Inform!

The Newsletter of the Foundation for Intelligent Physical Agents

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Report of the 30th FIPA Meeting in London

FIPA held its 30th meeting and 2003 General Annual Assembly on November 19-21, 2003, in London, UK, co-located with the technical meeting of the Object Management Group. A report on the activities of the OMG during this time can be found on their website at http://www.omg.org. The meeting was held at The Hilton on Park Lane, across the street from Hyde Park and off Piccadilly Road. The London venue was made doubly interesting by the visit of U.S. President George W. Bush at Buckingham Palace only half a mile away from the hotel. Numerous protest marches, a heavy police presence and considerable government and security helicopter traffic punctuated the three days of the GAA!

Significant organizational business was conducted in the general assembly. Statute changes were made to allow for up to 2 associate members to serve on the Board of Directors and to allow for a minimum of 4 Directors. These changes enabled the election of Monique Calisti of Whitestein, Stefan Poslad of Queen Mary and Jim Odell of Agentis Software to the Board of Directors. Board jobs were apportioned as follows:

- President–Michael Kerstetter, The Boeing Company
- VP & Secretary–Stefan Poslad, Queen Mary
- Chair of the Image Committee–Monique Calisti, Whitestein
- Chair of the Finance & Auditing Committee and Membership & Nomination Committee–Jim Odell, Agentis Software.

Jacquie Kelly, the FIPA Secretariat, will continue as Treasurer. Regretfully, Michael Berger of Siemens had to step down from his leadership position in FIPA. The Board wishes to express its profound appreciation to Michael for his service for the past two years as Chair of the Finance and Auditing Committee

and the Membership and Nomination Committee. His enthusiasm, dedication, insight, and leadership were instrumental in guiding FIPA through a period of significant change.

However, the most significant proposal adopted was a major realignment of FIPA's membership structure. Beginning with the next FIPA fiscal year, starting 1 July 2004, FIPA will have a single, unified membership level. Under this new structure:

- All members having full voting rights
- All members will have the right to be represented on the Board of Directors
- The initial membership fee will be 2250 CHF (euro and dollar equivalents will be provided)
- Statute changes will require a ½ quorum of members in good standing and majority approval of those present.

By June 2004 the board will submit for review, in preparation for voting at the next GAA, revised statutes eliminating references to dual levels of membership. This is an important step for FIPA and one that I believe will help ensure organizational stability, enlarge the

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News in Brief

The 31st FIPA meeting will be held in Barcelona, Spain from 17—19 March, 2004 at the kind invitation of Universitat Autonoma de Barcelona (UAB) Information on this meeting will be posted at http://www.fipa.org/activites/meetings as soon as available

FIPA is pleased to support the upcoming Conference on Autonomous Agents and MultiAgent Systems (AAMAS) which will be held this July in New York.

As always, FIPA is interested in receiving notification of any FIPA related papers being published so they can be maintained on the FIPA website as a service to the FIPA community. Papers of interest, include those specifically about the work of FIPA, as well as more generally those that discuss aspects of multi-agent systems that are related to FIPA's work. If you have an article, paper or technical report you would like to add to this site please enter it at http://www.fipa.org/resources/documents.html

J. Kelly

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FIPA Single Tier Membership Proposal

FIPA membership has historically been divided into two tiers: principal and associate membership. Both types of member are active in the technical work of FIPA. However, principal members pay increased fees, have voting rights to influence management decisions made by FIPA such as election of FIPA officials to the FIPA Board and are able to stand for election to the FIPA Board that governs FIPA. Associate members pay less fees, do not have voting rights and could not until recently be elected to any part of the Board of FIPA. Principal members tended to be companies and associate members tended to be academic institutes. At the recent successful 30th FIPA meeting in London, it was proposed that the membership of FIPA moves to a single-tier at the start of the next full year of membership, July 2004 – June 2005. There was general agreement for this at the meeting.

