Report of the 31st FIPA Meeting in Barcelona

FIPA held its 31st meeting on March 17-19 2004, in Barcelona, Spain at the kind invitation of Universitat Autonoma de Barcelona (UAB). The meeting was held on the UAB campus, which is located in the beautiful hill country a short distance outside of Barcelona. Barcelona itself is a beautiful and friendly city with much to see and do. For those of us who came a few days early or stayed a few days after, it was great fun to take the short train ride into the city and do some sightseeing and enjoy the food, people and shopping.

The meeting was held the week following the tragic attack by terrorists on the trains in Madrid. It was a time of national mourning. On behalf of the FIPA membership, the Board extends its sorrow and sympathy to the people of Spain. We also extend our heartfelt thanks to Dr. Sergi Robles, Joan Amitller and their colleagues for continuing their efforts to host the meeting in spite of this difficult period of upheaval.

The Technical Committees were quite busy. Here is a brief overview of the activities of each:

TC Ad-hoc continued discussions of the current FIPA Agent Management (f-in-00023) draft specification and a new specification (f-in-00095), Agent Discovery Service, which was approved as Experimental. The work of TC Ad-hoc is near to ending; the workplan is fulfilled and work on a white paper will be discontinued. Their next steps are to finalize the Agent Management specification, deliver the experimental specs to the FAB for approval and issue calls for Implementations and Information. The committee remains formally constituted during the calls and any necessary follow-on activity. During this period Michael Pirker of Profactor replaces Heikki Helin as co-chair.

At the suggestion of the **TC Interaction Protocols** chair and with the recommendation of the FAB, the Board of Directors approved the merger of this committee into TC Modeling.

TC Methodology had extensive discussions on a number of topics including

- Evaluation and abstraction level comparison of existing fragments;
- The method base structure and a proposed initial specification;
- The MAS meta-model;
- The fragment definition, and;
- Methodology scope and consequences.

Refer to the Resolutions document or the committee chair for more detailed information.

The **TC Modeling** participants had discussions regarding their meta-model and how it represents the link between the agent models and their counterparts in software engineering. They resolve that:

- The meta-model should clearly define what the paradigm contributes to software systems;
- Specific meta-models should extend/inherit from the general meta-model created by TC Modeling
- The general meta-model be kept as a minimum set… and more.

They propose to use the general meta-model as the basis for defining the new modeling elements required to describe agent systems. The model core is starting to consolidate, but work continues as they define the missing parts and how they combine with the present core model.

At the suggestion of the **TC Interaction Protocols** chair and with the recommendation of the FAB, the Board of Directors approved the merger of TC IP into TC Modeling.

The main achievements by **TC Security** at the meeting were discussions related to the FIPA f-in-00095 document. This is close to being a completed preliminary specification proposal. Informal advice has been sought from the FAB regarding dealing with the general issue of extending existing current standard specifications, in particular the abstract and concrete envelope specifications) to support the new envelope security extension. Currently, it is proposed that a new extension field be added to the current envelope standard specifications that points to a set of extension headers, one of which is the new security header (another, in the future, could be a possible QoS header). At this time, it is left to the FAB to state more exactly the process for dealing with enhancements to current specifications.

TC Security plans as next steps to complete a preliminary specification of the security

Barcelona Workshop Report

The 31st meeting of the FIPA standards group was held in Barcelona, Spain, from 17 - 19 March at the kind invitation of Universitat Autonoma de Barcelona (UAB). The meeting was held at the Engineering School building, in the campus of the UAB. This campus is in the outskirts of Barcelona, and it is really a big town for students and teachers, with all facilities, and surrounded by nature. There was a very pleasant spring weather during the meeting.

- There was a workshop on the second day of the meeting. Six speakers talked about interesting topics for the FIPA community. These were their talks:
- "Agent-based Activities at UAB", Sergi Robles and Joan Ametller, CCD research group, Universitat Autonoma de Barcelona
- In this talk Joan Ametller presented the current research activities carried out by the CCD group at the Universitat Autonoma of Barcelona. One of their main research lines is devoted to agent security and mobility.
- "The AgentCities.ES project", Antonio Moreno, University Rovira i Virgili
- Sergi Robles set out Antonio Moreno's presentation about the Spanish project AgentCities.ES.
- "EuropeAid @LIS TechNET Project", Luigi Ceccaroni and Steve Willmott, Universitat Politecnica de Catalunya
- "The Jade Board Initiative", Fabio Bellifemine, Telecom Italia Lab
- "The AgentLink III Project", Terry Payne University of Southampton
- "Engineering environments for multi-agent systems", Juan Antonio, Rodriguez-Aguilar. Artificial Intelligence Research Institute (IIIA) Spanish Scientific Research Council

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envelope spec, propose necessary changes to the related standard envelope spec, and draft the abstract security architecture spec.

