

**PROPOSAL FRONT PAGE: PART B**

***FULL TITLE:*** AgentLink III: A Co-ordination Network for Agent-Based Computing

***ACRONYM:*** AgentLink III

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***LIST OF PARTICIPANTS:***

1. Department of Computer Science, University of Liverpool, UK (Liv)
2. Department of Electronics and Computer Science, University of Southampton, UK (Soton)
3. Whitestein Technologies, Switzerland (Whitestein)
4. Software Department, Universitat Politecnica de Catalunya, Spain (UPC)
5. Gerstner Laboratory, Czech Technical University, Czech Republic (CTU)
6. Dipartimento di Elettronica, Informatica e Sistemistica, Universita degli Studi di Bologna, Italy (UniBo)
7. Siemens Aktiengesellschaft, Germany (Siemens)
8. British Telecommunications plc, UK (BT)

***CO-ORDINATOR NAME:*** Peter McBurney

***ORGANIZATION NAME:*** University of Liverpool, UK

***CO-ORDINATOR EMAIL:*** p.j.mcburney@csc.liv.ac.uk

***CO-ORDINATOR FAX:*** + 44 151 794 3715

## **PROPOSAL SUMMARY PAGE**

**FULL TITLE:** AgentLink III: A Co-ordination Network for Agent-Based Computing

**ACRONYM:** AgentLink III

### **STRATEGIC OBJECTIVES:**

The objectives of this co-ordination action are as follows (listed in decreasing order of priority):

- To gain competitive advantage for European industry by promoting and raising awareness of agent systems technology.
- To support standardisation efforts for agent technologies and to promote interoperability.
- To facilitate improvement in the quality, profile, and industrial relevance of European research in the area of agent-based computer systems, and draw in relevant prior work from related areas and disciplines.
- To support student integration into the agent community and to promote excellence in teaching and in the area of agent-based systems.
- To provide a widely known, high-quality European forum in which current issues, problems, and solutions in the research, development and deployment of agent-based computer systems may be debated, discussed, and resolved.
- To identify areas of critical importance in agent technology for the broader IST community, and to focus work in agent systems and deployment in these areas.

### **PROPOSAL ABSTRACT:**

AgentLink III is proposed as a follow-on to AgentLink II, the IST-funded Network of Excellence for agent-based systems established in August 2000. Agent-based systems are one of the most vibrant and important areas of research and development to have emerged in information technology in the 1990s, and underpin many aspects of the broader IST FP6. An agent is a computer system that is capable of flexible autonomous action in dynamic, unpredictable, typically multi-agent domains. Some application domains where agent technologies will play a crucial role include: *Ambient Intelligence*, the seamless delivery of ubiquitous computing, continuous communications and intelligent user interfaces to consumer and industrial devices; *Grid Computing*, where multi-agent system approaches will enable efficient use of the resources of high-performance computing infrastructure in science, engineering, medical and commercial applications; *Electronic Business*, where agent-based approaches are already supporting the automation and semi-automation of information-gathering activities and purchase transactions over the Internet; *the Semantic Web*, where agents are needed both to provide services, and to make best use of the resources available; *Bioinformatics*, where intelligent agents may support the coherent exploitation of the data revolution occurring in biology; and others including monitoring and control, resource management, and space, military and manufacturing applications, for example.

Many observers believe that agents represent the most important new paradigm for software development since object-orientation. The concept of an intelligent agent has already found currency in a diverse range of sub-disciplines of information technology, including computer networks, software engineering, artificial intelligence, human-computer interaction, distributed and concurrent systems, mobile systems, telematics, computer-supported cooperative work, control systems, and electronic commerce.

AgentLink III will act as a unifying focus for agent-based activities in these different domains. As with AgentLink and AgentLink II, the long-term goal of AgentLink III is to put Europe at the leading edge of international competitiveness in this increasingly important area.

## **B.1 Scientific and technological objectives of the project and state of the art**

AgentLink III is proposed as a follow-on to AgentLink II, the IST-funded Network of Excellence for agent-based systems that was established in August 2000. Agent-based systems are one of the most vibrant and important areas of research and development to have emerged in information technology in the 1990s, and underpin many aspects of the broader IST Sixth Framework Programme. An agent is a computer system that is capable of flexible autonomous action in dynamic, unpredictable, typically multi-agent domains. Some application domains where agent technologies will play a crucial role include: Ambient Intelligence, the seamless delivery of ubiquitous computing, continuous communications and intelligent user interfaces to consumer and industrial devices; Grid Computing, where multi-agent system approaches will enable efficient use of the resources of high-performance computing infrastructure in science, engineering, medical and commercial applications; Electronic Business, where agent-based approaches are already supporting the automation and semi-automation of information-gathering activities and purchase transactions over the Internet; the Semantic Web, where agents are needed both to provide services, and to make best use of the resources available, often in cooperation with others; Bioinformatics and Computational Biology, where intelligent agents may support the coherent exploitation of the data revolution occurring in biology; and others including monitoring and control, resource management, and space, military and manufacturing applications, for example.

Many observers believe that agents represent the most important new paradigm for software development since object-orientation. The concept of an intelligent agent has already found currency in a diverse range of sub-disciplines of information technology, including computer networks, software engineering, object-oriented programming, artificial intelligence, human-computer interaction, distributed and concurrent systems, mobile systems, telematics, computer-supported cooperative work, control systems, and electronic commerce.

AgentLink III will act as a unifying focus for agent-based activities in these different domains. As with AgentLink and AgentLink II, the long-term goal of AgentLink III is to put Europe at the leading edge of international competitiveness in this increasingly important area. The Agent Technology Roadmap, prepared as part of AgentLink II, identified 41 recommendations to promote research, development and, importantly, take-up in agent-based computing and to consolidate Europe's strengths in this area. AgentLink III will work towards these objectives by means of the following medium-term goals:

- to gain competitive advantage for European industry by promoting and raising awareness of agent systems technology;
- to support standardisation efforts for agent technologies and promote interoperability;
- to facilitate improvement in the quality, profile, and industrial relevance of European research in the area of agent-based computer systems, and draw in relevant prior work from related areas and disciplines;
- to support student integration into the agent community and to promote excellence in teaching and in the area of agent-based systems;
- to provide a widely known, high-quality European forum in which current issues, problems, and solutions in the research, development and deployment of agent-based computer systems may be debated, discussed, and resolved;
- to identify areas of critical importance in agent technology for the broader IST community, and to focus work in agent systems and deployment in these areas.