The motivation for this is as follows. Associate membership is increasing and principal membership is falling for both companies and academic members. Associate members feel they contribute increasingly to the technical work but feel under-represented at the level where the FIPA management and decision-making process occurs. In addition, less principal members are becoming involved in the management of FIPA. In order to keep FIPA on a firm financial footing, the fees of the membership for the single tier membership need to be somewhere between the current full and associate membership fees - a level of 2250 CHF (Swiss Francs) has been proposed. If the single tier membership is accepted, all members can vote and run for election for the FIPA board of directors. Such a statute change requires a quorum, in person or by proxy, of one half the members in good standing and approval of at least one half of the non-abstaining votes. By June 2004 the board will submit the revised statutes for the approval of the membership, eliminating references to dual levels of membership.

Board of Directors

Agents for Ambient Intelligence

Ambient intelligence refers to the emerging computing paradigm where human users are empowered through interacting with ambient digital environments that are aware of their presence and context, able to provide personalized services to their requirements, capable of anticipating their behavior and responding to their presence. Computational devices within these environments (our homes, workplaces, cars, body, etc) may be embedded and often have multimodal interfaces through which they can sense and effect their environment according to their degree of operational transparency. Additionally, adhoc wireless networking helps create inobtrusive connectivity across both local and distant locations. This potentially complex infrastructure is driven by software services which can be broadly categorised as being:

Environment-oriented

A class of services transparent to the user with the functionality needed to integrate and control devices, networks, and interfaces within the context-aware ambient environment (e.g., communication, naming, routing, roaming, storage, etc.).

Application-oriented

A class of services tailored to the role requirements of a user operating in a specific application context. E.g. automatically providing hospital patients with medication according to live, ambient sensory feedback and analysis.

A key necessity in achieving a feasible instantiation of such an environment is embedded software that integrates and adapts these services (and the devices which host them), to changes in the environment or in the user requirements, whilst minimizing human intervention and service interruption. This article outlines why agent technology offers a powerful means to achieve this.

Agent Mediated Interaction and Integration

As we know, software agents are conventionally capable of autonomous, smart and proactive decision making, contextulising the behavior of users, coordination with other agents, and dynamic adaptation to changing goals and environments. As such they form a suitable technology to deliver on two aspects of functionality required within the ambient intelligence environment:

Device-oriented Agents

From this perspective an agent is bound, for a given duration, to a device or to a service (or collection of services) operating on that device. The agent does not have to be physically resident on the device, and in some cases, may be unable to do so due to local memory or processing limitations. In this instance the concept of ownership is central as it enables the agent to take on representation of its owner, the user, which increases the value of the bond between the two and allows the user to become a stakeholder in the system. In turn, the ability to exchange expressive, semantically rich messages between agents means that they can construct relationships between themselves and thereby their owners. This representational aspect of agency implies that the agent is a 'trusted' entity acting as a gateway to the ubiquitous domain of devices and services. With a device such as a mobile phone, a physically resident, or logically associated, agent can either recognize the device itself as the owner, or an operator of the device. In either case, the interface is transparent and typically configured to the appropriate role-based interaction by applying a profile. Some of the value brought about by these agent bindings is:

- Creating and managing a virtual presence for the user
- Providing a context aware, adaptive interface onto the environment
- Providing a point of presence that can reason about semantically enriched information
- Linking the user with a population of other users, devices and services and enabling collaboration to participate in tasks of collective interest

Network-oriented Agents

Here the agent is a software entity existing and operating within the environment and acting as an integrator of services and devices. In this role the agent takes on responsibility for connecting the potentially disparate collection of opaque and transparent (embedded) devices, software services and users in ways appropriate to the various usage contexts. For example, a perception made by a single sensor may imply that several actions must be taken within the ambient environment (e.g. notifications, switching on of devices, etc.). The mapping of this interaction may require the integration of several services and other entities, perhaps bringing about temporary composite groups of services to solve the particular action requirement. In this sense also, the agent should have an identifiable owner, but this may be a nominal relationship extending purely to responsibility rather than representation. In this context, the agent, as a function of its capabilities, is really a means to elaborate the relationship between both human users and devices/services, and between devices/services themselves, within the ambient environment.

Some Challenges

Engineering intelligence within the ambient computing environment is an ambitious and multi-faceted problem. We view agents as a means to solve some of these problems and through this deliver on many of the expectations of both communities. In our view, some of the primary challenges emerging from this discussion are:

Agents managing ambient intelligence to distribute resource availability and enable integration between software services making use of and/or embedded within a variety of physical (possibly mobile) devices.