TC Semantics had a busy meeting. Interest and participation was such that they extended discussion sessions from two to three. They resolve to implement their initial plan involving:

- Drafting and circulating goals/proofs of success and a whitepaper;
- Establishing awareness of other standards and languages;
- A call for input and discussion, and;
- Creation of a formal workplan.

At the suggestion of the **TC Ontologies** chair and with the recommendation of the FAB, the Board of Directors approved the merger of TC Ontologies into TC Semantics.

FIPA's **Image Committee** discussed newsletter content, outside image, liaisons, and sponsorships, among other topics.

Finally, the FIPA social dinner at one of the best restaurants in Barcelona was a great (and delicious) success! A pleasant and productive time was had by all, greatly facilitated by the pleasant facilities arranged by Sergi, our host. The resolutions of the meeting, as well as detailed information on all activities can be found on the FIPA website, www.fipa.org.

The next meeting, in Rockville, Maryland (Washington DC) has been timed to immediately precede the next AAMAS meeting in New York City for the convenience of those planning to attend. I hope to see you all, in July, at *both* meetings!

M. Kerstetter

News in Brief

As approved at last year's General Assembly in London, FIPA is eliminating its two-tier membership structure of Principal and Associate members and is combining the two into one uniform membership with equal rights and dues of CHF 2,250 per annum. For further information please refer to the FIPA Inform! Volume 4 Issue 2 available at www. fipa.org. Please look for the 2004/2005 membership invoices in the mail. If you have any questions about the revised fees or membership in general, please contact the FIPA Secretariat at secretariat@fipa.org.

The next FIPA meeting will be held in Washington DC July 14—16 hosted by Intelligent Automation, Inc (IAI). To register and for more information go to: http://www.fipa.org/activities/nextmeeting.html

The FIPA Secretariat has a new address: 135 Maitland Drive, Alameda, CA 94502. New phone and fax are + 1 510 337 0693

J. Kelly

An Overview of FIPA

The FIPA Mission

The core mission of FIPA, the Foundation for Intelligent Physical Agents, is to facilitate the interoperability of agents and agent systems across multiple vendors' platforms. For this purpose, FIPA has adopted and has been working since 1996 on specifications that range from: architectures supporting agent-to-agent communication; communication languages and content languages for expressing messages; and interaction protocols which group single messages together to form complete transactions. A key notion expressed by the FIPA specifications is that through the combination of speech acts, predicate logic, and public ontologies it is possible to offer a standard means of interpreting inter-agent communication in a way that respects the intended meaning of the communication.

In particular, the range of activities the FIPA community has focussed on includes:

- Development of standard specifications to build such open, interoperable agent infrastructure.
- Guidelines for industrial development of agent platforms and agent-based applications.
- Creation of an open discussion forum:
  - FIPA meetings open and free to anybody willing to attend. There are three 3-day meetings each year held at different locations worldwide advertised on the FIPA web site, http://www.fipa.org.
  - On line discussions via specific technical mailing lists (these can be found at: http://www.fipa.org/activities/mailing.html) or via the more generic list: chat@fipa.org
- Strong liaison with universities, projects, standards.
- Sponsoring of relevant events in the agent world and dissemination of FIPA standards and artefacts in several ways (newsletter, web site, white papers).

The Relevance of FIPA

Over the last few years, FIPA has been playing an important role in bringing together a broad cross-section of organizations (both industrial and academic) and key players from several fields including Information Technology and Telecommunications. In doing so, the FIPA body addressed important needs of the whole agent community recognizing the main challenges to be faced today.

- Specifications for standardising agent communication and interoperability of multi-agent systems.
- *Challenge*: even if only FIPA does this, it is important to clarify how other standard activities and technologies relate to its work. In this perspective, FIPA has established a number of liaisons to ongoing standardization activities and bodies.
- Promoting the deployment of specifications such as software implementations: FIPA specifications are today the basis of many agent platforms and applications.
- *Challenge*: even though quite few platforms

are largely deployed in the research community, most of them have not reached an industrial grade and business use has not happened so far.

