wallnau, Kurt C. Results of SEI Independent Research and Development Projects FY 2007 (CMU/SEI-2008-TR-017). Software Engineering Institute, Carnegie Mellon University, July 2008. http://www.sei.cmu.edu/library/abstracts/reports/08tr017.cfm.

[4] [Berry 2009] Berry, Dave. Avoid Disaster, Embrace People-Processes Like Change Management. http://blogs.oracle.com/governance/2009/06/avoid_disaster_embrace_peoplep_1.html (June 2009)

[5] [Brown 2004] Brown, Kyle. & Ellis, Michael. "Best Practices for Web Services Versioning: Keep your Web Services Current with WSDL and UDDI." IBM developerWorks (January 2004). http://www128.ibm.com/developerworks/webservices/library/ws-version/

[6] [Canfora 2008] Canfora Gerardo, Fasolino Anna Rita, Frattolillo Gianni, &Tramontana, Porfirio. "A Wrapping Approach for Migrating Legacy System Interactive Functionalities to Service Oriented Architectures." Journal of Systems and Software 81, 4 (April 2008): 463-480.

[7] [Carrière 1998] Carrière, Jeromy, Kazman, Rick, & Woods, Steve."Requirements for Integrating Software Architecture and Reengineering Models: CORUM II," 154-163.Proceedings of the Working Conference on Reverse Engineering (WCRE'98). Honolulu, HI, USA, October 12-14, 1998.

