

# Report on the Fourth International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS 2005)

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■ The 2005 Autonomous Agents and Multiagent Systems Conference (AAMAS 2005) was held July 25–29, 2005, at the University of Utrecht, the Netherlands. This report reviews the activities of that conference, including the workshop and tutorial programs, the main conference and poster tracks, the industry paper track, the demonstration track and sponsor demonstration sessions, the invited talks, exhibition, doctoral mentoring program, as well the sponsorship and scholarships activities.

Although it is one of the youngest subfields of artificial intelligence, the area of autonomous agents and multiagent systems can with some justification claim to be one of the most active. The Autonomous Agents and Multiagent Systems (AAMAS) conference series is the main conference venue for research in this area. It was initiated in 2002 as a merger of three conferences: the International Conference on Autonomous Agents, the International Conference on Multiagent Systems, and the International Workshop on Agent Theories, Architectures, and Languages. It aims to provide a high-profile and high-quality forum for research in the theory and practice of autonomous agents and multiagent systems. AAMAS 2005 is the fourth conference in the series, following successful conferences in Bologna, Melbourne, and New York. It is the first of the series to be affiliated with AAIL.

AAMAS 2005 was held on July 25–29, 2005, at the University of Utrecht, the Netherlands. The city of Utrecht is more than 1,300 years old and located in the center of the Netherlands, about 40 minutes by train from Amsterdam. AAMAS 2005 was held at the conference center of Utrecht University, located on the university campus in Uithof on the outskirts of Utrecht. The local organization team was headed by Virginia Dignum and Frank Dignum and performed miracles.

The conference itself was five days in total, consisting of a tutorial program, a workshop program, the main conference technical track, a reviewed poster track, a reviewed industry paper track, a reviewed demonstration track, sponsor demonstration sessions, invited talks, an exhibition with exhibits from technology providers and publishers, a doctoral mentoring program, and the second annual AAMAS women’s luncheon, which provided women with the opportunity to discuss their experiences, problems, and successes in an informal setting. AAMAS 2005 was preceded by the seventh European Agent Systems Summer School (EASSS 2005) for about 120 students, which was organized by Europe’s coordination network for agent systems (AgentLink) and was as successful as previous summer schools in Utrecht, Saarbruecken, Prague, Barcelona, Bologna, and Liverpool. Affiliated with AAMAS were also a JADE meeting, where recent extensions to the Java agent development framework (JADE) and future development plans were discussed, and a FIPA meeting, where the standards organization for agents and multiagent systems (which was recently officially accepted by the IEEE as its eleventh standards committee) discussed how to move standards for agents and agent-based systems into the wider

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context of software development in general. Overall, AAMAS 2005 had 778 academic and industrial participants from 44 countries on six continents.

The AAMAS 2005 opening reception was held at the Academiegebouw, the academic center of the university, located in a historic building next to the Dom tower. The main room of this building, in which the Treaty of Utrecht was signed in 1579, is of special importance, as the treaty signified the start of the Netherlands as one state. The AAMAS 2005 banquet was held at an old fifteenth century farmhouse, De Beesde, just outside of Utrecht.

### Workshop Program

The workshop program consisted of 28 half-day and full-day workshops, which attracted 763 participants. The workshops covered a variety of topics, including the perennial favorites (using agents in e-commerce, logical foundations of multiagent systems, agent-oriented software engineering, and so on). A number of newer workshops also made their appearance at the conference, from the thoroughly fashionable (“smart grid technologies”) through to the intriguingly novel (“creating bonds with humanoids”). It has been a deliberate policy of the AAMAS conference series to encourage a wide range of workshops, with a number now having appeared at every AAMAS. The result seems to be an arrangement of benefit to both the workshops (which have a regular home and potentially a large audience) and the conference (which benefits from extended participation and a series of focused extra tracks, which can explore issues that might be too tentative or preliminary to make it into the main technical conference track).

### Tutorial Program

The tutorial program consisted of 13 half-day or full-day tutorials with 162 participants. The tutorials covered topics such as Education-Based Multiagent Systems, Peer-to-Peer Trust and Reputation, the Role of Roles in Multiagent systems, Temporal and Resource Reasoning for Planning, Scheduling and Execution in Autonomous Agents, Tools and Technologies for Agent-Mediated Web Services, Engineering Self-Organizing Applications, Agent Communication, Multiagent Planning, Agent-Based Software Engineering, Programming Languages for Multiagent Systems, Models of Argumentation and Dialogue, Specifying Knowledge and Belief Change in Multiagent Systems, and Multirobot Systems.

