

Agent-Oriented Information Systems (AOIS'99)

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Workshop Organization

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Introduction

Agent-Orientation is emerging as a potentially powerful new paradigm in computing. Yet its role in information systems and information systems development is only beginning to be investigated.

Information systems continue to be the predominant application of computing technology, and the development, maintenance, and evolution of information systems remain the primary pre-occupation of most computing professionals. However, the environment for information systems has been changing rapidly and often radically. Organizations in almost every sector — manufacturing, education, health care, government, and businesses large and small — are reinventing themselves in a competitive, fast-moving, global environment. They are becoming more interconnected, more decentralized, but more interdependent. New information system concepts and technologies have contributed in no small measure to these changes. These have accelerated with the advent of the Internet and the World Wide Web. At the same time, technology has also contributed to much of the complexity and obstacles to change, as evidenced in the problem of legacy systems.

Techniques such as Structured Analysis and Entity-Relationship modeling, while revolutionary in their time (and still the foundation of much of IS practice today), were developed for the environment of the 1970's. Throughout the 80's and 90's, any extensions have been developed, with object-orientation gaining increasing momentum. The rapidly changing environments of today and of the near future call for further advances in IS concepts and techniques.

Agent concepts, which originated in artificial intelligence but which have further developed and evolved in many areas of computing, hold great promise for responding to the new realities of information systems. While there are many conceptions of agents, most have embodied higher levels of representation and reasoning involving knowledge/belief, perception, goal, intention, and commitment. On the one hand, the technical embodiment of these concepts can lead to advanced functionalities, e.g. in inference-based query answering and in transaction monitoring. On the other, their rich representational capabilities allow more faithful and effective treatments of complex organizational processes.

Will agent concepts and techniques figure prominently in information system architectures of the near future? Will they play key roles in the requirements analysis, design, implementation, and evolution of information systems? What are our visions of agent-orientation in information systems, and what will be the appropriate research agendas for pursuing them?

The International Workshop on Agent-oriented Information Systems (AOIS) aims to bring together researchers and practitioners from the Information Systems and Agents communities who will be shaping the future of information systems engineering.

Technical topics of interest suggested in the call for papers include:

- agent-oriented modeling and design methods
- models and architectures for agent-oriented information systems
- agent-oriented requirements engineering
- agent-oriented transaction models
- agent-oriented extensions to database languages (such as SQL)
- agent-oriented enterprise modeling
- agent-oriented business process modeling and reengineering
- agent communication languages for business communication

- automated business-to-business interaction (including negotiation and contracting)
- agent-based workflow modeling
- agent-oriented extensions to enterprise resource planning (ERP) systems

In addition to submitted technical papers and position papers, the workshop features invited speakers and panel discussions.

For the two workshop locations, we received 19 technical paper submissions from which we have accepted 9 papers for presentation, and 9 position papers from 11 countries.

We hope these contributions will mark the starting point in the development of the new area of AOIS research.

Themes for Discussion

Agent concepts could fundamentally alter the nature of information systems of the future, and how we build them. Much like Structured Analysis, ER modeling, and Object-Orientation, Agent-Orientation may bring fundamental changes to IS practice. However, at this point, what these changes might be, and how they would come to pass remain rather unclear. While the agent research area is very active, IS concerns are not yet well covered. We hope this workshop provides a forum for presenting results in this area, and also acts as a catalyst to foster progress.

We encourage you to articulate your vision of the AOIS area, what are the most important aspects or issues for AOIS. As suggested above, AOIS is not concerned with basic or generic agent concepts or technologies, but with specific orientation towards information systems and information systems development.

We outline some possible themes. You are welcome to address these or expand on them, or identify additional themes we have missed.

Is agent-orientation for IS primarily an implementation technology, or will it also be a shift in representational paradigm?

Information systems are used to store and manipulate information about the world. In what ways would AOIS extend the expressiveness of information systems? An AOIS can maintain higher-level representations of (natural or artificial) agents it has to deal with, in terms of their abilities, knowledge or beliefs, perceptions, commitments, expectations, trust relationships, etc. On the other hand (or at the same time!), an AOIS may itself be designed as an agent (or multiagent system) with its own intentional properties and states.

Why are agent concepts relevant to IS? Are they introduced to achieve new functionality, or to achieve non-functional qualities?

Much of AI agent research aims to achieve functionality not achievable before, i.e., various forms of "intelligence". Mainstream IS, however, is dictated by many pragmatic concerns, such as reliability, performance, etc., and today, especially interoperability and high-level cooperation, legacy migration and evolution. Agent-orientation would be a big boost for IS if it can help achieve these non-functional qualities, even if no new functionality is introduced. We note that some areas of agent research are also directed at non-functional aspects, such as usability (user interface agents), believability (believable agents) and mobility.

What are the relevant properties of an agent from an IS perspective?

For example, in AI agent research, the sought-after properties are autonomy, situatedness, adaptivity, sociability, mobility, believability, etc. Are these the right properties for IS, and in what priority? What are the overlaps with IS and software engineering concepts such as openness, platform-independence, location-independence, performance, robustness, evolvability, etc.?

What are the implications of agent-orientation on the IS development process?

For IS, the development process and methodologies are crucial. They must be industrial-strength production systems, not experimental systems, i.e., producible with predictable quality and schedule. What development process will be appropriate? Will it be substantially different from traditional IS or OO IS development? Will agent-orientation facilitate reuse? Can agent concepts be useful in the development process itself, and not just in the resulting product? Many human agents are involved during the development process as well as in the usage environment. Agent concepts have been used in requirements engineering, business process modeling, enterprise modeling, and user modeling. Some agents can adapt, learn, evolve on their own, so the notion of development may become less clear-cut.

Could the agent concept become a new fundamental organizing concept for dealing with complex artificial phenomena, much like the concept of system in systems theory, entity in data modeling, and object in object-orientation? Would it replace or extend or augment these earlier paradigms? Are there any conflicts among them?

What are the key components of an agent-oriented approach to IS?

Knowledge representation and reasoning? Communication and cooperation? Analysis and design methodologies? Should everything be treated as an agent or will there be other types of entities (such as objects) within the AOIS paradigm?

What are the most significant technical results from agent research (or other areas) that would make up the foundations of the AOIS area? What adaptations are needed? What are the key papers most relevant to AOIS? Are there key papers for each of the technical areas listed in the CfP? What are the technical issues and areas for AOIS?

What transitional pathways can be envisaged for realizing an AOIS vision?

Would it be evolutionary or revolutionary? Do we start from niche applications, then move incrementally into mainstream? What time line is realistic? What level of maturity is needed, and where are we on the various fronts? What are the technical obstacles that need to be overcome by AOIS research? What are the non-technical obstacles?

How will AOIS co-exist with various IS developed under different paradigms? How do we agentify an existing IS? Is object-orientation a necessary step towards AOIS?