Agents hiding network complexity and embedding context-sensitivity to provide seamless mobility to end users by hiding low-level network heterogeneity and access details (e.g., roaming management), by deploying high-level abstractions for semantically grounded communication (i.e., semantic web, structured ontologies).

Agents enabling intelligent interfaces that adapt behavior according to different users' needs, learning new concepts (users' preferences, important events, etc.), anticipating users' requirements and taking the initiative to make suggestions and proactive choices, interfaces can better fulfil users' expectations and needs.

Agents controlling security by implementing authentication, policy and trust models.

Agents delivering dynamic service provisioning by deploying coordination and negotiation to dynamically aggregate services according the usage contexts.

Software agents will not be alone in this space: combining this approach with a number of key technologies (e.g., semantic web, web services, RFID tags, GRID computing, etc.) and integrating them within incoming IT infrastructure and networking elements will be crucial in building the path toward ambient intelligence to becoming part of our everyday life experience.

M. Calisti, D. Greenwood

If you have a story or article that may be of interest to the agent or FIPA community, please submit it to **inform@fipa.org** for inclusion in future issues of FIPA Inform!

Edited by the FIPA Image Committee
Comments and opinions are those of the authors, not necessarily of FIPA or its members.
All correspondence, including submissions for "News in Brief" should be addressed to image@fipa.org

Plans for the Semantics Technical Committee

Semantics is the most important unsolved problem in computer communications. Its solution offers broad, fundamental abilities in many areas including: message routing, robotics, data integration, context and personalization, hypertext insertion, semantic searching, text summarization, and translation

The FIPA Semantic TC is engaging a plan that will result in:

1. A set of requirements for semantic exchange among agents, (and later, between humans and agents)
2. A working model that demonstrates their achievability.

As a beginning to this solution, the TC is drafting key requirements and definitions. We will need a definition of "success" and a definition of "proof of success." Here are the first attempts:

Definition of Success:

1. "When the intended meaning sent by an agent is understood by the receiving agent." -- after Mike Uschold at the London meeting
2. "When an agent provides a meaningful response to the solicitation of an originating agent."

Proof of Success:

"When at least five agents with both differing capabilities and overlapping capabilities can perform at least three physical tasks from three unfamiliar, differing domains where the tasks cannot be accomplished by any agent subset of less than size three and some differing capabilities and some overlapping capabilities are required for success."

Do you have better definitions? Or some thoughts? Or just want to participate?

If you do please email the Chair at semantics-chair@fipa.org . We will be scheduling brainstorming at telecoms throughout the year. Also, let us know of other organizations and people with whom we should collaborate.

At the last meeting, we looked at requirements from the standpoint of linguistics. For an overview, see www.fipa.org/docs/input/f-in-00096/ for 100 slides on low-level semantics. This presentation describes the difference between high-level and low-level semantics and considers how semantics are expressed in lexical structures.

At the next meeting, we will move from word-level semantics to sentence-level semantics and describe how semantics are embodied in ontological and episodic structures.

In the rest of the year, the focus will move to high-level semantics of agent dialogues where we will consider question/answer structures and re-look at speech acts. With these descriptions and requirements well formulated, the next year plans on building a model to surface issues and provide validation that the requirements can be formulated as standards.

Ev Sherwood

Palermo Department of the Italian National Research Council

The ICAR-Palermo department is part of the Institute of High Performance Computing and Networking (ICAR - Istituto di Calcolo e Reti ad Alte Prestazioni). ICAR is a public research institution jointly funded by the Italian National Research Council (CNR) and the University of Palermo. The goal of ICAR is to to carry out both basic and applied research, technological transfer, and high education, in the area of high performance computing and intelligent systems in distributed environments. 29 people are involved in the ICAR-Palermo department: 19 CNR staff, 10 professors from the Department of Computer Science of the University of Palermo. Other researchers are involved in Naples and Cosenza sites. ICAR-Palermo collaborates extensively with companies, universities and research institutions, in Italy and abroad.

