

SIGABIS Exchanges,

an official publication of the Association for Information Systems (AIS)
Special Interest Group on
Agent-based Information Systems (SIGABIS)

Volume 2, Issue 1

August 1st, 2004

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
(USC Marshall School of Business)

Prof. Riyaz Sikora
(University of Texas at Arlington)

Board of Advisors

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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Calls for Papers + Work in Progress + Upcoming Events

CFP: Mini-track

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

WeB 04 Theme: "Dynamic, Personalized and Service-Oriented E-Business"

Mini-track Theme: "Agent-based IS."

• Paper Submission: August 20

- Notification of Acceptance: September 30
- Final, camera-ready copy due: October 15

Before submitting please contact the track chairs and send your abstract. (csl)

WIP: Special Issue

of *Journal of Information Systems and e-Business Management* on Agent-based IS (JISeB, published by Springer).



Thank you for your overwhelming response, which caught us by surprise and caused a delay in the review process.

We have received **18** submissions for approximately **4** slots, which sets the acceptance rate at **22%**.

The review is in its final round and we are on track to deliver our issue for Q4. (csl)

Upcoming: Track

at **AMCIS Americas Conference on IS 2004**, August 5-8, New York City, NY.

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).

"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).

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).

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).

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 Edi-

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)

tor (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.

Please don't hesitate to contact us if you are interested in running a RA! (csl)

RA1: New Project P2—Competition & Industry Dynamics

IT innovation enables industry structure change, which, in turn, may require new business strategies. Examples include electronic markets, which increase price competition, and Web services, which can ease outsourcing, enabling specialization strategies. To explore, therefore, the dynamics of competition between integrated and specialized firms that compete in quantity (Cournot) and price (Bertrand), we have developed a two-tier, serial, symmetric supply chain model.

Economic theory suggests that specialization can be advantageous. Specialized firms enjoy, for example, lower production cost. However, they are also more reliant on market interac-

tion, which can increase transaction cost and expose them to the risk of market failure through, among other things, a lack of liquidity in input markets. These problems may be amplified when intense price competition forces exits from the market.

Many supply chain models ignore price competition by pointing to the Bertrand paradox. However, while companies may try their best to avoid competing on price, economic data suggests that they do not succeed all the time. The US producer-price index, for example, a measure of inflation at the wholesale level, fell a seasonally adjusted 1.9% in April 2003--the largest decline on record (Department of Labor

2003).

We have formalized competition between integrated and specialized firms as a complex adaptive system because it allows us to model industry structure and transaction cost as endogenous variables. The behavior of firms and their interaction is based on micro-economic cost theory and the theory of non-cooperative games. Experiments have been conducted using discrete event simulation. (Please see insert on page 3 for our first talk and paper on the subject.) (csl)

RA3: New Project P3—Standardization & Web Services

Web Services: Strategies for Dealing with Imperfect Standards

Editor: Sanjay Gosain, Robert H. Smith School of Business, U of Maryland

Research Objectives

A rapid rate of technical progress leaves formal standardization efforts slow to catch up, if the standards are formulated by relatively slow moving and deliberate standard-setting bodies. In the case of web services, the underlying technologies are relatively new and still evolving—with some apprehension that the technology evolution is still trying to catch up to the marketing hype. There is also a need to create consensus across multiple stakeholders among different organizations that are impacted by the standards. Also, a number of different standard-setting bodies (W3C, IETF, OASIS, WS-I etc.) are involved with developing standards for different areas that impact the design, development and deployment of web services. This variety has been due to the different functional scopes, different time frames, and different approaches to protection of intellectual capital, among others. While standard-setting organizations help to mediate between different interests and technologies to impose a standard they are often slow to react to change and,

in the absence of concrete implementations, may lack specification clarity.

While there is great potential for web services, the standards that they represent are still imperfect and will be likely to mature over time. Although many vendors have agreed on a core foundation for HTTP and XML-based Web services protocols and interfaces (e.g., SOAP, UDDI, and WSDL), this core set is only sufficient in trivial situations.

This study aims to provide insights for enterprises to deal with the lack of a complete set of standards at the higher layers of the protocol stack (e.g. security, choreography, provisioning etc.) as they build business applications that use existing web-services protocols.

Approach

This study draws on coordination theory to develop a conceptual framework outlining three approaches for organizations to deal with changing standardization regimes: (a) The dependencies across components, conforming to different standardization regimes, are continually bridged through intermediary services (e.g., using a protocol adapter that translates to an unanticipated emergent standard), (b) The dependencies across components are minimized through loose coupling so that standardization regime changes for any component

have a minimal impact on other components (e.g., encapsulating the functionality susceptible to design change into a module with abstract interfaces), and (c) The impacted components are rapidly reconfigurable as and when standardization regime changes (e.g., by building in "extension" features into applications). The risk for organizations investing in web services can be further managed by mechanisms such as organization's attention to signals from the periphery, undertaking low-risk experiments to learn in different areas, and bricolage-like improvisations of their legacy components.

Status

The first, theory development stage of the study has been completed. The empirical validation phase is now being launched. Please download a presentation (www.agentbasedis.org; RA3).



