

SIGABIS Exchanges,

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Special Interest Group on
Agent-based Information Systems (SIGABIS)

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SIGABIS
www.agentbasedis.org

History

This SIG was founded by Chris Schlueter Langdon and Riyaz Sikora and is one of the first six officially sanctioned groups announced in ISWORLD in July 2001.

Chairs and Founders

Prof. Chris Schlueter Langdon
(CTM/USC)

Prof. Riyaz Sikora
(University of Texas at Arlington)

Board of Advisors

Prof. John H. Holland, Honorary Member
(U of Michigan, Santa Fe Institute, World Economic Forum)

Prof. Steven O. Kimbrough
(The Wharton School, University of Pennsylvania)

Prof. Dan O'Leary
(USC Marshall School of Business)

Prof. Mike J. Shaw
(University of Illinois at Urbana-Champaign)

SIGABIS: An Introduction

History

The Special Interest Group on Agent-Based Information Systems (SIGABIS) is affiliated with the Association for Information Systems (AIS), the premier global organization for academics specializing in Information Systems. Our Web site went live in 2002, and 2003 was our first year of operations.

Purpose

The **agent metaphor** has become popular in mainstream computing and business

schools largely due to its suitability for the study of distributed systems, such as the Internet and the Web.

We expect to see the emergence of new **distribution channel structures** and **customer interfaces** (e.g., 1-to-1 customization, recommendation 'engines'), **supply chain topologies** (e.g., virtual business networks), and **market-making mechanisms** that use new kinds of intelligent, distributed computational processes in the form of agents.

Mission

SIGABIS is a forum to bring together like-minded researchers and practitioners to:

- Collaborate in rigorously building agent-based computational theory and practice.
- Promote the advantages of agent-based computational modeling.
- Advance scientific research in areas that can benefit from agent-based techniques. (csl)

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John Holland Joins SIGABIS

We are honored that John accepted the invitation to join our Board.

John is known as the "father of genetic algorithms." He is a Professor of Psychology, Electrical Engineering and Computer Science at the U of Michigan, a Santa Fe Institute Board member, a recipient of the MacArthur ("genius") fellowship and a fellow of the World Economic Forum.

He has, single-handedly, created much of the foundation that we rely on for rigorous research in our focal area, particularly his pioneering

work on complex-adaptive systems (CAS).

John's expertise as a psychologist will be especially valuable, as agent-based IS have expanded beyond supply chains to decipher emergent consumer behavior and purchase patterns. (csl)

Upcoming: Track

at **WeB 04**, the third, pre-ICIS Workshop on E-Business 2004, Dec. 11-12, Washington, D.C.

4 papers have been invited for presentation and publication in *Proceedings of WeB 04*. The acceptance rate was 50%. (csl)

Calls for Papers + Work in Progress + Upcoming Events

Call for Papers: Track at AMCIS Americas Conference on IS 2005, August 11-15, Omaha, NE.

Track: **Agent-based IS**

Mini-track: **Intelligent Agents and Multi-Agent Systems**

Co-Chairs: Vijayan Sugumaran, Oakland University, and Stefan Kirm, University of Stuttgart/Hohenheim. (csl)



The Association for Information Systems (AIS) is "the premier global organization for academics specializing in Information Systems" (www.aisnet.org).

Agency theory analyzes the costs of resolving 2 types of conflicts that can arise between principals and agents under conditions of incomplete information and uncertainty: (1) **Adverse selection** is the condition under which the principal cannot ascertain if the agent accurately represents his ability to do the work for which he is being paid. (2) **Moral hazard** is the condition under which the principal cannot be sure if the agent has put forth maximal effort (Eisenhardt 1989).

RA1 follows the tradition of laboratory experiments as a tool in **empirical economic analysis** established by Smith. He pioneered tests of predictions from economic theory by way of laboratory experiments (Smith 1962; overview in Kagel and Roth 1995).

Smith "initiated the use of the laboratory as a **wind tunnel**" in order to study the performance of proposed institutional mechanisms for deregulation, privatization, and the provision of public goods" (The Royal Swedish Academy of Sciences 2002, 9).

RA3: "A Web service is viewed as an abstract notion that must be implemented by a concrete agent. The agent is the concrete entity (a piece of software) that sends and receives messages, while the service is the abstract set of functionality that is provided" (W3C 2003, 7).

SIGABIS Focus

Our group is strictly focused on agent-based information systems. It is therefore important to explain how we define this and the scope of our SIG.

What is an IS?

In line with the research literature, we define an IS as a group of information technology (IT) components serving a common purpose, which is to automate a particular set of business activities (S. Langdon 2003, Bakos 1985; Dewett and Jones 2001, 317-320).

What is an "agent?"