To achieve these goals, AgentLink III will:

- actively promote awareness of agent research and development activities within European industry by means of an industrial awareness programme, to include visits, liaison, awareness events and case-studies, drawing attention to the potential advantages of agent-based solutions and describing the scope of agent-systems technology;
- promote the adoption of standards and the awareness of standardisation activities in the area of agent technology, and engage with standardisation efforts, by contributing to ongoing standardisation forums, and disseminating specifications;

- encourage technology transfer from academia to industry, by supporting industrial-academic meetings and pump-priming technology transfer collaborations, particularly with respect to the IST programme;
- provide support for innovative, high-quality conferences and workshops related to agent systems research, technology, and applications, and foster cross-disciplinary research links;
- consolidate the pan-European infrastructure for drawing in students to the area of agent-based systems, disseminating curricula, reading lists, courses, and teaching materials;
- establish and maintain databases that map agent-based systems research and development skills to researchers and practitioners across Europe;
- establish high-quality channels of communication on research, technology, and application aspects of agent-based systems, including a dedicated World-Wide Web (WWW) site, email list, and printed newsletter.

Experience with AgentLink II demonstrates that this programme will clearly achieve the medium term goals of AgentLink III, and represents a sound and pragmatic first step towards the long term network goals. As with AgentLink II, every effort will be made to encourage AgentLink III members to be as fully involved as possible both in the activities and the decision-making aspects of the network.

AgentLink III will focus on the *take-up* aspects of agent systems. Thus AgentLink III will not directly support research, nor will it support development of applications. Instead, AgentLink III will encourage and wherever possible facilitate industrial-academic and cross-disciplinary collaborations, and will enable the flow of results, technologies, problems, and skills in both directions. In addition, AgentLink III will promote the adoption of agent technologies in European industry through the dissemination reports on areas of strategic importance and European strength, as well as on establishing effective links with related disciplines and with related areas.

AgentLink and AgentLink II defined the scope of their activities via a classification scheme, which proved to be effective in determining how and where network resources can and should be applied. AgentLink III will adopt a revised version of this classification scheme, and extend it over time – see Tables 1 and 2 below.

Emphasis in the research actions of AgentLink III will be placed on best practice (e.g., methodologies for agent system design), and on drawing in aspects from related areas as well as contributing to these other areas. The industrial/application areas to be addressed by AgentLink III are summarised in Table 2.

<b>Table 1: Research Areas within the scope of AgentLink III</b>
RA1 Micro/agent-level issues in agent technology 1.1 Agent control architectures 1.1.1 deliberative/cognitive agent control architectures & planning 1.1.2 reactive/behavioural agent control architectures 1.1.3 hybrid agent control architectures 1.1.4 layered agent control architectures 1.2 Foundations of agency 1.2.1 practical reasoning/planning and acting 1.2.2 rational action & agency 1.2.3 decision making, decision theory, & agency 1.2.4 agent representation & specification formalisms 1.2.5 semantics of agency & logics of agency 1.2.6 computational/complexity issues of agency
RA2 Macro/society level issues in agent technology 2.1 cooperation 2.1.1 cooperation protocols 2.1.2 models and formalisms for cooperation 2.1.3 game/economic theoretic models of cooperation 2.1.4 conflict detection & resolution in multi-agent systems 2.1.5 coalitions & coalition formation 2.2 coordination 2.2.1 coordination techniques and protocols 2.2.2 coordination languages & systems 2.3 computational market systems

2.3.1	market-based control
2.3.2	market-oriented programming
2.4	communication
2.4.1	agent communication languages
2.4.2	speech acts
2.5	negotiation, bidding, and argumentation
2.6	foundations of multi-agent systems
2.6.1	emergence of cooperation and social action
2.6.2	sociology, ethology, and their relationship to multi-agent systems
2.6.3	functionality and swarm behaviour in multi-agent systems
2.6.4	semantics of multi-agent systems & logics of multi-agent systems
2.6.5	computational/complexity issues of multi-agent systems
RA3 Agent system implementation issues	
3.1	environments & testbeds for agent system development
3.2	programming languages, tools, & libraries for agent system development
3.3	relationship of agents to objects and other paradigms (e.g., logic programming)
3.4	evaluating agent systems
RA4 Best-practice in agent system development	
4.1	standards for (multi-) agent systems
4.2	analysis, specification, design, & verification techniques for agent systems

<b>Table 2: Development/Application Areas within the scope of AgentLink III</b>	
DA1	Electronic commerce
DA2	Information gathering, management, and retrieval
DA3	Internet and World-Wide-Web agents
DA4	Expert assistants & human computer interfaces
DA5	Business process control, workflow, emergency management
DA6	Industrial control & scheduling, embedded systems
DA7	Telecommunications network management and control
DA8	Simulation
DA9	Entertainment & virtual environments
DA10	Education
DA11	Robotics
DA12	Mobile computing
DA13	Intelligent home & office
DA14	Advanced services
DA15	Health

A key success of AgentLink II has been to establish a high-quality communications infrastructure for communicating the results of the network. The key aspect of this infrastructure is a WWW site: the domain name `AgentLink.org` was registered for AgentLink, and all the network's public documents and activities are accessible via this regularly maintained site. The aim in AgentLink II was to establish `www.AgentLink.org` as a "portal" site for international agent-related activities, and it has been successful in becoming identified as the key agent resource in this respect. The aim for AgentLink III will be to enhance the content of the website to provide a stronger resource to support take-up activities, and to provide a semantically rich domain for use by agents themselves.

In addition, AgentLink established a printed newsletter, which was substantially improved and enhanced in AgentLink II, especially with respect to presentation and distribution. As well as carrying news about AgentLink itself, this newsletter carries "feature" articles of general interest to the agent community, keeping members up-to-date with the main developments in the field. The newsletter is distributed to all AgentLink members and to a broader global distribution list, and is also freely available via the AgentLink WWW site.

Finally, a regular monthly email digest has been established, (currently with nearly 600 subscribers), through which the activities of AgentLink are communicated to members. AgentLink III will continue all of these infrastructure activities, and will work towards the goal of becoming recognised as the first point of contact for agent activities in the European region.

The success of AgentLink III will be assessed primarily by measuring:

- the number of sites becoming or applying to become members of AgentLink III;
- the number of research and education activities established through AgentLink III, and the volume of interest in these activities; and finally
- the general level of interest in agent technology in European industry and academia.

## B.2 Relevance to the objectives of the IST Priority

The stated focus of the IST Programme in FP6, contributing to the Community's social objectives, is to

*“on the future generation of technologies in which computers and networks will be integrated into the everyday environment, rendering accessible a multitude of services and applications through easy-to-use human interfaces. This vision of "ambient intelligence"<sup>1</sup> places the user, the individual, at the centre of future developments for an inclusive knowledge-based society for all.”*

(IST 2003-2004 Workprogramme, p4).

In order to realise this vision, new technologies are required, which cut across traditional R&D boundaries and go beyond existing software and communications paradigms. Agents are currently regarded as the best candidate for such technologies - hence the enormous interest in agent technology throughout the software and telecommunications industries.

As stated in Section B.1, AgentLink III will address a range of issues and problems facing the European agent community, in order to enhance the effectiveness of agent R&D activities and to help diffuse results, problems, techniques, and experiences among the relevant communities. In so doing, AgentLink III will make a clear positive contribution to the aims of the IST programme and the social objectives it supports.