"Web Services: Strategies for Dealing with Imperfect Standards" (*MIS Quarterly* Standards Workshop, Seattle, WA, December 2003)

Acknowledgments

The study is supported by Digital Evolution and the Center for Telecom Mgmt., USC Marshall School of Business. (sg)

Research Note: Benefits of Strategic Simulation (by Chris Langdon)

Computational methods including agent-based simulation are next generation analytical tools that are quickly emerging to complement conventional, linear research instruments to aid analysis in areas that exhibit **complex, dynamic, non-linear, and emergent behavior**, such as business transformation, and ecosystem markets and competition.

The realities of digital business competition, its **discontinuities**

and **turbulences**, have revealed the limitations of traditional, linear tools, such as trend analysis or the calculation of equilibria. Linear tools have proven very useful for generalizing observations of linear phenomena into theory. However, the behavior of a whole system is often more than a simple sum of the behavior of its parts. When applied to nonlinear problems of e-business development and transformation,

traditional tools have produced approximations that failed to provide explanations, which has stimulated the development of next generation analytical tools, such as agent-based modeling and simulation.

The advantages of focused simulation experiments are numerous:

First, any analysis is not limited to a one-shot experiment, but

(Continued on page 4)

RA1: Emergent Behavior & Strategic Simulation

Project P2: Price Competition & Industry Dynamics

New talk and paper at the

Third
CMIE/CIBER Conference,
September 12-13, 2003

UCLA Anderson School of
Management, LA, CA



Conference Theme:
**Managing in the Global
Information Economy**

Conference Chairs:
Uday S. Karmarkar and Uday Apte

(<http://www.anderson.ucla.edu/research/cmie/conf2003/index.html>)

Dynamics of Competition in
Price and Quantity in Two-
Tier Serial Supply Chains:
An Exploratory Analysis
Using Agent-Based
Computational Methods

Chris Langdon (csl@ebizstrategy.org) and Riyaz Sikora (rsikora@uta.edu)

We have formalized Cournot and Bertrand competition between integrated and specialized firms as a complex adaptive system because it allows us to model industry structure and transaction cost as endogenous variables. The behavior of firms and their interaction is based on micro-economic cost theory and the theory of non-cooperative games. Experiments have been conducted using discrete event simulation. (csl)

(Continued from page 3)

allows for **multi-step games** to observe events as they unfold over time.

Second, **different scenarios** with different business strategies can be tested.

Third, the dynamic nature of experiments can allow for the **emergence of unexpected behavior** that would otherwise only in hindsight seem possible.

a) Multi-step Games instead of One-shot Analysis

If conventional scenario analysis plots a picture of the future, our computational approach reveals how the future unfolds as if in a movie, frame by frame. We can stop the film, rewind and replay, and even interact and change parameters on the fly.

b) Wargaming: Testing of Market Entry Strategies

Often, companies try to break into an industry through a niche, leveraging a cost or differentiation advantage (for example, VoIP-based telephony services). Such focused entry requires less capital. However, it is also more vulnerable, because the more focused or specialized the entrant, the more dependent it becomes on up and downstream suppliers, some of which may very likely try to prevent entry. Only very daring entrepreneurs try to break into heavily integrated industries, such as Richard Branson with Virgin Mobile.

c) Emergent Behavior and Unexpected Outcomes: Temporal Price Competition

It is well known that price competition and its effects on profitability and market structure over time are difficult to assess with traditional analytic tools. We do know that sustained price competition eliminates all profits (the Bertrand paradox). However, often companies use price competition only for a limited time, for example, to deter entry or squeeze competitors out. Very little is known about the mechanics of temporal price competition. Are vertically integrated companies better off than more specialized ones? How does the number of competitors affect outcomes? Do results change over time? Simulation experiments can provide likely answers.

Agent-based IS Track, Web 03, Dec. 13-14, Seattle, WA

Pictures & Videos Available Online

Thank you, again, for a successful track. Pictures 1-4:

(1) Edward Carlson's Space Needle & Frank Gehry's Music Museum.

(2) Steven Kimbrough's presentation on "A Note on Q-learning in the Cournot Game."

(3) Vijay Sugumaran's talk on "Agent-Based Mass Customization Environment."

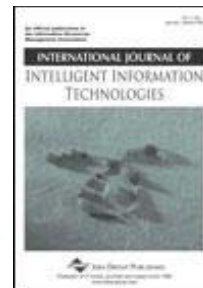
(4) Victoria Yoon's paper on "LOGOS: An Agent-based NASA Ground Operations System Prototype."



New Scientific Journal: *IJIT*

In order to better fulfill its mission SIGABIS facilitates publishing and quick dissemination of research findings in its focal area. Therefore, we organize and manage "fast-tracking" arrangements for SIGABIS event. We are particularly happy about our new relationship with a new scientific journal that is targeted at similar research problems as SIGABIS:

International Journal of Intelligent Information Technologies



"IJIT is a much needed publication outlet for research on important and emerging issues in the design and deployment of intelligent systems! This new journal promises to fill an existing gap in the field and will promote interdisciplinary research."

— Dr. Sudha Ram, Eller Professor of Management Information Systems, University of Arizona.

Web site: www.idea-group.com/ijit

IJIT Brochure: www.agentbasedis.org

Editor-In-Chief: Vijayan Sugumaran, Ph.D., Oakland University

Published: Quarterly (print and electronic), ISSN: 1548-3657, eISSN: 1548-3665

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Impressum

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

Editor in Chief: Chris S. Langdon.

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