Meeting Results

Report of Pleasanton Meeting

The 23rd FIPA meeting was held October 8-12, 2001 in Pleasanton, California, USA hosted by Sandia National Laboratories. The annual General Assembly voted on the FIPA Board of Directors and modifications to the Statutes.

Work was performed as follows:

AgentCities SIG: See Page 3.

Architecture TC: Continued work on service models and abstract content representation.

Compliance TC: Created to generate conformance profiles for FIPA specs and conformance methodology.

FIPA for Business Applications SIG: Created to ensure and demonstrate the business relevance of FIPA by identifying core benefits that FIPA offers to industrial application areas.

Gateways TC: Developed Call for Technology on ad-hoc FIPA. Proposed changes to *Nomadic Application Support.*

Interoperability WG: Created to run interoperability trials, providing feedback on specifications.

Ontology TC: Developed and considered requirements based on use cases. Completed white paper and second Request for Information.

Product Design & Manufacturing WG: Formally dissolved, with the work in the three teams to continue as SIGs and liaison activities with the HMS.

Security WG: Developed white paper and discussed feedback to Request for Information.

Semantics TC: Released Request for Information.

More details at
www.fipa.org/activities/pleasanton2001.html

D. Steiner

Report of Sendai Meeting

The 22nd FIPA meeting was held July 23-27, 2001 in Sendai, Japan, hosted by Communications Technologies.

Work was performed as follows:

AgentCities WG: Submitted a test suite for FIPA. Changed to SIG.

Agreement Management TC: Formally dissolved.

Architecture TC: Continued work on service directory service and abstract content representation. Suspended work on policies and domains.

Gateways TC: Released Preliminary Specifications on *Message Buffering Service* and *Message Interoperability Service*. Proposed changes to *Message Transport Service* providing buffering, transformation and transport-behavior.

Ontology SIG: Promoted to TC. Released Request for Information.

Product Design & Manufacturing WG: Revised workplan to comprehend three teams: Holonic Enterprise, Planning & Scheduling, and Shop Floor/Machine Control.

Security SIG: Promoted to WG.

Semantics SIG: Created to provide new FIPA semantics framework.

More details at
www.fipa.org/activities/sendai2001.html.

D. Steiner

News In Brief

FIPA is here to stay. As announced at the 22nd Meeting in Sendai, Japan, the membership overwhelmingly voted to continue FIPA beyond its initial 5-year term.

On September 1, 2001 the FIPA Secretariat duties were transferred to Jacqueline Kelly, in Concord, USA. The Secretariat can be contacted at secretariat@fipa.org.

After election by the General Assembly at the 23rd Meeting in Pleasanton, California, the new FIPA Board of Directors is structured as follows:

- Frank McCabe, Fujitsu – President
- Bernard Burg, Hewlett Packard – VP and Secretary
- Donald Steiner, WebV2 – Treasurer
- Michael Berger, Siemens – Chair, Membership and Nomination Committee
- Monique Calisti, EPFL – Chair, Image Committee
- Kihoshi Kogure, NTT – Director
- Heimo Laamanen, Sonera—Chair, Finance and Audit Committee

The next FIPA meetings take place February 11-15, 2002 in Lausanne, Switzerland; May 6-10, 2002 in Vancouver; and late July 2002 in Helsinki, Finland. See http://www.fipa.org/activities/meetings.html for more details

The eagerly awaited open source release of the lightweight extensible agent platform from the EU 5th Framework Project LEAP was available as of September 2001. Details and source code downloads are at http://leap.crm-paris.com.

On the educational front, Rogier Thiessen has built a FIPA-Compliant Agent Development Toolkit. More information is at http://www.epitec.nl/gadget/

J. Kelly

Why Semantics is Important

Like me, are you somewhat intimidated by the cryptic notation used in the "formal model" sections of FIPA specifications? You may also wonder what relevance these cryptic squiggles have for the average programmer or businessperson.

FIPA's core mission is to construct specifications that permit true interoperability between agent systems, which means sharing tasks in meaningful and mutually beneficial ways. A key feature of FIPA's approach includes the assumptions that the systems belong to different owners and use 'public' means of communication.

Unlike human agents, software agents won't likely 'hang out' and chat, because all conversations between software agents have a purpose. From our point of view, a key purpose is the establishment of an agreement. Sometimes, the agreement refers to a real world activity involving the owners of the agents; at other times, the agreement refers to future behavior of the agents themselves—often about future conversations. (Of course, a given conversation may also *fail* to arrive at an agreement.) Another characteristic of agent conversations and contracts is that they can *be* about the agents'

shared activities. Even the *form* of a conversation can be governed by these pre-existing agreements.

