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## SERVICE ORIENTATION AND THE SYSTEMS ANALYSIS AND DESIGN COURSE: IS CURRENT STATE OF PRACTICE STATE-OF-THE-ART?

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### Extended Abstract:

**Keywords:** service orientation, systems analysis and design, curriculum

### I. INTRODUCTION

The *IS 2009 Curriculum Guidelines for Undergraduate Programs in Information Systems*, a report generated by the Association for Computing Machinery (ACM) and the Association for Information Systems (AIS), highlights the emergence of a new architectural paradigm. In the report it states, "Service-oriented architecture, web services, software-as-a-service, and cloud computing are all important elements in the new way of organizing the fundamental architecture for computer-based systems and solutions that is gradually becoming the dominant paradigm of organizational computing" [Topi et al., 2009 p. 6]. As services become a predominant platform for crafting modern enterprise applications, systems analysis and design methods must incorporate additional elements to ensure good service-oriented development outcomes [Zimmermann et al., 2004]

The Systems Analysis and Design (SAD) course can play an important role in preparing students for the service-oriented environments they are likely to encounter. While currently there are no widely accepted service-oriented analysis and design methods, additional elements needed to supplement well-established systems analysis and design practices have been identified. Therefore, state-of-the-art practice in SAD courses would include these supplemental service-oriented analysis and design elements. Updating a SAD course in this manner, however, may not be readily accomplished. Faculty teaching SAD must first recognize the need to update the course with service-oriented analysis and design elements. Given the competing demands for faculty time and attention, SAD faculty may not yet recognize a need for this update. Additionally, when faculty do recognize the need to update SAD courses with service-oriented elements, it may not be clear what elements should be incorporated. This study addresses three related research questions. First, what content is taught in SAD business school courses? Second, does this content address service-oriented analysis and design elements? And, third, what mechanisms are used to gain input or receive feedback from industry practitioners regarding SAD course content?

The results of this study are important, as higher education institutions have often fallen short in preparing students for the skills most needed in the IT workplace [Hoppe, 2007; Trauth et al., 1993]. Faculty can benchmark their own SAD courses and gain insights into what service-oriented elements might be incorporated. Industry practitioners can gain insights into how they might interact with SAD faculty to exchange information regarding the service-oriented analysis and design skills needed in today's workplace. And researchers can gain insights into future directions for service-oriented research in the information systems education domain. The

remaining sections of this extended abstract address the following: the SAD course, service-oriented analysis and design elements, and an overview of the planned research methodology.

## II. THE SAD COURSE

SAD has been referenced as the defining course in an IS curriculum [Surendra and Denton, 2009], with 94% of IS programs offering it [Kung et al., 2006]. As the types of systems deployed in organizations has become more varied and complex, systems analysis and design has also become more complex with a wide array of approaches, methods, and techniques that may be covered. As a result, SAD courses can vary in their content depending upon the number of SAD courses included in a program, local/regional business needs, and the curriculum decisions of SAD faculty [Batra and Satzinger, 2006]. However, at its core, the SAD course prepares students to analyze and document business requirements, and convert those requirements into detailed system requirements and high-level design specifications [Topi et al., 2009].

## III. SERVICE-ORIENTED ANALYSIS AND DESIGN ELEMENTS

Information systems based on service-oriented architectural platforms provide enterprise business solutions that can be extended or reconfigured on demand. As a result, these systems are flexible and adaptable, allowing for quicker response to changes in business environments and needs. Gartner [2009] anticipates systems enabled by service-oriented architectural platforms are “inevitable for most organizations.” This new architectural paradigm is important for information systems students to understand, particularly in the systems analysis and design context.

Service-oriented analysis and design (SOAD) involves the analysis and design of business processes and the corresponding software applications that support them, in a tightly aligned fashion. SOAD requires the decomposition of business processes into tasks or business services that can be reconfigured into various choreographed processes over time. In a similar manner, software applications are configured by choreographing the series of software services that implement the corresponding business services in a process. This allows an organization to quickly change its business processes to meet changing environmental or strategy-driven needs. It also enables flexible and highly adaptive business applications through the development, reconfiguration, and reuse of software services over time.

After years of experience engaging in service-oriented analysis and design practice, Zimmermann et al. (2004) determined a need to augment traditional SAD methods. They note that elements of object-oriented analysis and design, enterprise architecture frameworks, and business process modeling are required in service-oriented analysis and design practice. However additional elements are also needed, such as services identification and definition, service categorization and aggregation, policies and aspects, meet-in-the-middle processes, semantic brokering, and service harvesting and knowledge brokering. To the extent that SAD courses incorporate this content, students are likely to have the skills required for service-oriented analysis and design work, as well as better understand the need for tight IT and business alignment in today's complex, fast-changing business environment.

## IV. OVERVIEW OF THE PLANNED METHODOLOGY

Our primary research questions address 1) what content is taught in business school SAD courses, 2) does the content address service-oriented analysis and design elements, and 3) what mechanisms are used to gain input or receive feedback from industry practitioners regarding SAD course content. Clearly, it is not possible to fully understand the extent to which CIS/MIS programs have included service-oriented content by solely examining their SAD course content. However, as SAD is a key course in CIS/MIS programs [Surendra and Denton, 2009], it is expected that programs addressing the service-oriented paradigm shift will include at least some service-oriented elements in their SAD course.