According to the Merriam Webster Collegiate Dictionary 2002 the origin of the term "agent" dates back to 15th century. The term can be defined as "one that acts or exerts power" or "a means or instrument by which a guiding intelligence achieves a result". We follow Holland, an artificial intelligence scholar and genetic algorithms pioneer, in our conceptualization of an agent in IS. In his research on complex adaptive systems--nonlinear systems defined by the interactions of large numbers of adaptive agents--

Holland borrowed the term "agents" from economics "to refer to active elements without invoking specific contexts" (1995, 6-7).

The field of economics that Holland was referring to is **Agency Theory**, which explains how to best organize the relationship between one party--the **principal**--who determines the work, and another party--the **agent**--who undertakes the work (Ross 1973; Grossman and Hart 1983; and for a survey, see Sappington 1991). (csl)

Research Area Strategy: Promoting Depth and Breadth

SIGABIS promotes rigorous research and, therefore, emphasizes depth by hosting highly focused **Research Areas (RAs)**. The breadth of agent-based IS knowledge grows with every new research area that is added to the SIG. Each RA is edited by an expert in this field, the Area Editor (AE). In 2003, our first year

of operation, we have launched our first three RAs:

RA1: Study of Emergent Behavior and Strategic Simulation using Complex Adaptive Systems (CAS).

RA2: Agent Learning.

RA3: Distributed Systems Architectures and Web Services—

How innovation with IT (Technology components: protocols, etc.) affects IS (Systems: e-delivery, etc.) capabilities.

We need your involvement: Please don't hesitate to contact us if you are interested in running a RA or if you like to write a piece or research note in SIGABIS Exchanges! (csl)

Special Issue of *JISeB* on Agent-based IS (by Riyaz Sikora)



The first special issue to be sponsored by AIS SIGABIS is being finalized for publication in the *Journal of Information Systems and e-Business Management*, a Springer Science journal. We have been overwhelmed by the strong response to our CFP. Many thanks to you and the reviewers! A total of 16 submissions were received, out of which only three papers were finally accepted for publication, an acceptance rate of less than 20%. Two papers, which had already been selected for presentation and fast-tracking at the Third Workshop on E-Business at ICIS 2003 were also invited, reviewed and revised for publication:

1. Agent-based Workflow Management Systems. The paper pre-

sents a flexible agent-based architecture of a workflow management system.

2. Computational Experimentations in Market and Supply-chain Co-design: A Mixed Agent Approach. This paper presents an architecture of SEAS, a computational experimentation system that can mimic real life economies. The authors create a synthetic economy containing a mix of human and artificial agents to extensively study the computational model of human decision-making in B2B e-commerce.

3. Modeling Online Service Discontinuation with Nonparametric Agents. This paper presents a multi-agent system to capture ISP subscriber information in order to automatically predict when a customer is dissatisfied and,

therefore, likely to discontinue the service.

4. Conceptualizing Coordination and Competition in Supply Chains as Complex Adaptive System. This article presents a model to explore the dynamics of outsourcing strategies and specialization effects. It extends the transaction cost based economic analysis by proposing a research model that explicitly recognizes industry-level feedback.

5. Supporting Mass Customization with Agent-Based Coordination. This paper presents a multi-agent system architecture for supporting mass customization. It presents a three-tier model of coordination and utilizes partial global plans for addressing the coordination problems. (rs)

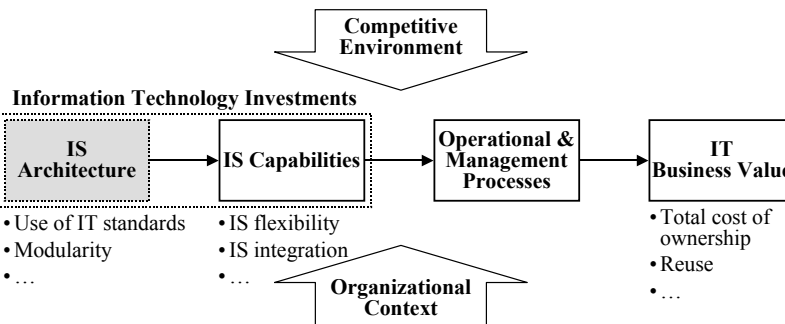
RA3 Update: IS Architecture as Intersection of Strategy and the IT Function