AgentLink III will have both a *primary* and *secondary* contribution to the Community's social objectives. The primary contributions of AgentLink III will be in the short term (less than five years), and are likely to be:

- the delivery of new and improved (agent-based) goods and services to citizens and organisations within the community;
- the development of new economic activities in the IT and telecommunications sectors (recognised as being crucial to the future success of European industry);
- wealth creation through the exploitation of new goods and services;
- improvements in the profile, industrial relevance, quality, and take-up of European agent research, with obvious positive benefits for creation and exploitation of new technologies, industries, and services; and
- the dissemination of advanced IT skills throughout the European region, with the obvious social benefits such exposure brings.

The secondary contributions of AgentLink III to community objectives will be more long term, and perhaps less tangible. These will include the development of a coherent European R&D community working in the agent area, as well as new European collaborations in the agent area. Agent technology is not restricted to one specific computing or communications domain. Rather, it is likely to play a key role in many aspects of the IST programme. AgentLink III seeks to develop the community infrastructure surrounding the general field of agent-based computing, which contributes in specific ways to the identified societal and economic challenges of IST in FP6. In particular, the areas for support are centrally aimed at “complex problem solving in science, society, industry and businesses” with a focus on both the technological development and,

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<sup>1</sup> ISTAG report: Ambient Intelligence scenarios for 2010, [www.cordis.lu/ist](http://www.cordis.lu/ist)

importantly, issues of take-up of this key enabling technology, so that it can and will provide better access to better knowledge and computing resources in these areas. Additionally, issues of “trust and confidence” have been identified in the AgentLink II Roadmap as deserving particular attention, both in relation to inter-agent interaction, and agent-user interaction. This is needed for reliability and effectiveness at a technological level, but also at the level of take-up and adoption. Indeed, the aims of AgentLink III are to address these aspects in a much stronger way than has been done previously.

In part due to the efforts of previous AgentLink projects, Europe has established itself as a leader in the field of agent-based computing in technological development, and particularly in industrial take-up. Europe is well-placed, but given the critical underpinning role of agent technologies across the broad range of Strategic Objectives in the IST programme, the need to further support efforts to ensure co-evolution of agent and other technologies and applications, and to explore new inter-disciplinary and intra-disciplinary relationships, is evident.

Below, we identify those areas of the IST programme that are most closely related to agent technology, and therefore most closely related to AgentLink III. The workprogramme of AgentLink III is situated firmly within the *Semantic-based knowledge systems* Strategic Objective, although many others are highly relevant. In particular, the following issues addressed under the *Semantic-based knowledge systems* Strategic Objective are seen by many as requiring agent technologies for providing the active components that realise the value of the Semantic Web through traversal and processing:

- *Semantic-enabled systems and services*: services that are “self-organising, robust and scaleable” suggest reification as agent-based systems, bringing to bear a range of techniques and tools for dealing with the dynamism and openness that characterises the Semantic Web.
- *Knowledge-based adaptive systems*: systems that provide “anytime-anywhere inferencing”, especially in support of “modelling and optimisation, automated diagnosis and decision support”, also align with the specific area of agent technologies, which address all these aspects, particularly in relation to agent architectures for decision-making, and to multi-agent systems that have achieved limited but notable successes in application to modelling and optimisation problems in industry.

The concepts inherent in a consideration of *Semantic-based Knowledge Systems* are those addressed within and by agent-based computing, which covers a broad range of related and relevant areas. Areas of particular interest in AgentLink and AgentLink II, addressed through Special Interest Groups, were all concerned with relevant areas: Intelligent Information Agents; Agent-Mediated Electronic Commerce; Agent-Based Simulation; Agents that Learn, Adapt and Discover; Methodologies for Engineering Agent Systems; and Mobile Agents for Telecoms and the Internet. Cross-fertilisation was a key part of this work with relationships established between the agent community and OntoWeb, EUNITE, COLOGNET, and others. Indeed, one of the key areas of focus in AgentLink III will be the establishment of further cross-disciplinary links between communities, and the establishment of links within disciplines but across areas, as recommended by the AgentLink Roadmap.

Related areas in the 1<sup>st</sup> call include the *Networked Businesses and Governments* Objective, specifically in relation to “*management of dynamic collaborative network* through work on ontologies, the social structure of agents and organisations (AgentLink II Roadmap, Recommendations 9-11) and complex adaptive systems (Recommendations 39-40). “Technologies for interoperability” makes explicit reference to “open networks intelligent, autonomous, self-adaptive, self-configurable and scalable software components for networked organisations”, exactly the same areas of concern as for agent-based computing. Indeed, the application and technology areas identified correspond very strongly to those explicitly discussed within the Roadmap.

AgentLink III is also directly relevant to several key issues in the second IST call. In particular, it impacts directly on *Open development platforms for software and services* through addressing the problems arising from open, dynamic and distributed systems, and in providing technologies for the interaction of systems and services. The AgentLink II roadmap identifies software development methodologies for agent systems as being especially important, and recognises the need for providing agent-oriented CASE environments, libraries of interaction protocols, etc (Recommendations 4, 5, 6). *Cognitive Systems* is similarly relevant in relation to methodologies for the construction of adaptive cognitive systems (which are also appropriately characterised as agents, and work on agent architectures and aspects of agent decision making and learning

will contribute substantially to this Objective. Interdisciplinarity here is a key recommendation of the AgentLink II roadmap (Recommendations 36-41).

The use of “intelligent, adaptive and self-configuring services”, “user profiling and personalisation” in the *Applications and Services for the Mobile User and Worker* Objective are targeted by the Roadmap (Recommendations 18-21), as are its concerns with interoperability of services (through coalitions and virtual organisations (Recommendation 17). Finally, agents provide a means to release the potential of Grid computing, and have been identified as one of the key enablers of the Semantic Grid, with eScience also identified as an important area by the AgentLink II Roadmap (Recommendation 15). This addresses aspects of the *GRID-based systems for solving complex problems* Objective.

### **B.3 Potential impact**

The potential economic impact of AgentLink III is enormous. Agents are recognised as an important technology for complex systems development by most major software and information technology companies across the world. This interest is evidenced by the fact that agent research and technology groups have been established by such companies as (in the USA), Microsoft, IBM, Sun Microsystems, AT&T, and Netscape. Many other large US companies with an information technology interest have also been actively engaged in agent projects. Examples include Andersen Consulting, Charles River Analytics, US West, and Xerox. In Europe, interest has spanned both technology companies and user organisations, including BT (UK), DaimlerChrysler (D), France Telecom (F), Motorola (F), Philips (NL), Rolls Royce (UK), Siemens (D), Telefonica (ES), and others engaging strongly in agent activities. Many industrial players in Europe have some of the longest-established agents research and development groups in the world, and are members of AgentLink II. Many SMEs and start-up companies specifically created to develop and exploit agent technology (such as Living Systems, D; Lost Wax, UK; Whitestein, CH) have also benefitted from AgentLink and AgentLink II activities over the past 5 years.