- Enabling and facilitating the integration of agents within current existing IT contexts.
- *Challenge*: FIPA has a strong industrial basis for this to be possible, but growth in its membership and contribution is essential.
- Defining and running a software maturity process - FIPA has set up an IETF-like process, including many implementations, tests and deployments.
- *Challenge*: gathering input from research and industrial applications of software agents, including feedback on the deployment of FIPA technology is a fundamental aspect.

FIPA Main Achievements

The outputs of FIPA in terms of standard specifications, tools, applications and methodologies can be considered as important indicators of maturity of the agent-oriented software paradigm, which are necessary for wider deployment and industrial take-up. Over 80 projects worldwide have used the FIPA agent specifications in a range of applications including telecoms and mobile systems, manufacturing, ecommerce, logistics, environment management, medical informatics and knowledge management. FIPA is the most commonly quoted agent communication model in presentations at agent conferences. Furthermore, FIPA's activity has been and remains the basis of several important frameworks:

- The Agentcities / OpenNet global agent testbed as a living network of FIPA compliant platforms and services – for more info see http://www.agentcities.net/ and http://www.agentcities.org/.
- The JADE board initiative which groups several companies working together to develop the JADE Platform and promote its adoption by the mobile Telecom industry as a standard middleware for mobile Peer-To-Peer intelligent agent applications – see http://jade.tilab.com/board.html.
- The set of open-source and licensed FIPA toolkits (a list of the main ones can be found at http://www.fipa.org/resources/livesystems.html), including the JSR-000087 Java Agent Services specifications – for more information see the latest news at: http://www.jcp.org/aboutJava/communityprocess/review/jsr087/.

Joining and Contributing to FIPA

There is now a single tier of membership for FIPA starting in 2004 – as described in the former FIPA Inform! Issue (vol. 4, issue 2). Organisations join FIPA by paying an annual membership fee of 2250 CHF (Swiss Francs).

The *benefits of FIPA membership* include: helping to actively promote the uptake of agent technology; receiving early briefings of some of the latest research and developments in agent technology; being part of a very active, public, research and development agent community and full access to the FIPA agent documentation, email lists and technical fora.

Agents and the Semantic Web Activity

Humble Beginnings

The Semantic Web effort has liberated information on the web from being simply data formatted for human consumption, to knowledge that can be read and reasoned about by agents. From humble beginnings, semantic annotations have evolved from meta-level annotations designed primarily for automated document management, such as defining high-level categorisations that reflected the content of the document, to complex expressions that relate concepts embedded within the document using various Description Logic formalisms.

Semantic annotations provide a mechanism for explicitly defining concepts within web documents that agents can then reason about. By publishing referent ontologies, annotators can define formally the meaning of their markup, which can drive inferential queries that go beyond simple keyword matching, or facilitate meaningful aggregation of data from different sources.

The Semantic Web is far from being a "*fait accompli*"; we are still a long way off from the vision presented in Berners-Lee, Hendler and Lassila's seminal Scientific American paper on "*The Semantic Web*". The Web Ontology Language (OWL) was first released during the Summer of 2002, built upon RDF.

Current Activities

2004 has heralded major developments within the Semantic Web Activity. In February, the W3C announced the release of two key Semantic Web standards, a revised RDF standard and the OWL (Web Ontology Language) standard. The emergence of semantic web technology as actual commercial grade standards has encouraged many content providers and developers to publish their data RDF or OWL, thus providing a plethora of available semantic markup that can be utilised by Agent developers. In a recent article, Jim Hendler asserted "*...[that there is already] RDF and/or OWL on over 10 million-accessible resources, that a search engine [is] available that indexes at over 250,000 web pages with RDF or OWL on them and finds at least 20M RDF triples on these pages, that OWL ontologies with over 10,000 classes are available on line, and that at least one major software vendor [has announced] an ontology management system...*".

In addition to the release of these standards, several specifications have been released to support agent and application developers utilise the new standard [1]:

· *A revised RDF/XML Syntax Specification*: this updates the grammar in the RDF Model and Syntax Recommendation, and addresses questions that have been raised about parts of the RDF 1.0 specification;

· *The OWL Overview*: this provides an introduction to OWL and OWL-Lite;

· *RDF Concepts and Abstract Syntax*: this defines the abstract graph syntax on which RDF is