Combining conversations and agreements in a way that avoids future glitches is a prime goal of FIPA's effort to construct a new semantic framework. Key deliverables would demonstrate:

- a rigorously defensible link with declarative statements that can constrain the permissible behaviors of a set of agents (particularly communicative behaviors);
- a sequence of messages that constitutes a permissible conversation protocol for establishing contracts;
- a set of subsequent agent behaviors that are justified/constrained by the contract.

The best tool for modeling concepts is logic. Newer logical techniques, based on modal logics, are very powerful tools for modeling the key ideas behind agents' interactions.

To date, the main emphasis on agent semantics has been based on Cohen and Levesque's Belief, Desire, and Intent (BDI) framework. These are based on modeling the mental states of agents.

FIPA Sendai Workshop

Agent Applications and Business in Japan

The workshop held at the 22nd FIPA Meeting in Sendai targeted the business applications of agent technology that FIPA should seriously consider.

First, Professor Tetsuo Kinoshita of Tohoku University talked on **Personal view of Agent Applications in Business**. As an introduction to the entire workshop, he summarized the result of the discussion at Network Agent Committee of Japan Information Processing Development Corporation, an extra-departmental body of Ministry of Economy, Trade and Industry. Professor Kinoshita was a chair of the applications working group. Using enterprise application integration as an example, he compared agent approaches with web-based solutions such as ebXML, SOAP, UDDI, WSDL etc. He concluded that agents should co-operate, not compete, with such non-agent technologies. The importance of the 'killer application' was also stressed.

Next, Professor Yasuhiko Kitamura of Osaka City University presented **Web Integration through Multiple Character-Agents Interface**. Human user interface is one of the key areas of agent technology, which is currently missing in FIPA specifications. Professor Kitamura showed the Multiple Character-agents Interface (MCI) in which multiple animated life-like character agents collaboratively work together to assist the human user in integrating information from the web. He demonstrated two prototypes to which the MCI was applied: Venus and Mars (cooperative cooking recipe search engine) and Recommendation Battlers (competitive restaurant recommendation application).

Kiyoshi Kogure of NTT talked on **Real-World-Oriented Information Integration and its Application to Digital Cities**. Digital Cities was an open initiative to create virtual 'cities' in the Internet that correspond to real and live physical cities. In his talk, geographically-oriented information integration system called GeoLink and agent-based coordination of regional information services were presented. The presentation was followed by a demonstration by Jun-ichi Akahani of NTT, who showed **Agent-based Coordination of Regional Information Services**. He demonstrated an agent-based system that enables flexible coordination of regional information services. This system adopted the GeoLink system, which was used in the Digital City Kyoto prototype, as a regional information server. FIPA ACL was used for inter-agent communications.

EU **CRUMPET** project team, led by Professor Stefan Poslad of Queen Mary, University of London, presented and demonstrated the project, implementation of FIPA Nomadic Application Support Specification, and micro FIPA-OS that is optimized for small and wireless devices. CRUMPET stands for CReation of User-friendly Mobile services PEronalised for Tourism. It implements context-aware tourism services for nomadic users. The participants in the demonstration were astonished by the powerful yet friendly application based on iPAQ PDA and FIPA agent technology.

After the demonstration session, Hiroyuki Aga of Sony talked on **The E-commerce Experiment in the Personal Agent-oriented Virtual Society "PAW^2", and its Evaluation**. Sony is one of major ISPs in Japan and they have been running PAW^2 (Personal Agent World – pronounce: pau-pau) on the Internet. PAW^2 is a multi-user 3D shared virtual environment that has about 120,000 registered users. Sony conducted the experiment to sell 'virtual' items with 'real' money, which are used to decorate, enhance or give access to special events to user's avatars in the virtual world. In the talk, he described PAW^2 system, its architecture, selling method, and the result of the experiment. In fact, total amount of real sales of the virtual items was more than one million yen in two months. It has been proved that agents can make money!