### Main Conference and Poster Tracks

The highlight of AAMAS is, of course, the main technical conference track. This track received 530 submissions, about the same as previous AAMAS conferences. Each paper was reviewed by at least three program committee members (guided by a senior program committee member), with some submissions selected for the main conference track and others for the poster track. AAMAS 2005 operated with 40 senior program committee members, 333 program committee members, and 114 additional reviewers to provide three reviews per submission. The review process was double blind for the first time in the history of the AAMAS conference series. It resulted in 130 accepted papers and 119 accepted posters, which appeared in the three-volume conference proceedings published by ACM in hardcopy and on CD. The paper acceptance rate for the main conference track was thus slightly below 25 percent. The papers were presented in three to five tracks with a total of 33 sessions, ranging from logical foundations, communication, learning, planning, and cooperation, to agent-oriented software engineering, ontologies, and applications. The posters were advertised during the technical sessions and then displayed in two poster sessions that happened at lunchtime (with lunch provided). Ten papers of outstanding quality were selected as “conference highlights” based on suggestions from the program committee, the senior program committee, and a further review of the highly scoring papers. From those papers, the paper “A Cost Minimization Approach to Human Behavior Recognition” by Gita Sukthankar and Katia Sycara won the AAMAS Best Student Paper Award (sponsored by Springer), and the paper “A Distributed Framework for Solving the Multiagent Plan Coordination Problem” by Jeffrey Cox, Edmund Durfee, and Thomas Bartold won the AAMAS Best Conference Paper Award. As it happened, the main author of this latter paper was also a student—which

might be taken to indicate either that AAMAS attracts bright graduate students or lazy faculty. Both teams of prize-winning authors received awards of US\$1000.

## Industry Paper Track

AAMAS 2005 featured, for the first time in the history of the series, a separate track specifically intended for industrial participants, organized in cooperation with AgentLink. The industry paper track was aimed at fostering mutually beneficial links between researchers engaged in foundational scientific research and researchers working on real-world applications to make autonomous agents and multiagent systems a commercial reality. This enabled the industrial participants to showcase the state of the art in industrial technology and applications of autonomous agents and multiagent systems to both their peers and the associated scientific community. The three cochairs of the industry paper track operated with a program committee of 28 researchers (mostly from industry) to provide three reviews for more than 35 submissions from Europe, Australia, Asia, and North America. The acceptance criteria were tailored towards practical relevance and impact rather than the scientific innovation criteria used in the technical track. This resulted in 15 accepted papers, which appeared in a fourth volume of the conference proceedings and were presented in three sessions that ran in parallel to the main conference track. Four papers covered transport, traffic, and logistics applications; 4 papers covered aerospace applications; 3 papers covered manufacturing applications; and the remaining papers covered applications in electricity network management and training systems for naval personnel. In addition, one invited speaker and eight industrial sponsors of AAMAS 2005 were invited to talk about their ongoing research. A panel on “Impact for Agents” was also held with participants from industry and academia. The industry paper track seemed popular with the audience, with approximately 60 audience members counted in each session.

## Demonstration Track and Sponsor Demonstration Sessions

The demonstration track featured applications of agent systems, including agents interacting with humans, semantic web applications, and other agent tools and platforms. The two cochairs of the demonstration track selected 18 demonstrations from 25 proposals, resulting in demonstrations being given every afternoon. The acceptance criteria were based on novelty, demonstrative use of agent technology, and potential impact on the community. “Prometheus Design Tool” by John Thangarajah, Lin Padgham, and Michael Winikoff won the AAMAS Best Demonstration Award, whose aim is to reward the development of agent technology that was applied effectively in practical applications and resulted in positive impact on society, industry, or a local community. “Gamble 2.0” by Matthias Rehm, Elisabeth Andre, and Michael Wissner won the CONVIVO Award for the Best Demonstration of People-Centered Agent Technologies. CONVIVO is a network of research institutions and companies from nine countries, funded by the European Commission. The aim of their award is to reward the development of agent technology that empowers and simplifies the everyday lives of people by making their interaction with these technologies simpler, easier, and more pleasant.