We plan to survey business school faculty about the content of their SAD courses and input/feedback mechanisms they use with industry practitioners to exchange information about SAD-related course content. To control for the variety of information systems programs (e.g., majors, minors, concentrations, etc.) that exist, only faculty at the 280 AACSB-accredited business schools listed by the AACSB as having CIS/MIS degree programs will be included in the sample. One point of contact, usually the department chair or lead of the unit offering the CIS/MIS program, has been identified at each business school. The survey invitation asks the point of contact to complete the survey if knowledgeable of the course content taught in their program's SAD-related course(s) or forward the survey to a single faculty member with responsibility for the SAD course(s).

Development of the survey has involved identifying topics covered in popular SAD textbooks and the SAD literature [e.g. Lang and Fitzgerald, 2006], incorporating the service-oriented analysis and design elements highlighted in Zimmermann et. al. [2004], and identifying faculty-industry information exchange mechanisms (see Appendix for survey instrument draft). After piloting our survey, we plan to distribute the survey and collect the data online.

Data analysis will consist of the use of three methods: descriptive statistics, cluster analysis and analysis of variance (ANOVA). The descriptive analysis was selected to illustrate the overall general findings of the data. Cluster analysis was selected in order to help identify sub groupings within the data in an effort to better understand relationships and profiles of behavior relating to SAD curriculum development. Batra and Satzinger [2006] note at least five different approaches can be taken when determining the content of SAD courses; however the authors base these approaches on the inclusion of object-oriented techniques and agile and iterative methodologies. The purpose of the cluster analysis is to see whether patterns in service-oriented analysis and design course content emerge. ANOVA was chosen in order to investigate the data by region. SAD course content may reflect regional needs [Batra and Satzinger, 2006]; therefore, we will investigate whether different regions in the United States have different patterns of SAD course content with regard to service-oriented analysis and design elements.

## REFERENCES

*Editor's Note:* The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
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## **APPENDIX : SYSTEMS ANALYSIS AND DESIGN COURSE CONTENT SURVEY**

### **Methodology (check all that apply)**

Not Covered, Covered in Required Course, Covered in Elective Course, Key Concept/Learning Objective

- Systems Development Lifecycle
- Rapid application Development
- Joint Application Development
- Object-Oriented Methodology
- Business Process Reengineering
- Agile Methodology
- Feature Oriented Domain Analysis
- Other (please specify)

### **Architecture (check all that apply)**

Not Covered, Covered in Required Course, Covered in Elective Course, Key Concept/Learning Objective

- General Concepts (e.g., encapsulation, hierarchy, modularity, coupling)
- The Open Group Architecture Framework
- Zachman Framework
- Service Oriented Architecture
- Other (please specify)

### **The Analysis and Design of... (check all that apply)**

Not Covered, Covered in Required Course, Covered in Elective Course, Key Concept/Learning Objective

- Business Processes
- Application Code
- Databases
- Data Dictionaries
- Forms and Reports

- User Interfaces and/or Dialogues
- Distributed and/or Internet Systems
- Use Cases
- Business Services
- Application/Software Services
- Outsourcing/Offshoring Contracts
- Software as a Service
- Web Services
- Purchased Systems (e.g., ERP, CRM, SCM)
- Outsourced Design and Development Resources

**Modeling Techniques/Languages (check all that apply)**

Not Covered, Covered in Required Course, Covered in Elective Course, Key Concept/Learning Objective

- Business Process Modeling
- Entity Relationship Diagrams
- Data Flow Diagrams
- Component-based Modeling
- Unified Modeling Language
- Business Service Modeling
- Application/Software Service Modeling
- Business Process Execution Language for Web Services (BPEL)
- State/Statechart Diagrams
- Analysis Class Diagrams
- Sequence Diagrams
- Activity Diagrams
- Use Case Diagrams
- Decision Trees/Tables
- Structure Charts
- Object-Relational Data Models
- Communication Diagrams
- Business Rule Diagrams
- Event-Driven Process Chain Modeling
- Storyboards
- Other (please specify)

**Project Management (check all that apply)**

Not Covered, Covered in Required Course, Covered in Elective Course, Key Concept/Learning Objective

- General Concepts (e.g., project lifecycle, RFP, feasibility, risk)
- PMI Body of Knowledge
- Gantt Charts
- PERT Charts
- Network/Critical Path Diagrams
- Service Level Agreements
- Team Skills and Roles
- Other (please specify)

**Tools (check all that apply)**

Not Covered, Covered in Required Course, Covered in Elective Course, Key Concept/Learning Objective

- CASE
- Business Process Modeling Tool
- MS Visio or similar
- MS Project or similar
- MS Access or similar

- Oracle DBMS or similar
- SAP or similar
- Other (please specify)

**Hands-On Skill Building (check all that apply)**

Not Covered, Covered in Required Course, Covered in Elective Course, Key Concept/Learning Objective

- Prototype Development
- Full System Build
- Real-world User/Client Interaction
- Other (please specify)

**What mechanisms, if any, are used to gain input or receive feedback from industry practitioners regarding SAD-related source content? (check all that apply)**

- Conferences/Meetings with Industry Practitioners
- Student Internships/Mentorships with Industry Practitioner Performance Feedback
- Faculty Internships/Mentorships with Industry Practitioners
- Student Projects with Industry Facilitated by Faculty
- Advisory Board with Industry Practitioner Membership
- Executive-in-Residence
- Faculty SAD-related Research
- Not Applicable
- Other (please specify)

**Please indicate where your program is located (check all that apply)**

- Northeast U.S.
- Southeast U.S.
- Central U.S.
- Midwest U.S.
- West U.S.

**Please indicate what position you hold (check all that apply)**

- Faculty Teaching SAD Course(s)
- Faculty NOT Teaching SAD Course(s)
- Chair/Lead of Unit Offering SAD Course(s)
- None of the Above