Tomoko Koda is a Senior Vice President of Technology, Lycos Japan Inc. In **Lessons Learned from Starting up Venture Businesses with Agent Technologies in Japan**, she shared with the audience her past experiences of developing and deploying agent-based applications. First, Petaro was a desktop agent with built-in advertisement of McDonald's, which made a great success. Then, Ms Koda started her own venture business, i-chara, which was aimed at creating intelligent animated characters that live in internet-capable mobile phones. Unfortunately, i-chara was liqui-

FIPA Pleasanton Workshop

The workshop held at the 23rd FIPA Meeting in Pleasanton focused on current trends and industrial applications that address agent-based applications and research concepts. These talks illustrated some unique and progressive approaches to agent application development within the government, military, and business sectors. Presentations were given by Dianne C. Barton, Sandia National Labs on **Use of Agent in Massively Parallel Simulation Systems;** Menno Jonkers, Tryllian on **Commercial Mobile Agent Technology**; John Howard, Sandia National Labs on **Computer Security Policies**; Ken Whitebread, Advanced Technology Laboratories on **Agent-based Systems for Military Command and Control**; and Ming-Chien Shan, Hewlett-Packard Laboratory on **Agents technology in E-Business**. We cannot sufficiently summarize all of these topics but will provide highlights of the talks given by Dianne C. Barton, Ken Whitebread, and Menno Jonkers.

For years researchers in high-performance computing and grid-based environments have been incorporating agent-based systems into their systems. Dianne Barton presented the successful smart agent-based economic simulation modeling system, known as ASPEM. This progressive economic modeling environment relies on agents to incorporate micro-level data to develop interaction forecasts for this complex system. Agents are also used to enhance the performance of the overall infrastructure by incorporating classifier systems and genetic programming algorithms to augment current/future agent behavior. The resulting complex adaptive system can be examined both computationally and analytically, offering new ways of experimenting with and theorizing about the impact of perturbation or shocks to an infrastructure network. ASPEN has been used in several domains and is now being used to model the electrical grid.

The military has used agent-based technology in many of their experimental applications for several years. Ken Whitebread provided an exceptional view of the Command and Control tasks applications for the US Army, Navy, and Marines. This talk highlighted major impact and effectiveness of agent-based technology on these Command and Control Systems. The lessons learned over these years have lead to the recent developments of the next generation CoABS project to develop an agent system development environment, known as Interoperable Intelligent Agent Toolkit (I2AT) program. The I2AT project expands the original focus to transition the agent-based system programming model from the research community into the general software engineering community. The I2AT project will achieve this process by developing a novel agent-oriented programming and life cycle model with the potential to revolutionize system development. This approach hopes to simplify the transition of the Command and Control Systems by allowing users and their IT support staff to do much of their own application development.

While agent-based tool-kits and developmental environments strive to improve the overall acceptance of this technology, only recently have these tools begun to be more acceptable by the larger research and business communities. Menno Jonkers provided a presentation and demonstration of the unique software technology and tools for agent system development, from the Dutch-based Company Tryllian. Unlike most tools the Tryllian software focuses on mobile agents, viewing them as distributed software components with high-level interactions, able to migrate between servers and easily given complex, 'intelligent' behavior. This talk also provided discussion of the challenges of transforming academic problems into mature commercial solutions with their product.

This workshop provided the participants with five exceptional presentations focusing on current application trends within the government and business sector. Like the Sendai 2001 workshop these presentations strive to exhibit the extent of agent-based systems outside of the initial research and academic community, while providing insight into future research goals and directions that still need to be explored.

N. Berry

The Agentcities Project

The *Agentcities* project is an initiative, originally designed to create a worldwide network of agents that is permanently available, open to anyone who wants to deploy agents, applications and services in a heterogeneous environment.

This project aims to create a network where agents that are running on different platforms, owned by different organizations, implemented in different ways and providing diverse services, can interact. Although standards such as DAML+OIL, ebXML, XML, RDF and others are relevant, the basis for this interoperability will be the FIPA standard for software agents.

The nodes currently announced or deployed in the Agentcities network (see Figure 1) are agent platforms. Agents running on a particular platform are able to connect to other publicly available platforms and communicate directly with their agents. Applications involving agents on multiple different network nodes can be created through the flexible use of this inter-agent communication model and the semantic frameworks, shared ontologies, content languages and interaction protocols that support it.

Figure 1: Deployed Agentcities Platforms in the Agentcities Network

Some nodes in the network will further provide useful services such as directory services (white and yellow pages), ontology services (simple repositories or more complex services for sharing ontology definitions), gateways (to perform translations between, for example, different transport protocols, languages, security domains and the like), testing and bootstrapping (automated systems to test the interoperability of platforms and to enable simple debugging and monitoring).

Towards a Global Network

The following Agentcities projects have either been funded or are planned for future deployment:

- Two projects Agentcities.RTD and Agentcities.NET have been funded by the European Commission's 5th Framework IST program (14 and over 50 partners respectively).
- Related project funding proposals have been submitted in Canada (19 partners), France (7 partners), Finland (2 partners) and Hungary (4 partners).
- Projects are planned in Japan (8 partners),

the United States (12 partners), Australia, New Zealand and Switzerland.