## Invited Talks

AAMAS 2005 featured three invited talks for the main conference track, one invited talk for the industry paper track, and one ACM/SIGART Autonomous Agents Research Award talk, all given in plenary sessions to all conference participants. In the main conference track, Johan van Benthem (University of Amsterdam and Stanford University) talked about Logical Dynamics Today, Cynthia Breazeal (Massachusetts Institute of Technology) talked about Socially Interactive Robots, and Dov Samet (Tel Aviv University) talked about How to Commit to Cooperation. In the industry track, Mark Greaves (DARPA) talked about Multiagent Systems in Defense. In the ACM/SIGART Autonomous Agents Research Award talk, Milind Tambe (University of Southern California) talked about Resolving Conflicts about Teamwork: Hybrids to the Rescue. The award is annually given to a researcher who has made exceptional contributions to autonomous agent systems over the preceding five years. Milind Tambe received the award for his seminal contributions to the theory, applications, and software infrastructure in the area of teamwork, which has become a flourishing research area in multiagent systems.



Figure 1. ACM/SIGART Autonomous Agents Research Award Talk by Milind Tambe (USC).

## Exhibition

AAMAS 2005 was accompanied by an exhibition where six publishers, research laboratories, and companies advertised their products, services, and research.

## Doctoral Mentoring Program

The doctoral mentoring program was aimed at enabling Ph.D. students in advanced stages of their research to interact closely with more senior members of the AAMAS community, to provide them with contacts and professional networking opportunities, to receive feedback on their research, and to get advice on managing their careers. It also allowed the students to present their work in a full-day meeting to a friendly audience of mentors and student participants, where short presentations by the students about their research were followed by discussions initiated by the mentors. Eighteen students were selected from more than 30 applicants. Every student was then assigned a mentor with similar research interests from a pool of 15 mentors. Mentors and mentees contacted each other before the meeting and then used the meeting to talk personally to each other. The meeting ended with a typically Dutch dinner in a pancake restaurant.

## Sponsorship and Scholarships

AAMAS 2005 had 20 corporate supporters and 10 other supporters, including ACM/SIGART, AgentLink, the Foundation for Intelligent Physical Agents (FIPA), the Defense Advanced Research Projects Agency (DARPA), and the National Science Foundation (NSF). The enthusiastic support of so many sponsors is a good indicator of how seriously the world is taking agent technology. About 40 percent of the participants in AAMAS 2005 were students. AAMAS 2005 used the sponsorship money almost entirely to support the tutorial presenters, workshop organizers, and 72 deserving students from 14 countries all over the world (with generous travel allowances for many students from abroad), ensuring that, for the first time in the history of the AAMAS conference series, all student authors of papers in either the main conference track or the poster track were offered financial support (in addition to some other students such as the participants in the doctoral mentoring program). Also, for the first time in the history of the AAMAS conference series, the conference was able to grant financial support to nonstudent researchers from underrepresented areas.

## AAMAS 2006

We are now looking forward to AAMAS 2006, which will be held May 8–12, 2006, in Hakodate (Japan) at Future University—Hakodate (FUN for short), a young university specializing in systems information science. Hakodate, located at the southern tip of Hokkaido, is one of Japan's most popular tourist destinations. It is a twin city of Halifax, Canada, because it has Goryokaku, a star-shaped citadel. The magnificence of the night view is often compared to a sparkling jewelry box. Many tourist attractions for families, including a trip to the nearby national park, are planned during the conference. Hot-spring fans will find many excellent sites to visit in and around Hakodate. Hakodate airport, located 30 minutes from the conference venue, is accessible by connection to three international airports. Additional information on AAMAS 2006 can be found at [www.fun.ac.jp/aamas2006](http://www.fun.ac.jp/aamas2006).

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**Munindar P. Singh** is a full professor in the department of computer science at North Carolina State University. From 1989 through 1995, he was with the Microelectronics and Computer Technology Corporation (MCC). Singh's research interests include multiagent systems and service-oriented computing, wherein he specifically addresses the challenges of trust, service discovery, and business processes and protocols in large-scale open environments. He received a B.Tech. in computer science and engineering from the Indian Institute of Technology, Delhi in 1986 and a Ph.D. in computer sciences from the University of Texas at Austin in 1993.

**Michael Wooldridge** is a professor in the Department of Computer Science at the University of Liverpool. He has published more than 200 articles in the theory and practice of agent-based systems, as well as 13 books in the area. His main interests have been in the use of formal methods of one kind or another for specifying and reasoning about multiagent systems. Other interests include agent-oriented software engineering and negotiation. In 1997, he founded AgentLink, the ESPRIT-funded European Network of Excellence in the area of agent-based computing, and coordinated AgentLink between 1997 and July 2000.