The main application/development areas in which agent systems are currently having an impact are summarised in Table 2. In electronic commerce (DA1), multi-agent negotiation, bidding, and argumentation techniques are found appropriate for second generation electronic commerce systems, in which computer systems will autonomously engage in transacting business across the Internet. More generally, agents are seen as a method for exploiting the Internet and World-Wide-Web (DA3) by companies who wish to exploit the agent metaphor in providing personalised, adaptive expert assistants & human computer interfaces (DA4). Business process control and workflow systems (DA5) are naturally represented as societies of cooperating agents, with agents corresponding to either individuals or organisations. Agent-based industrial control & scheduling systems (DA6) have been pioneered in Europe. Telecommunications network management and control systems (DA7) have been investigated by many telecommunications companies. More recent but promising development activities also fall within the scope of AgentLink III, including simulation (DA8), entertainment & virtual environments (DA9) and education (DA10). Some aspects, like mobile agent technology, potentially cut across many of these activities. Even minor advances in these application areas will prove to have dramatic impacts on profitability and competitiveness for the organisations involved. For example, with respect to electronic commerce, there is enormous commercial and competitive advantage to be gained by the first companies that provide effective autonomous negotiation or bidding techniques.

While these very different application domains have widely varying properties, certain common themes emerge that will be the focus of AgentLink III activities. In single agent applications, the design of systems that are capable of flexible, timely autonomous action becomes paramount. When considering multi-agent applications, the design of societies that are capable of effective cooperation become more important. The research areas of AgentLink are focussed on understanding the principles behind both of these areas.

Finally, like all advances in software, the wider use of agent-technology is likely to have a positive effect in the range and complexity of software systems that can be successfully implemented. This in turn is likely to lead to areas of research and development that can currently only be guessed at.

The effective dissemination of AgentLink III results will be vital to the effectiveness of the project. The primary mechanism for dissemination of AgentLink III results will be electronic: as described in Section B.6, a dedicated World-Wide Web site will be established for AgentLink III, where all public AgentLink III documents, reports, databases, teaching materials, and software will be made available. Email will be used wherever possible to facilitate communication and decision making within the network (including a dedicated, edited email newsletter). A regular printed newsletter will continue to be published from AgentLink II to communicate news and other relevant information throughout the network. Industrial/technology databases, and research databases will also be developed, and distributed both within AgentLink III and to other interested parties. The power of the web- and print-media for communications are shown by the success of the AgentLink II web-site and newsletter: the AgentLink II web-site is now the major portal in Europe for agent technologies, and the newsletter achieves wide and influential distribution.

AgentLink III will also take advantage of many academic lines of communication in order to contact potentially interested parties. Examples include the many open electronic mailing lists dedicated to agent-based activities, the various established and respected conferences in the area of agent systems (which many AgentLink II nodes have been involved in organising), and journals in the area (which many AgentLink II members have editorial representation on).

Finally, the various *technical forum groups* (TFGs) (T5.1, T5.2) will ensure the flow of expertise and results between nodes of the network, and in particular, will facilitate technology transfer from research to industry. These activities will create tightly focussed communication channels that simply would not exist otherwise.

### **B.3.1 Contributions to standards :**

Much of the standardisation effort in the agent community has fallen to the Foundation for Intelligent Physical Agents (FIPA, see: [www.fipa.org](http://www.fipa.org)) and the Object Management Group (OMG), which are the premier agent standardisation bodies, although the former is the significant active organisation. Importantly, as technologies converge, other non-agent standards are becoming increasingly relevant; over the next few years, there will be a much larger role for the less rich, but more widely adopted, *Web Services* standards.

Europe has been a prime mover in the FIPA standardisation effort, which seeks to address interoperability concerns through a sustained programme. This is one area in which the visibility of agent technology is strong, with some of the most active take-up efforts from early adopters as, for example, is illustrated by the Agentcities initiative.

The core mission of the FIPA software agent standards consortium is to facilitate the interoperation and interworking between agents across multiple, heterogeneous agent systems. To this purpose, FIPA has been working on specifications that range from agent platform architectures to support communicating agents, semantic communication languages and content languages for expressing messages and interaction protocols that expand the scope from single messages to complete transactions. FIPA activities are concerned with: building a service model for representing, modelling, discovering and using services; developing a new semantic framework to reflect the needs of verifiability and conformance; creating new specifications to ensure that interoperability between FIPA-compliant agent platforms and platform fragments can be maintained in *ad hoc* networks; standardising ontology modelling, representations and use within agent systems.

In the last few years, several new technologies have emerged that are aimed specifically at the ad-hoc networking that is central to the support of significant agent-based systems. These include Jini, UPnP and Salutation, for example, which define discovery and registration protocols that allow for dynamic discovery. Similarly, markup languages such as XML and RDF(S), along with standardised ontologies, provide a means for resource description and manipulation of this data at a semantic level. Much of this amounts to a matter of leveraging existing work for application to agent-based computing, one of the most salient current examples being *Web Services*, which include UDDI, SOAP, WSDL/WSCL, etc. There are also now a large number of agent development environments and toolkits (including 10-15 implementations of the latest FIPA standards). While not all of the available tools are sufficiently mature for mission critical usage (especially the non-commercial offerings), such systems are providing researchers and developers with vital tools for

rapid prototyping and testing of agent systems. In a similar vein, initiatives at the community level offer important potentially standardised infrastructure, or standards for infrastructure, that can provide a critical enabler for development of scalable interoperable systems. These include: XML, the universal format for structured documents and data on the Web; RDF, a framework for describing and interchanging metadata; ebXML, to standardise XML business specifications; RosettaNet, to create and implement industry-wide eBusiness process standards.

AgentLink III will contribute to the development of agent-specific standards activities, notably through efforts such as FIPA; facilitating the dissemination of relevant standards initiatives in the area of agent technology through academia and industry; and finally focussing European research on agent-based systems on industrial problems, by facilitating the transfer of user requirements from industry to agent researchers. AgentLink III will seek to become affiliated with standards organisations, building on relationships already established, and developing new relationships. It will seek to ensure community representation in the standards efforts themselves, and to contribute directly to ongoing standardisation activity. Resources will be made available for AgentLink III members to attend meetings and report upon standardisation initiatives.

## B.4 The consortium and project resources

Given the potential size of the proposing consortium, (AgentLink II has over 180 members), it would be infeasible to present a CV and background for every proposer. For this reason, we simply give a CV of the main coordinators of the project, and list the members in Appendix 1.