Although these projects each have their own funds and aims (deployment of services, distributed holonic manufacturing, user interface and learning, ontologies, domain and policies, and wireless deployment, etc.), they are unified in the objective of creating a global interoperability infrastructure based on common standards.

Agentcities Applications

Whilst infrastructure (messaging, directories, etc) is necessary to create the network, the objective of the Agentcities project is not simply to deploy infrastructure but also to create a rich, open environment to explore the semantic-web ecosystem by supporting diverse applications.

The initial example of developing a platform in the network to model the services available in a town or city: tourism, entertainment, events, history, travel (hence the name *Agentcities*) simply provides a convenient domain focus to begin tackling the problems of semantics, ontology and dynamic service composition in manageable proportions. Other Agentcities projects are already considering very different application domains and how to exploit Agentcities in their own way. Interest groups that are already forming include: Travel, tourism and entertainment services, centered around cities and major events; Business services, like market places, payment systems, transactions and catalogue services; Coordination technologies, for media streaming and synchronization; Medical and healthcare services, for organ transplantation, access to patient medical records and local emergency services; Manufacturing and supply chain integration, for coordinating distributed manufacturing processes and supply chain integration; Security services, for analyzing and addressing the security needs of such open, heterogeneous environments; eLearning, for distributed tutoring systems; Personalization of user services to suit individual tastes; and seamless deployment over any kind of network.

Agentcities Task Force

With the progress of the Agentcities deployment around the world, the need of a forum for coordination appeared to leverage efforts in the Agentcities network, and also to generalize it towards the complete ecosystem of web-services. This effort is called Agentcities Task Force (ACTF). It will act in the following capacity:

- *Coordination*: Facilitate coordination between different projects and activities contributing to and using the Agentcities network.
- *Network support*: Encourage and support joint resources such as directories, ontology repositories and the like.
- *Promotion, dissemination and liaison*: Raise

awareness of work being carried out in the network to effectively contribute to existing standards bodies and to encourage increased interest, participation and development.

The ACTF will act as a coordinating body between different Agentcities projects, and will also liaise with relevant standard bodies where the Agentcities community might bring valuable experimental feedback on agent platforms, content representation, ontologies, content manipulation, agent communication and interaction protocols. At the time of writing, the ACTF is still being formed and a consultation process is underway.

Conclusions

Agentcities looks set to become the largest deployment of interoperating agents and is growing fast. As a global, open testbed, Agentcities answers the need of a shared, large-scale experimentation of agent systems and Internet-based services in the ever changing world of technologies, and also enriches the agent world through the use of DAML+OIL, XML, RDF and other standard technologies to shape a new ecosystem leading the way to the information systems of the future.

S. Willmott, J. Dale and B. Burg

For more information on the Agentcities project, see the Agentcities Web site at:
http://www.agentcities.org/

However, for modeling the relationships between agents, focusing on the publicly observable effects of agents' behaviors is more sound.

Put simply, if you sign a contract to buy a car, whether or not you are feeling happy or intend to sell the car the following day, you have signed the agreement. Therefore, your future behavior is constrained (you have to pay off the loan) along with that of the dealer (he has to service the car).

What about our original consumers of semantics: programmers and businesspeople? Programmers need confidence and the ability to rely on contracts between the elements that they are using. From a programmer's perspective, programming 'against' an entity with unreadable rules is almost impossible. The programmer has to waste tremendous energy trying to anticipate situations that might never happen—simply due to the uncertainty in dealing with willful agents. Having a clear contract makes the task of programming agents much more tractable.

However important contracts may be to programmers, they are far more important to businesspeople. Justifying investment in a business risk is hard if no guarantees exist about the rights and responsibilities of the parties.

The promise of all those cryptic squiggles is that programmers will be able to give accurate advice to businesspeople about the rights and obligations entered into by their agents. Accurate semantics support accurate e-commerce.

F. McCabe

FIPA Member Profile—Siemens

Siemens with headquarters in Berlin and Munich (Germany) is one of the world's largest electrical engineering and electronics company and one of the richest in tradition. In fiscal 2000, the company recorded sales of EUR 78.7 billion. Siemens had 447,000 employees at the end of the fiscal year on September 30, 2000 in over 190 countries around the world in hardware and software production, engineering, service, sales, and development. The company operates some 500 production facilities in over 50 countries, underlining its status as an innovative global player. The company boasts an impressive international presence, focusing on the core business segments of Energy, Industry, Information and Communications, Health Care, Transportation, and Lighting.