The Palermo-ICAR department is organized in research laboratories, focused on the following topics:

Artificial Intelligence: research interests are related to hybrid knowledge representation systems and their management. In particular, they are developing decision making techniques for modeling multi-agent systems under uncertainty. Other efforts are related to mobile agents for Internet applications.

Robotic Systems and Artificial Vision: faces with strategies for multi-robot environments, perceptive systems for robotics, the RoboCup environment, robotics for space applications. Research interests of this group are also in the areas of 3D vision (3D shape reconstruction by algorithms of shape from shading, shape from stereo and shape from motion), integration of symbolic and subsymbolic processing for image understanding, active vision based on attentive models, dynamic scene understanding, neural networks for computer vision. A specific research activity deals with the design of robotic multi-agent systems and explores the most important topics of agent-oriented software engineering.

Computer Networks: is exploring key issues in the recent technology of Active Networks, mainly related to a number of new challenges, such as distributed strategies, resource management, application interactions, efficiency and performance. This recent paradigm allows users to develop specific algorithms to be integrated into the network protocols, and to achieve application-oriented network functions. Research interests of this group are also in the areas of Routing Protocols. An adaptive routing protocol sensible to the network load is explored and new heuristics for the Steiner Tree Problem in Networks are proposed to be adopted in multicast routing.

Image Analysis and Visual Databases: main experiences of this group are in the areas of automatic feature extraction from images and video, image motion description, content-based indexing and retrieval in multimedia databases, similarity evaluation based on algorithmic distance measures, fuzzy techniques and neural networks.

Innovative Digital Computer Architecture (INCA): the research trusts of the INCA group are along the following two lines: (i) definition and design of digital neural architectures for object and feature classification, both supervised and unsupervised; (ii) design and implementation of fine-grain SIMD computer architectures for digital color image processing.

Multimedia Processing on Grid Computing: research activities are focused on the implementation of distributed, cooperative applications where both computational resources and software components are integrated in scalable Virtual Organizations. Most activities deal with multimedia applications for computational grids that, in order to perform 'on demand' processing of resources distributed on the network, use available computational services, import active computation components and take advantage of authoring environments and PSE for image processing. Further researches concern distributed information systems and numerical analysis and algorithms. For more information see: http://www.pa.icar.cnr.it

M. Cossentino

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membership basis and help guarantee an effective leadership.
The Technical Committees were quite busy. Briefly, the activities of each:
TC Ad-hoc worked to extend the current FIPA Agent Management specification to meet the requirements of yellow page services in ad hoc networks and discussed the need for a standard way of advertising FIPA agent services in JXTA technology. Further editing of the FIPA Agent Management specification and fipa00096 is needed. Both to be completed by the 31st FIPA meeting in Barcelona.
TC Interaction Protocols began with presentations on differing views on Interaction Protocols. The presentations by Shamima Paurobally of Southampton University, Juan Manuel Serran of University Rey Jan Carlos, and James Odell and Marc-Philippe Huget, presented alternative perspectives and made clearer further work that needs to be done on the current AUML interaction diagrams. Participants agreed that the current workplan is insufficient, and resolved to develop, via email discussion, a new workplan to be presented to the FAB prior to the next meeting. Details can be found in the meeting resolutions or through the TC IP mailing list.
TC Methodology approved a glossary of terms as an internal document. There are two different kinds of terms: a list of terms directly related to the work of this TC and a list of terms coming from common software engineering and agent contexts. Also, the fragment definition document has been approved as a preliminary specification and will be published on the web site and an internal document containing a set of fragments (extracted from already SPEM documented methodologies) by next March. It was also decided to base method base repository specifications on a textual document complimented by a formal XML representation according to a schema.
The **TC Modeling** participants reached a basic agreement on an abstract syntax (in the form of a class diagram) that specifies the notions of agent, agent class, role, group for modeling agent-based systems and agreed that these areas would be explored and defined in more detail by this TC. They agreed to explore the notions of position, environment, and context; to begin adding agent properties such as capabilities, goals, and so on, as well as to continue the refinement of the FIPA AUML language specifications for Class Diagrams and Sequence Diagrams.
TC Security enjoyed presentations by Ben Mankin (formalism for distributed authorization), Alois Reitbauer (distributed application security requirements), Jim Juan Tan (Syntax for per-message-based security) and Giosue Vitaglion (per-message security proposal). There was considerable discussion of the proposed per-message-based security specification (f-in-00095). They plan to continue their work on this and an abstract security architecture specification via the mailing list and teleconferences.
Everett Sherwood of Motorola Laboratories was introduced as the new chairman of **TC Semantics**. This committee is just getting reorganized and is working to redefine its direction following a period of inactivity. Presentations were made by Everett ("On Eliciting Requirements for Agent Semantics from Linguistics Concepts") and Alexander Artikis of Imperial College ("An Executable Specification of Open Norm-Governed Computational Systems"). A draft of a revised workplan was submitted for consideration.
FIPA's **Image Committee** discussed newsletter content, outside image, liaisons, and sponsorships, among other topics. We appreciate the efforts of those who represented FIPA to the general community in 2003: Steven Willmott who wrote a book chapter about FIPA specs and activities, Steven, Jonathan Dale and Stephen Cranefield at AAMAS03, Michael Berger at IDIN03 and Monique Calisti at the Agentcities Public Information Days 4.
TC Ontologies and **TC Services** did not meet due to the absence of key members.
The resolutions of the meeting, as well as detailed information on all activities can be found on the FIPA website, www.fipa.org.