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It is possible and easy to contribute to FIPA in several ways. Contribution to the FIPA standards process begins with an idea for work being formed. Such an idea should be suitable for standardisation in supporting software agents and should be applicable to and in the context of other FIPA specifications. To submit an idea to FIPA for consideration, a work plan should be constructed which gives a detailed description of the work involved and a time line for developing this work further. Once completed, a work plan can be submitted to the FIPA membership. If there is enough support within the FIPA membership for the proposed work plan, it can be submitted to the FIPA Architecture Board (fab@fipa.org) for approval. When a work plan is submitted, the proposers of the work plan must commit to undertake the work in collaboration with other FIPA members, preferably at official meetings. Upon approval by the FIPA Architecture Board, a Technical Committee or Working Group will be formed to organise and coordinate the work plan, or it will be allocated to an existing TC or WG. You initially do not need to be a member to start to contribute, but it is expected that an organisation joins after its attendance of up to three FIPA meetings. Non-members can also join the technical and non-technical email lists.

Today's FIPA Activities

The main activities of FIPA are partitioned into different types. FIPA's core standardisation activities are centered on the creation and maintenance of specifications. This work is managed by Technical Committees (TCs). Other work, which may or may not be of a technical nature but does not necessarily contribute to the production of specifications, is handled by Working Groups. Special Interest Groups undertake auxiliary work, which is of interest to sections of FIPA membership. The current active TCs include: TC Adhoc, TC Modelling. TC Methodology, TC Security and TC Semantics. **TC Ad Hoc**'s interest lies in ad hoc networks, which consist of devices running either complete FIPA-compliant agent platforms, fragments of FIPA-compliant platforms or a combination of the two. **TC Methodology** is focusing on: compiling a glossary of terms and specifying a methodology based on the concept of a fragment of the development process represented in a formal XML schema. **TC Modelling** was established to develop vendor-neutral common semantics, meta-model, and abstract syntax for agent-based methodologies, **TC Security** is working on a concrete per-message-based security specification; an abstract security architecture specification that support multilateral, multi-party security profiles and an analysis of current security models for open distributed systems. The **FIPA Semantic TC**'s current plan is to specify both a set of requirements for semantic exchange among agents, (and later, between humans and agents) and a working model that demonstrates their achievability.

FIPA welcomes input from the community to strengthen the existing TCs and possibly develop other TCs in new work areas to help promote the uptake of agent technology.

S. Poslad
M. Calisti

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!

Combinatorics and Digital Communcation Group

The Combinatorics and Digital Communication Group (CCD Group) is a research and teaching group within the Computer Science Department of the Autonomous University of Barcelona (UAB). It was created in 1988 and is directed by professor Josep Rifà. The CCD group is organised as a research group constituted by 33 researchers (3 of them are professors). Few years ago, it was recognized as a Consolidated Research Group by the Department of Universities, Research and Information Society of the Catalan Government.

The main research line describing the activity of the group has been the study and tuning of methods, algorithms and prototypes to achieve security, reliability and efficiency in the telematic processing of information. Research interests in the group are distributed among several computer science areas related through combinatorics and digital communication. There are mainly three research lines in the group at the moment:

Agent Security and Mobility, and Cryptographic Protocols   The work of the group in this line is focused in two areas. Firstly, in the design and implementation of protection mechanisms for mobile agents and agent applications. In this area our group is working on itinerary protection mechanisms and

security and trust models. Secondly, in the design and implementation of cryptographic protocols, especially for electronic voting, electronic auctioning and other electronic commerce applications. Some results of this line have been patented and a spin-off company has been established.

Compression and classification
Two fundamental aspects of information processing are considered: classification and compression. In the case of classification, classic techniques as binary decision trees or linear discriminant analysis, as well as modern techniques as bagging or cascading are studied. In the case of compression, focused mainly on image compression, theoretical and practical research is currently under development in each one of the three steps of most image coding systems: transform (wavelets), quantization, and entropy coding.

Combinatorics and Algebraic Codification
This was the first area of research in the Group. It is focused on the study, construction and classification of algebraic codes for error-detection and correction in digital transmission systems. Currently, new families of non-linear binary codes are considered, specially, 1-corrector perfect codes and Z4-lineal, Q8-codes.

These research lines have been implemented through well-defined objectives in several competitive projects. The group has been funded by the European Commission, the Spanish Government, and the Catalonian Government. The list of more relevant projects include the developing of killer secure mobile agent applications, the developing of hyper-spectral image processing techniques for remote sensing, the implementation of an electronic voting scheme prototype, and the application of coding for error-correction in cryptography. The group is also participating in several thematic networks regarding agents, security, trust, and networks. The CCD Group has near 300 publications, including full books and articles in prestigious journals.