### **Partner 1 (Co-ordinator): Department of Computer Science, University of Liverpool, UK**

**The University of Liverpool** was founded in 1881, and is one of Europe's leading research Universities. Since its founding, members of University staff have won 8 Nobel Prizes (in Physics, Chemistry, Physiology or Medicine, and Peace). Annual research income is approximately 90 million euros. Today, the University has more than 23,000 registered students, in faculties covering a wide spread of academic disciplines: Medicine, Arts, Law, Science, Engineering, Veterinary Science and Social and Environmental Studies. Research plays a major role in the University, and, as just one example of that, the University obtained

**The Department of Computer Science** at the University of Liverpool has 25 academic staff, and was awarded a grade of 5 in the most recent Research Assessment Exercise (RAE) conducted by the British Government in recognition of the international standing of its research. The Agent Applications, Research and Technologies (Agent ART) Group is one of the leading centres for Agent Research in Europe. The Department also has several other strong research groups, the Logic and Computation Group, the Complexity, Theory and Algorithms Group, BioComputation and Computational Biology Group, and Pattern Recognition and Image Analysis Group. The Agent ART Group has undertaken a number of European research projects, most recently the European Fifth Framework IST SLIE project (IST-1999-10948) and the Esperanto Services Project (IST-2001-34373), aiming to bridge the gap between the current World Wide Web and the Semantic Web. Research projects have also been undertaken for national research funding councils, such as the Engineering and Physical Sciences Research Council (EPSRC) and the Biotechnology and Biological Sciences Research Council, and leading information technology companies, such as British Telecom and Hewlett-Packard.

**Peter McBurney** is a lecturer in the Department of Computer Science at the University of Liverpool, UK. He has a First Class Honours degree and University Medal in Mathematical Statistics from the Australian National University, Canberra, and a PhD in Computer Science from the University of Liverpool. He is the author of a number of papers on multi-agent systems in journals and at major conferences. He was Co-Chair of an American Association of AI (AAAI) Fall Symposium on Chance Discovery in 2002, and was Programme Co-Chair and Local Organizer of the UK Multi-Agent Systems (UKMAS) meeting in Liverpool, UK, in December 2002. McBurney was a member of the core team which produced the AgentLink II Roadmap, which outlined a strategy for research and deployment in agent technologies in Europe over the next decade. Between his two degrees, McBurney spent over a decade as a management consultant, advising global telecommunications companies on market entry strategy and implementation. His work involved the creation and management of large, multi-disciplinary teams of telecommunications industry professionals for new venture planning and establishment, and his clients included: AT&T, British Telecom, ICO Global, Inmarsat, NYNEX, Pacific Telesis, Singapore Telecom, Sony, US WEST, and World Insurance Network.

**Michael Wooldridge** is Head of Department, Head of the Agent ART Group and Professor of Computer Science in the Department of Computer Science at the University of Liverpool, UK. He has been active in the research and development of multi-agent systems for over a decade, gaining his PhD for work in the theoretical foundations of multi-agent systems from the University of Manchester, UK in 1992. Prof Wooldridge has published over 100 articles in the theory and practice of agent-based systems, and has edited or co-edited eight books in the area. He is also the sole author of two books on multi-agent systems, one a research monograph, and one an introduction to the subject. He has served on many program committees for conferences and workshops in the area, and is a director of the International Foundation for Multi-Agent Systems (IFMAS). He is co-chair of the Second International Joint Conference on Multi-Agent Systems (AAMAS-03), to be held in Melbourne, Australia. He also serves as co-editor of the *Journal of Autonomous Agents and Multi-Agent Systems* (Kluwer), and an editorial board member for the *Journal of Applied AI* (Taylor & Francis). He was Coordinator of AgentLinkI, the first AgentLink network.

**Wiebe van der Hoek** is Professor of Computer Science in the Department of Computer Science at the University of Liverpool, UK. He has a masters degree in mathematics from the University of Groningen, and a PhD in Computer Science from the Free University in Amsterdam. His research centres on epistemic logic and its use in multi-agent systems, and he is the author or editor of ten books or special issues, and over 100 research papers in this area. He has been honoured with numerous invitations to give invited talks, and in 2002, was the recipient of a William Evans Award Fellowship, allowing an extended academic visit to New Zealand. van der Hoek is an Associate Editor of the journal *Studia Logica*, and a board-member of the LOFT-conference (Logic and the Foundations of Game and Decision Theory), an international conference on logic and game-theory. He is a board member of the AgentLink network of excellence and was the coordinator of the AgentLinkII Workpackage on Education and Training, from February 2001.

## **Partner 2: Department of Electronics and Computer Science, University of Southampton, UK**

**The University of Southampton's** origins date from 1862, and it was granted its Charter as a University in 1952. It now has over 100 departments, research centres, and associated consultancy units. Its Faculties are: Arts, Science, Social Science, Engineering and Applied Science, Mathematical Studies, Law, Medicine, Health and Biological Sciences, and University of Southampton New College. The University now has over 18,000 students (as at November 1998), based at its seven major campuses in Southampton and Winchester. Mergers and new initiatives have expanded its academic base over recent years and brought new opportunities for teaching and research.

**The Department of Electronics and Computer Science** at Southampton University is the largest of its kind in the UK. It is ranked fourth in the world for academic research in electronic engineering and was awarded a grade 5\* for Electronics and a grade 5\* for Computer Science in the 2001 RAE exercise. Research activities are currently concentrated into eight major areas namely communications, declarative systems and software engineering, image speech and intelligent systems, microelectronics, multimedia, parallel and distributed computing and optoelectronics. The Department recently identified agent-based computing as a new strategic direction for research and has developed a large agent technology group with related interests in knowledge technologies, pervasive computing and other areas.

**Terry Payne** is a Lecturer within the Intelligence, Agents, Multimedia Group, at the University of Southampton. He holds a BSc. In Computer Systems Engineering from the University of Kent at Canterbury, UK, and an MSc & PhD in Artificial Intelligence from the University of Aberdeen, Scotland. He is currently engaged in research on agent-based service discovery, coordination, and interoperation for agents, web services and Services on the Computational Grid through DAML-S and the Semantic Web. Other research projects cover areas of machine learning and adaptive interfaces; to date he has published over 30 papers and articles on this work, and in 2001 was the winner of the Semantic Web challenge at SWWS01. He is on several Program Committees for various Agents, Services and semantic web conferences, and is the Tutorial Chair for the 2003 International Conference for Electronic Commerce. He is currently involved in the DARPA Agent Markup Language (DAML) programme; is a co-author of the DAML-S Service Description Language; and a member of the International Joint Semantic Web Services Consortium (SWSC) - Language Committee.

**Michael Luck** is a Senior Lecturer in the Intelligence, Agents and Multimedia Group in the Department of Electronics and Computer Science at the University of Southampton, UK. He has worked in the field of agent technology and multi-agent systems for over ten years, having previously led the Agent-Based Systems Group at the University of Warwick for seven years, and having gained his PhD from University College London in 1993 for work on agent-based discovery. Dr Luck is a co-founder of the UK Special Interest Group on Multi-Agent Systems, and currently Chair of the UKMAS Steering Committee. He is a member of the Advisory Boards of FIPA (the agent standards body), MAAMAW (the European agent conference) and CEEMAS (the Central and Eastern European agent conference). He has served on numerous programme committees for agent conferences and workshops, and has organised and chaired several international conferences in the area of agents, including those for industry. Dr Luck has contributed to policy making forums for national and European agencies, has reviewed proposals for many national and international funding agencies, and has published extensively in this area (with over 75 papers and 5 books). Since 2000, he has been Director of AgentLink, the European Network of Excellence for Agent-Based Computing.