M. Kerstetter

Rockwell Automation

Rockwell Automation (RA) is a leading industrial automation company focused to be the most valued global provider of power, control, and information solutions. With a focus on automation solutions that help customers meet productivity objectives, the company brings together leading brands in industrial automation, including Dodge® mechanical power transmission products, Reliance Electric™ motors & drives, Allen-Bradley® controls & engineered services & Rockwell Software® factory management software. Global technical and customer service is an integral part of RA, with nearly 5,600 distributors, system integrators, and agents serving customers in 80 countries. Headquartered in Milwaukee, Wisconsin, RA employs approximately 22000 worldwide.
Since the mid-1990s Rockwell's Advanced Technology (AT) Development Labs has been investigating and developing agent technology as part of its focus on "flexible reconfigurable systems". AT's general strategy is to identify the technologies that promise to advance e-manufacturing, then with partnerships with universities, other technology developers, and customers, develop the technologies so that Rockwell can offer them within their products.
For the past three years, AT has been partially funded from the Office of Naval Research (ONR) in collaboration with The Johns Hopkins University Applied Physics Laboratory to apply intelligent agents to achieve the U.S. Navy's goals of improved survivability and readiness of U.S. Navy shipboard systems. ONR presented four fundamental considerations:

- Reduced manning – The control system must be capable of making decisions on behalf of the equipment with less human intervention.
- Flexible distributed control – The system must adapt to changing conditions without using predefined recipes.
- World-wide support – By using commercial off-the-shelf (COTS) control equipment, the total cost of ownership is reduced and a ship can be maintained at any friendly location around the world.
- Reliable and survivable operation – Without a central point of control, there is also no single point of failure. The control system can function even with multiple equipment failures.

The pilot system used is a shipboard chilled water system (CWS). The Navy built the Reduced Scale Advanced Development (RSAD) model at its Philadelphia Naval Business Center; the RSAD is currently configured as a reduced scale chilled water system of a destroyer class ship. AT built a smaller prototype at its facility in Cleveland, Ohio. Once the agents were completed, AT tested them on its prototype against a set of operations and desirable reconfiguration scenarios provided by the Navy. Once the agent behavior and control logic were successfully verified, AT transported the software library to the RSAD facility, where it was subsequently installed. The RSAD is currently controlled by 68 agents hosted by 23 of Rockwell Automation's Logix family programmable controllers.
AT not only developed a state-of-the-art agent system that controls the CWS, but also created a development environment (DE) that is used to build libraries of agent behavior descriptions that can later on be reused and applied in similar applications. The control system developer is not required to fully understand the details of multi-agent system technology. He need only understand his application domain and enter application specific knowledge through the DE. The agent and system architecture and tools are presently works-in-progress and subject to continuous improvement.

R. Staron