The teaching responsibilities of the group are distributed among 30 courses including undergraduate subjects, a doctorate program within the Computer Science Department, and specialization courses on security and networks.

For more information about our activities, staff, or a full list of projects and publications, please visit our web page at http://ccd.uab.es/?lang=angles

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based, and serves to link its XML serialization to its formal semantics;

· *RDF Semantics*: this specifies a precise semantic theory for RDF Model and Syntax and RDF Schema, and of corresponding entailment and inference rules which are sanctioned by the semantics;

· *OWL Semantics and Abstract Syntax:* this provides a high-level, abstract syntax for both OWL and OWL Lite;

· *RDF Vocabulary Description Language 1.0*: this describes how to use RDF to describe RDF vocabularies;

· *OWL Reference*: this provides a systematic, compact and informal description of all the modelling primitives of OWL;

· *Use Cases and Requirements*: a set of usage scenarios, goals and requirements for OWL;

· *Test Cases*: a set of machine processable test cases for both RDF and OWL that both illustrate how the two languages can be used, and also document correct behaviour.

At the same time as the release of the RDF and OWL standards, two new working groups were announced: the Semantic Web Best Practices and Deployment Working Group, & RDF Data Access Working Group.

Semantic Web Best Practices and Deployment Working Group
Theory and test cases are insufficient to gain a real understanding of how the semantic web can be pragmatically used by applications and agents alike. Only through applying techniques (and adapting them) to new, novel domains can developers acquire a fundamental understanding of the OWL, how it can be deployed, and what the large scale practical issues are. For this reason, the Semantic Web Best Practices and Deployment Working Group (SWBPD) was formed. Small task forces are invited to define a chal-

lenge problem, and develop a document describing best-practices processes for using Semantic Web technology [2]

RDF Data Access Working Group
RDF databases (or triple-stores) were some of the earliest Semantic Web infrastructure components to be developed. Just as much of the World Wide Web is generated from databases, an increasing volume of Semantic Web data is appearing in triple-stores. To utilise this markup, an agent may have to access one (or possibly several) triple-stores, each of which may assume a different protocol or query language. The RDF Data Access Working Group was chartered with the task of gathering requirements and define HTTP and/or SOAP-based protocols for selecting instances of subgraphs from RDF graphs, thus facilitating the integration of data from different sources on the web (akin to how SQL joins data through merging tables in local relational databases) [3]. The first Use Cases and Requirements document was published June 2004 [4].

In addition to the above activities, other agent-relevant efforts are underway within the Semantic Web Activity. One of the challenges for any author when generating annotated content is that of embedding annotation within HTML content. Traditional methods, some of which led onto the development of ontologies (such as Dublin Core [5] provide high-level meta annotations, typically at the top of the web document. Whilst this may be used to select certain documents from a corpus or web site, this form of annotation is too course-grained to facilitate agent-comprehension of web pages. Ideally, annotation should be at the term or element level within the document, integrated with the (X)HTML level.

To attempt to resolve this long-standing prob-

lem, the Semantic Web Coordination group publish a GRDDL Note in April, 2004 [6]. GRDDL - Gleaning Resource Descriptions from Dialects of Languages is a mechanism for encoding RDF statements in XHTML and XML. This mechanism relies on the fact that some transformation mechanism exists (referenced within the document) that provides explicit transformations for the XHTML annotations into RDF, typically using XSLT. Annotations are embedded within XHTML tags, and their interpretation can be affected by the structure of the document. Whilst this can be problematic for an agent to interpret, the linked XSLT transformation includes the missing interpretations that when applied to the source document, yield unambiguous RDF. This mechanism also has the added advantage that an agent need only parse RDF rather than interpret XHTML.

Whilst the Semantic Web may still be in its infancy, current activities clearly demonstrate that the effort is no longer constrained to a few research labs scattered around the world, but that concerted efforts are underway to determine how to define, publish, access and utilise semantic markup, both at the research and commercial level. As more markup becomes available, so do the opportunities for Agent researchers to exploit this valuable resource, and to make a significant contribution towards an emerging paradigm.

[1] http://www.w3.org/2001/sw/Activity
[2] http://www.w3.org/2003/12/swa/swbpd-charter
[3] http://www.w3.org/2003/12/swa/dawg-charter
[4] http://www.w3.org/TR/2004/WD-rdf-dawg-uc-20040602/
[5] http://dublincore.org/
[6] http://www.w3.org/TR/2004/NOTE-grddl-20040413/

T. Payne