The information technology (IT) function is confronted with the consequences of three trends that overlap and interact: First, information systems (IS) are quickly emerging as the “factory” in many industries. Examples include Apple’s iTunes online music store. Second, software and certain IS capabilities, such as IP (Internet Protocol) mobility are increasingly delivered as a service, which may be outsourced and offshored. Third, IT innovation, such as Web services technology complicates choices. Web services are widely expected to significantly extend the Web’s capabilities and its organizational and strategic impact. While Internet technology has made inter-connectivity easier, Web services technology could greatly improve the inter-operability of distributed systems, allowing for machine-to-machine communication and—from a business perspective—the wholesale automation of service operations and delivery. In order to handle these challenges many opinion leaders and IT executives, such as John Chambers, CEO of Cisco, stress

the importance of a new paradigm (e.g., keynote speech, CTIA 2004). The future of IT strategy and management is less a piecemeal affair, but one that is more unified or architecture-centric. The IS architecture is increasingly where business strategy intersects with the IT function. An IS architecture can

provide a map and guidelines for translating business strategy into a plan for the IT infrastructure. In some industries, such as computers and consumer electronics, competition is increasingly architecture based. For example, battle lines in the computer industry have evolved along so called Application Programming Interfaces (APIs), more or less standardized connectors between software ap-

lications. Despite the acknowledged importance of an IS architecture, the concept has so far remained elusive, partly because **architectures have emerged ex-post or more or less accidentally as the result of decades of proliferation of IT investments.** Today, an IS architecture requires ex-ante guidelines of how to design an IS. This includes entity relationship data modeling and input-output process modeling, complete with computer-aided software engineering tool support. However, a similarly disciplined and rigorous approach to architecture design is missing; this includes the computer science literature on software architectures. As a first step we propose extending the traditional IS impact model to recognize architecture as a separate research construct in IS.



Select presentation slides are available for download at: www.agentbasedis.org (RA3).

Acknowledgments

The study has benefited from discussions with many CIOs and IT executives. The author would like to thank Steffen Neumann (DaimlerChrysler R&D), Kim Spenchian (MGM), John Stubbs (Sony), Ed Trainor (Paramount) and participants of the CIO Breakfast in Los Angeles.

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Research Note: Understanding “Loops” or Feedback using Agents (by Chris Langdon)

Many of us have taught MBAs and executives and heard about a type of business problem that sounds simple but has largely eluded rigorous analysis: **A strategy that makes perfect sense and is executed flawlessly goes terribly wrong.** For example, companies often increase advertising spending to boost sales to create a profit. However, if all competitors do the same, the strategy will fail. Instead of higher profits, the outcome will likely be higher cost and lower margins for everyone. Researchers refer to this as industry-level feedback. Strategies that make perfect sense at the company or individual level can aggregate up to industry-level conditions, which can have the

adverse effect and for all incumbents. Feedback can even escalate into entirely new challenges and for the entire industry. The auto industry provides ample evidence. Currently, automakers are eagerly entering every niche. While it makes perfect sense from the perspective of an individual firm to enter related and profitable new market segments, at the aggregate, the industry level, there will be two likely negative consequences: First, overcapacity leading to price competition and, second, restructuring of the entire industry. While overcapacity and price competition are immediately visible, such as in discount battles, restructuring is the result of a long

chain of events and consequences: As a result of the initial business expansion, executives are inevitably confronted with more complex ‘make or buy’ decisions. New market segments typically mean more products, which translates into more parts. The challenge with more parts is for companies to decide what parts to make themselves or buy from others. While individual-level ‘make or buy’ decisions are very complicated and specific to local circumstances, the outcome at the aggregate level is surprisingly clear: overall, companies tend to outsource, becoming more vertically specialized. Specialization, in turn, triggers another competitive effect: lower

entry barriers. For example, until recently, Detroit’s big three automakers owned the SUV segment, which was also their most profitable, according to industry analysts. However, increased industry-level specialization has significantly reduced entry barriers. Many companies use the same vendors for the same type of component, which makes it easier for others to enter. Some even team up to use the same parts. For example, Porsche teamed with Volkswagen to build its Cayenne as a ‘sister’ car to VW’s Touareg, a move that added two more and new competitors to this segment. If the SUV market growth stalls then all

(Continued on page 4)

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this new competition will surely reduce profitability.

Agent-based modeling and simulation experiments provide a research strategy to investigate such feedback loops with utmost scientific rigor. First, problems can be conceptualized as complex adaptive systems (CAS) following generally accepted design principles (e.g., Holland 1995),

which improves external validity. Second, CAS can be properly implemented to allow for reliable computational experiments, because modern agent-based IS allow, for example, for inheritance and encapsulation, which aid the development of implementations with greater flexibility for aggregation and adaptation and change. (csl)

SIGABIS @ AMCIS 04, New York, NY

ABIS 1: INTERFACE AND LEARNING AGENTS

Chair: Victoria Yoon, UMBC

"Learning Agents For Dynamic Supply Network Management,"

Gavin R. Finnie, Bond University, Jeff Barker, Bond University

"An Exploratory Investigation of the Self Serving Biases of Interface Agent Users," Alexander Serenko, Mihail Cocosila, all DeGroot School of Business, McMaster University

"Natural Language Interface for a Multi Agent System," Victoria Yoon, UMBC, Bonnie Rubenstein Montano, Georgetown University, Teresa Wilson, UMBC, Stuart Lowry, Science Applications Int. Corp.