### **Partner 3: Whitestein Technologies, Switzerland**

Based in Switzerland, Whitestein Technologies is a young SME (founded in January 1999) with a team of about 50 enthusiastic and highly skilled people distributed between various offices in Zurich (Switzerland), Bratislava (Slovakia) and Sophia Antipolis (France). Whitestein strongly believe that agent-based technologies will be the foundation of a next generation of distributed information systems and network infrastructures, in particular, in combination with other leading-edge technologies such us web services, GRID approach and mobile wireless computing. One of their main interests is on the definition and deployment of flexible, smart and effective techniques for better coordination of software systems and components and thereby services offered in electronic complex environments such as communication networks, adaptive supply networks, hospitals, etc.

**Monique Calisti** joined Whitestein Technologies AG in June 2002 as vice-president of the Research and Development group. She is currently responsible for several internal research activities (including scientific editing, publishing, students' supervision in collaboration with academic partners); for Whitestein's participation and technical contribution to two main current international - ITEA and IST- projects, and, in the last months, she has been directly involved in four proposals for the 1<sup>st</sup> IST call of the 6<sup>th</sup> EU FP. Actively involved in the activity of FIPA since 1998, where she has been working in several technical working groups, also as the editor of the FIPA Content Language Library specification, she is currently a Director of the Board of FIPA. After her graduation (with distinction) from the Università degli Studi di Bologna (Italy) in Electrical Engineering in 1996, she obtained her first PhD in Telecom Engineering (i.e., network management in distributed networks). She then attended the post-graduate School in Telecommunication Systems at the EPFL in Lausanne (Switzerland) before finally joining the Artificial Intelligence Laboratory of EPFL. Here she obtained in 2001 her second PhD in Computer Science (i.e., coordination of self-interested and constrained software agents). Direct participation in the European ACTS project KEOPS (1996-1997), active contribution to the Agentcities.RTD IST proposal and project (2001-2002), work package leader and contributor in the Agentcities.NET and AgenLink II IST projects.

Note that should the agreement on Swiss participation in FP 6 not be in force when the European Commission definitively decides to support the project, Swiss partners will be funded by the Swiss Government.

### **Partner 4: Universitat Politecnica de Catalunya (UPC), Spain**

The UPC was created in 1971. The university is located on 9 campuses in Catalonia with the two main sites located in Barcelona. Almost all technical fields are taught at the faculties and technical schools of the UPC. In addition, the UPC provides academic supervision to a number of associated schools and hosts several research institutes. The Software Department is one of the 38 departments of the UPC and has 150 staff members (100 with tenure track). The Knowledge Engineering and Machine Learning (KEMLg) has been active in the Artificial Intelligence field since 1988. Currently, the group comprises 8 researchers (7 with tenure tracks), 10 Ph.D. students and more than 30 students doing their final projects under our supervision. KEMLg has a long track record in European projects and participates actively in National and International research programs. UPC is currently the technical coordinator of the highly successful Agentcities.RTD and Agentcities.NET projects 5<sup>th</sup> Framework projects. The group's main fields of interest are the Agents Technology, Communication and Coordination technologies, Knowledge Engineering and Management, Machine Learning and Knowledge Representation. UPC co-ordinates the largest PhD programme on Artificial Intelligence in Spain. Two key personnel at UPC are **Ulises Cortés**, who is Coordinator of the Artificial Intelligence Ph.D. programme of the Technical University of Catalonia (since 1991) and has over 30 international journal papers and over 75 conference/workshop papers, and **Miquel Sànchez-Marrè**, a researcher in the Artificial Intelligence Section, of the Software Department (LSI), at the Technical University of Catalonia, who undertakes research in agent-based and distributed intelligent systems.

**Steven Willmott** is a Researcher in Artificial Intelligence Section of the Software Department (LSI), at the Technical University of Catalonia and holds a fellowship from the Spanish Ministerio de Education, Cultura y Deporte. Steven obtained a BSc degree in Mathematics from the University of Warwick (UK, first class

honours), an MSc degree in Knowledge Based Systems from the Department of Artificial Intelligence, University of Edinburgh (UK, with distinction and the Howe prize for best Student) and completed his PhD entitled ‘Coordination Structures for the Intelligent Control of Dynamic Distributed Systems’ at the École Polytechnique Fédéral de Lausanne (Lausanne, Switzerland) in December 2001. His main research interests combine Distributed Artificial Intelligence (in particular: agent communication, open agent infrastructures, organisation and co-ordination) and distributed network environments. For the past 3 years he has served as the technical coordinator of the European Agentcities projects (Agentcities.NET IST2000-28384 and Agentcities.RTD IST2000-28385 with a total budget 7.3Million €) and is one of the primary coordinators in the global Agentcities initiative (<http://www.agentcities.org/>).

### **Partner 5: Czech Technical University, Czech Republic**

The Gerstner Laboratory was founded in 1996 as an extension of the Joint Research Centre of Czech Technical University in Prague and FAW, University of Linz (Austria) and supported by the University Research Support Scheme grant of the Ministry of Education of the Czech Republic. The Gerstner Laboratory carries out basic research in distributed artificial intelligence, multi-agent systems, machine learning and system diagnostics, knowledge-based systems, data warehousing & data mining, evolutionary computing, intelligent robotics and biocybernetics. The areas of applied research include computer integrated manufacturing, software testing and software diagnostics, and system diagnostics. Research activities in the laboratory are primarily funded by local/European research projects and industrial contracts. The laboratory co-operates extensively with both international and local industrial companies e.g. Rockwell Automation (US), Vitatron Medical (NL); US Air Force Research Laboratory (US), Grundfos A/V (DK), TeleData Electronics (DE); LIAZ Pattern Shop (CZ). The laboratory has established links with many universities and institutions worldwide via bilateral agreements, networks of excellence and joint projects. Since 2000 the Gerstner Laboratory has been involved as a key actor in the EU Centre of Excellence MIRACLE (Machine Intelligence Research and Application Centre for Learning Excellence). The laboratory organized or was directly involved in organizing several international conferences, workshops and summer schools (e.g. CEEMAS 2003, BASYS 2002, KSCO 2002, ACAI/EASSS 2001, HoloMAS 2000-2003, BASYS 1998, ILP summer school 1998, DEXA 1994).