The intelligent autonomous systems group within Siemens Corporate Technology is one of the international competence centers in the area of agent technology, actively involved in international program committees (e.g. ATAL, AOSE, PAAM), acting as conference chairs (e.g. Autonomous Agents 2001), lecturers at Summer Schools and universities, project coordinators and reviewers for the European Commission and other communities as well as providing board member and TC chair in FIPA. The focuses of the group are basics in agent technology, agent-oriented software engineering (AgentUML), agent platforms (MECCA, LEAP), and, in particular, application areas supporting the Siemens business units (like automotive, transport services, mobile communications and services, industry) with new middleware (e.g. agent platforms), components (e.g. matchmaking), applications, solutions and services. The projects range from case studies, technological consulting, and business opportunity scanning to prototypes. Exemplary projects are games on air (community support for mobile gaming), personal travel assistance (door-to-door travel planning and guidance), human resource management (job profile matching), e- and m-Business, electronic auctioning as well as corporate team management. Within the European project LEAP (Lightweight Extensible Agent Platform, IST 1999-10211) Siemens presented a LEAP-based FIPA-compliant agent platform with a footprint less than 30kB on the mobile phone SL45i enabling smart agent-based applications on small devices supporting mobile communications.

B. Bauer and M. Berger

dated in June 2001. Her 'heaven and hell' talk concluded with a powerful manifesto: 'Yes, agent technology is marketable.'

Finally, Gaku Yamamoto of IBM Tokyo Research Laboratory talked on **Caribbean: Technology of the Agent Server capable of Hosting Large Number of Agents**. After successful implementation of Aglets mobile agent platform, researchers at IBM TRL are working on business applications of agent technology. Caribbean is an agent server that can host hundreds of thousands of agents on a single computer for real applications needs. As an operating system manages processes and related resources, Caribbean handles agents and takes care of persistency, messaging, shared services, memory management and execution scheduling. The agent server was actually used in a banking system and proved better performance compared to traditional RDB-based systems.

The presentations are available at http://www.fipa.org/activities/sendai2001.html

H. Suguri

The Newsletter of the Foundation for Intelligent Physical Agents

FIPA Member Profile—Sandia

Sandia is a multiprogram national lab operated by Sandia Corp., as a subsidiary of Lockheed Martin, for the US Department of Energy's National Nuclear Security Administration. Sandia employs approximately 7500 researchers between their main site in Albuquerque New Mexico and a second site in Livermore Ca. Established as an engineering. and integration facility Sandia National Labs (SNL) has a long history of pursuing cutting edge research to support a diverse set of projects. Sandia provides scientific and engineering solutions to meet national needs in nuclear weapons, defense systems, energy, security, environmental integrity, and national challenges for both government and industry. Sandia sustains areas of scientific depth in the following disciplines: Adv. Manufacturing, Biotech., Computational and Information Sciences, Electronics, Eng. Sciences, Materials and Process Sciences, Microelectronics and Photonics, Modeling and Simulation, Nanotechnology, Pulsed Power Sciences, Surety Sciences.

Agent-related research at SNL began in the early 1990's and extends today across several research groups at both SNL sites. These groups provide competency in agent research and applications generally associated with problem solving, enterprise integration, modeling and simulation, integration, computer security, robotic collaboration, and parallel-computing domains. Newest applications for agent technology include human cognition, swarm systems, biological-based system, smart sensors, and pervasive/embedded systems.

The agent-related projects developed at Sandia are used to support a wide variety of business activies and research interest; we will only hightlight a few projects for this article. The widely popular Java Expert System Shell (Jess) software, which was initially developed to solve

the mosaic classification problem; is widely used to provide reasoning for several agent systems and applications. The exceptional Standard Agent System uses the concept of virtual genomes to generate a multiagent system capable of providing computer security against intruders, virus attacks, and trojan horses. While the ASPEN project uses agents to generate an economic modeling environment to evaluate complex infrastructure behavior (e.g., electrical grid). The ABel project explored concepts for incorporating agents into existing enterprise infrastructure to improve integration and performance.

The Sandia agent researchers collectively represent diverse participation in chairing and coordination of workshops, tutorials, and programs for various conferences related to agents, super computing, neural networks, AI related topics, university based seminars, as well as TC chair participation in FIPA.

N. Berry

Edited by the FIPA Image Committee. Comments and opinions are those of the authors, not necessarily of FIPA or its members. Please submit articles of interest to the agent or FIPA community for future issues of FIPA Inform! All correspondence, including submissions for "News in Brief" should be addressed to Image@FIPA.org