ABIS 2: AGENT-BASED APPLICATION DEVELOPMENT

Chair: Vijayan Sugumaran, Oakland University

"The ADAPT Toolkit-Supported Engineering Process For Agent Based Applications," Rainer Herrler, University of Würzburg, Christian Heine, University of Hohenheim

"Agent Enabled Composition Of Services Bundles For M-Commerce Applications," Thomas Leary, Al Salam, Rahul Singh, all University of North Carolina

"Development of a Web Service Agent-based Family Wealth Management System," Shijia Gao, Dongming Xu, Yingfeng Wang, Huaqing Wang, all City University of Hong Kong

ABIS 3: PRIVACY, TRUST, SIMULATION, AND AGENTS

Chair: Dawn Jutla, St. Mary's University

"Privacy Agents and Ontology for the Semantic Web," Dawn N. Jutla, Saint Mary's University, Liming Xu, Dalhousie University

"A Conceptual Trust Framework for Semantic Web Agents," Todd Kowalczyk, The Hartford, Gregory W. Hislop, Drexel University, Heidi J. C. Ellis, Rensselaer at Hartford

"Agent Based Modeling and Simulation of Causal Maps," Douglas A. Druckenmiller, William Acar, Marvin Troutt, all Kent State U

ABIS 4: AGENT-BASED ONLINE AUCTION AND NEGOTIATION

Chair: YongSeog Kim, U of Iowa

"Bidding Agents in Online Auctions: What are they doing for the principal?," Gilbert G. Karuga, University of Kansas, Sasidhar Maganti, University of Kansas

"Bilateral Price Negotiations by Software Agents - A Model for Measuring Marketplace-Related Negotiation Behavior," Stefan Sackmann, University of Freiburg, Germany

"An Optimal Auction Infrastructure Design: An Agent-based Simulation Approach," Yongseog Kim, Utah State University

SIGABIS @ WeB 04, Washington, D.C.

Session 1b, 9:45AM-11AM, Grand Hyatt Hotel, Room Arlington

"The Enhancement of Solving the Distributed Constraint Satisfaction Problem for Cooperative Supply Chains Using Multi-agent Systems," Fu-ren Lin, Hui-chun Kao

This paper proposes an agent-based distributed coordination mechanism that integrates negotiation using generic algorithms to reach quasi-optimal and executable order fulfillment schedules. The supply chain structure of a mold manufacturing industry serves as an example to evaluate the proposed mechanism. The performance is benchmarked against methods from the literature. Results indicate that the proposed distributed coordination mechanism is a feasible approach to solving order fulfillment scheduling conflicts in outsourcing situations.

"A Fuzzy Constraint-based Approach to Multilateral Negotiation in e-Business," K. Robert Lai, Menq-Wen Lin

This paper presents a general problem-solving framework for modeling multi-issue, multilateral negotiations using fuzzy constraints. Fuzzy constraints are used to naturally represent each agent's desires involving imprecision and human conceptualization, particularly when lexical imprecision and subjective matters are concerned. Our approach enables an agent to systematically relax fuzzy constraints. It also allows exploiting similarities in fuzziness in order to select alternatives that are more likely to be accepted by opponents, which helps both parties to advance towards a deal more quickly. An application to multilateral negotiation of a travel-planning problem is provided to demonstrate the usefulness and effectiveness of our framework.

"Location-Aware Intelligent Agent System for Publish/Subscribe Middleware in Mobile Environments," Amrish Vyas, Victoria Yoon

We propose adding a Location-Aware Intelligent Agent System (LIA) to publish/subscribe (Pub/Sub) middleware. We use intelligent agent technology to add "intelligence," mobility, and autonomy. The pub/sub paradigm is well-established for supporting many-to-many interactions of loosely-coupled entities. We discuss an application scenario.

"The Design Science of Agent-based Modeling and Simulation of Business Systems: Opportunities, Critical Issues," Chris S. Langdon

In the management sciences IS research has begun to advance knowledge in the use of agent-based systems as a means to seek different, computational explanations for business phenomena that have eluded scientific inquiry reliant on traditional, specifically, law and axiomatic explanation (Kimbrough 2003). While computer science related research has been focused on the artifact itself, research in the management sciences is explicitly focused on business issues. This perspective requires a modified research approach, which is discussed in the paper. (csl)

Impressum

SIGABIS Exchanges is the official newsletter of the Association for Information Systems (AIS) Special Interest Group on Agent-based Information Systems.

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