**Michal Pechoucek** works as assistant professor in Artificial Intelligence at the Department of Cybernetics, CTU FEE. He graduated in Technical Cybernetics from FEE-CTU in 1995, got his M.Sc. degree in IT: Knowledge Based Systems from the University of Edinburgh and completed his Ph.D. in Artificial intelligence and biocybernetics at CTU in Prague in 1998. He is the Head of the Agent Technology Research Group at the Gerstner Laboratory for Intelligent Decision Making and Control. His research focuses on problems related to social knowledge, acquaintance models, forming coalitions, monitoring, meta-reasoning and reflection in multi-agent systems while at the same time he is interested in industrial applications of agent technologies. Dr. Pechoucek participated in and coordinated several international projects (EC funded) and acted as a principal investigator of direct research contracts (Rockwell Automation, US Air Force, Office of Naval Research, NASA). He is an author or co-author of about 50 publications in proceedings of international conferences and journal papers. In addition, he is the co-chair of the International Workshop on Industrial Applications of Holonic and Multi-Agent Systems (HOLOMAS 2000, 2001, 2002) and CEEMAS2003 - Central and Eastern European Conference on Multi-Agent Systems. Besides, he is a PC member of several workshops and conferences related to multi-agent system research. Michal Pechoucek consults with Rockwell Research Center in Prague and is a senior research consultant in CertiCon, corp.

### **Partner 6: Department of Computer Science and Engineering of the University of Bologna, Italy**

The Department of Electronics, Computer Science and Systems (DEIS) is a research centre of the University of Bologna, Bologna, Italy. It was officially established as a Department of the University of Bologna in April 1983 and consists of approximately 100 professors and permanent researchers plus an equal number of non-permanent researchers including PhD candidates. The department was created by merging the Institute of Electronics and the Institute of Automatics. Nowadays, the field of technical interest is grouped into seven areas: Automatics, Biomedical Engineering, Computer Science, Electromagnetic Fields, Electronics, Operations Research, and Telecommunications. DEIS features an impressive record of research activities,

publications, presence in national and international scientific organisations, patents as a first general impression of the scientific outcome. DEIS currently produces about 350 scientific publications per year. It operates 19 research labs and has approximately 50 active project contracts with industry and external institutions. The total amount of funding in 2001 was 4.6 million Euro with about 24% coming from the University of Bologna, 47 % from MIUR and CNR, 11% from the European Commission, and 18% from industry. DEIS continues to grow strongly, as reflected by a 50 % increase in the full professorship establishment between 2000 and 2002.

**Andrea Omicini** is Associate Professor at the DEIS, the Department of Computer Science and Engineering of the University of Bologna. He received his Laurea degree in Electronic Engineering in February 1991 and his PhD in Computer Science in November 1995, both from the University of Bologna. He has written over sixty articles on coordination models and languages, Internet technologies, and agent-based models and systems, published in international journals, books, conferences and workshops. He edited four international books on agent-related issues, and guest edited three international journal's special issues on coordination models and infrastructures. He has held several tutorials on agent-based systems and coordination models at international conferences. He has organized and chaired international conferences and workshops. Currently, he is the Program Chair of the 7th International Workshop "Cooperative Information Agents" (CIA 2003), and of the 19th ACM Symposium on Applied Computing (SAC 2004). He is also a member of the Program Committees of many international conferences and workshops. He is currently the Chair of the SIG on Agents and Multi-Agent Systems of the Italian Association for Artificial Intelligence (AI\*IA), and is Member of the Directive Council of the Italian Association for Logic Programming (GULP). Since 1991, he has participated to many national and international projects, and contributed to several NoE - AgentLink I and II in particular. Currently, he is Associate Investigator of the DEIS Unit for the MIPAF 3-years National Project *SIPEAA*, and Chair for the Working Group *Software Aziendale*.

### **Associate Partners**

In addition to the major partners listed above, there are three associate industrial partners who will provide expert advice and guidance to particular workpackages. Two of these companies, Siemens and BT, have completed A2 forms, and so are listed as Partners 7 and 8.

#### **Partner 7: Siemens Aktiengesellschaft, Germany (Associate Partner)**

Siemens, which has headquarters in Berlin and Munich, is one of the world's largest electrical engineering and electronics companies. In fiscal year 2002, the company recorded sales of DM 84,016 billion and income of DM2,597 billion after taxes and extraordinary items. Siemens had 426,000 employees at the end of the fiscal year on September 30, 2002. Spending on research and development was more than DM 5.8 billion in fiscal year 2002, or just over 6.9 percent of sales, underscoring the enormous importance of innovation at Siemens. The company's innovative strength is further evidenced by more than 7000 invention disclosure reports submitted. The company is the largest patent applicant at the German Patent and Trade Mark Office, and ranked first or second at the European Patent Office. More than half of Siemens' 53,000 researchers and developers are working on software projects in our various business areas, making the company one of the world's largest software houses. Siemens also continues to concentrate on expanding the range of services offered to complement its products, systems and solutions. The Corporate Technology (CT) department with its 2,400 employees worldwide plays a special role in the area of research and development inside Siemens. CT works as a network of competences and partner for innovation and works very closely with business departments. With its six technology departments (Materials & Manufacturing; Production Processes; Energy; Microsystems; Information & Communications; and Software & Engineering) CT contributes to the future of Siemens and increases the competitiveness of the company. The technology departments are concentrating on 40 core technologies with strategic importance for the company. For the AgentLink III project, Siemens will play an important advisory role, and no man-months have been budgeted for the company's contribution to the project.

**Jorg P. Muller** is currently a senior project scientist in the Software Agents group at Siemens AG, Munich, Germany, where he is developing innovative agent-based technologies and applications for e-commerce,

traffic telematics, and mobility. From 1996 to 1999 he was Principal Software Engineer for Zuno Ltd., a spin-off of Mitsubishi Electric in London, and for John Wiley & Sons, Ltd., where he developed architectures, services, and solutions for agent-based digital libraries and e-commerce. From 1991 to 1996, he was a scientist in the multiagent systems research group at the German Artificial Intelligence Research Centre (DFKI GmbH), Saarbrücken, Germany. He holds a Ph.D. in Computer Science from the Universität des Saarlandes in Saarbrücken, and a M.S. in Computer Science from the Universität Kaiserslautern. Dr. Müller has published one monograph, has co-edited four books, and has written more than 70 peer-reviewed research papers on Intelligent Agents.

#### **Partner 8: British Telecommunications plc, UK (Associate Partner)**

BT is one of Europe's leading providers of telecommunications services with a turnover of approximately 24.6 billion pounds in 2001/2002. Its principal activities include local, national and international telecommunications services, higher-value broadband and Internet products and services, and IT solutions. In the year ended 31 March 2002 (the 2001/2002 Financial Year), 89% of BT's revenues were derived from operations within the UK, where the company is the largest full-service telecommunications operator, serving over 21 million corporate and residential customers with more than 28 million exchange lines, as well as providing network services to other licensed operators.

BTexact Technologies, headquartered at Adastral Park (Martlesham Heath) in Suffolk, UK, is home to 3,500 of BT's top scientists, engineers and business people. Btexact's employees include many who are world leaders in their specialist fields, working at the forefront of standards development and new technologies in areas such as multimedia, IP and data networks, mobile communications, network design and management, and business applications. Btexact provides research, development and consulting services for BT: developing innovative technological ideas and solutions that translate into practical and marketable solutions for the businesses. The laboratories played a leading role in the development of global communications standards and the company inherits from them a science and engineering base acknowledged widely as second to none. BT spent 362 million pounds on Research and Development in 2001/2002. BT is an active participant in European collaborative R&D through its participation in EU Framework Programmes. BT has participated in all the EU Framework Programmes, mainly in the IST area.

**Dr Simon Thompson** has a BSc in Computer Science from the University of Hertfordshire and PhD in Applied Mathematics from the University of Portsmouth. His PhD thesis was concerned with structural risk minimisation in Machine Learning. Since 1997, Thompson has been working on developing commercial applications of Intelligent Agents. He is also heavily involved in the development of Agent Systems and is currently the Maintainer of the Zeus Agent Toolkit, an open source project developed by BT and now widely adopted as one of the leading tools for developing collaborative agent systems. He has authored a number of papers on subjects ranging from Machine Learning, Genetic Algorithms and Multi-Agent Systems to Business Process Representation and Abstraction. He is a named inventor in over ten pending patents. His areas of expertise are: Java, distributed computing, intelligent agents, collaborative agents, machine learning, open source development, community development processes, and agent development toolkits and environments. For the years 2002-2003 Thompson is a visiting research fellow at the University of Southampton. He has worked on three FP5 projects: LEAP, Agentcities.RTD and Agentcities.NET, and has experience of co-ordinating and running work packages in European funded projects. He is a co-ordinator in the CONOISE project funded jointly by BT and the UK e-Science initiative.

#### **Partner: IBM Research Labs, Israel (Associate Partner)**

IBM R&D activity in Israel began as the brainchild of the late Dr. Josef Raviv who opened the Scientific Center in 1972. In 1993, IBM established the Research Lab in Haifa (HRL). As part of IBM's Research Division, HRL's mission is to perform R&D projects vital to IBM's future success. These projects include work in the areas of VLSI design, verification technology, storage subsystems, computer systems, programming languages and environments, advanced applications, multimedia, and service technologies.

**Onn Shehory** is a researcher at IBM research labs in Israel. He is also an adjunct faculty member at the Technion, Israel Institute of Technology. Dr. Shehory has been studying, designing and developing agent-based systems for ten years. He has a comprehensive knowledge of the leading technologies in the field, and has published dozens of papers. Dr. Shehory has a rich teaching and lecturing experience. Since 1999, Dr. Shehory has taught several courses on agent technology at three institutes (Carnegie Mellon, Technion and Bar Ilan). Dr Shehory will provide expert advice, as an associate partner, to Workpackage 3 on Research Co-ordination.

### ***Cost Breakdown***

We next provide a brief breakdown and justification of the proposed budget for AgentLink III. Establishing and running AgentLink and AgentLink II, the previous European networks of excellence in agent-based computing, have given us considerable, detailed experience in the administration, costing and operation of networks such as these. Through this experience, we have learnt just how much work and expense is involved in creating and supporting a successful community, and in co-ordinating its research and development activities across Europe. This detailed and practical experience has guided our costing proposals for the AgentLink III Co-ordination Action. We have adopted what we believe is a realistic level of personnel support for the project, given the level of activity anticipated and the increased focus in AgentLink III on industrial awareness and deployment activities.

#### *Personnel Costs*

Over the three years of the network, personnel and salary costs (including associated indirect costs) will total: 1,090,120 Euros.

Will fund one financial and general project administrator, one events coordinator, and one WWW manager and information officer, one publications officer, each full-time throughout the life of the project. The tasks here show primary responsibilities; we envisage a shared support infrastructure across aspects of event organisation, in which personnel will contribute across tasks, so that peaks and troughs of activities may be balanced.

Experience with AgentLink II indicates that a significant amount of time is required to deal with network member expense claims, preparing the newsletter, dealing with applications for membership and general enquiries, and other administrative duties. The appointment of a full-time administrator is therefore essential to provide a professional network service.

Event organisation and coordination is a substantial role that will also require dedicated support. This involves events as diverse as the Agent Technology Conference for industry, the Technical Forum and the Summer School, each of which presents distinct demands, as well as Roadmapping, Management, Review and other *ad hoc* meetings,

A full-time WWW manager is also required in order to provide a professional, high-quality, up-to-date WWW site that facilitates semantic agent-based querying. Without such support, it is impossible to maintain the WWW site to provide a comprehensive resource for the community.

We will require a full-time publications officer to represent the network through high-quality, high-impact design, presentation and distribution of numerous publications. These include the 3-times-a-year newsletter, the annual report, the roadmap, industrial case-studies, as well as proceedings for events such as the Summer School and Technical Forum, leaflets invitations for the Agent Technology conference, etc.

Finally, an allowance has been made for salary costs for technical support staff, so that the web-server and email discussion server are provided at the highest levels of service quality.

### *Travel and Subsistence*

Over the three years of the network, travel and subsistence costs (including indirect costs) will total: 369,000 Euros. Travel will be a substantial component of the project activity, with visits budgeted on an average of 750 Euros per person per meeting. Per year, this includes: 4 industrial liaison visits, 4 standardisation liaison visits, 10 people to attend standards meetings, 50 people to attend Technical Forum meetings, 10 people to attend 2 management/other meetings per year. Additional support will be made available for smaller coordinator meetings. Experience with AgentLink II indicates that this will be adequate to maintain a high-level of activity.

### *Durable Equipment*

Over the three years of the network, the costs of durable equipment (including indirect costs) will total: 32,400 Euros. This provides for 6 PCs in the first year of the project, together with networking and printing costs, and 3000 Euro per year thereafter for miscellaneous computing costs.

### *Consumables*

Over the three years of the network, consumable costs (including indirect costs) will total: 10,800 Euros. This provides 4,500 Euro per year for consumables at each administrative site.

### *Subcontracting*

Over the three years of the network, sub-contracting costs (for which there are no indirect costs charged) will total: 30,000 Euros. This will provide for several weeks labour per year to be sub-contracted, for such tasks as preparing course materials, writing reports, roadmapping consultancy activity, and so on.

### *Other Costs*

Over the three years of the network, other costs (including indirect costs) will total: 460,400 Euros. This figure provides for the following items (all figures presented without indirect costs):

- Agent Technology Conferences;
- representation at major commercial conferences;
- conference/workshop support;
- Agent Summer School organisation, including production of all course materials;
  
- journal subscription for members;
- technical forum organisation and proceedings;
- printing roadmaps;
- printing newsletters and other leaflets, advertising materials, brochures, and suchlike; and
  
- shipping and postage costs for newsletters, etc
- costs associated with auditing of partner expenditures, and management of the project.

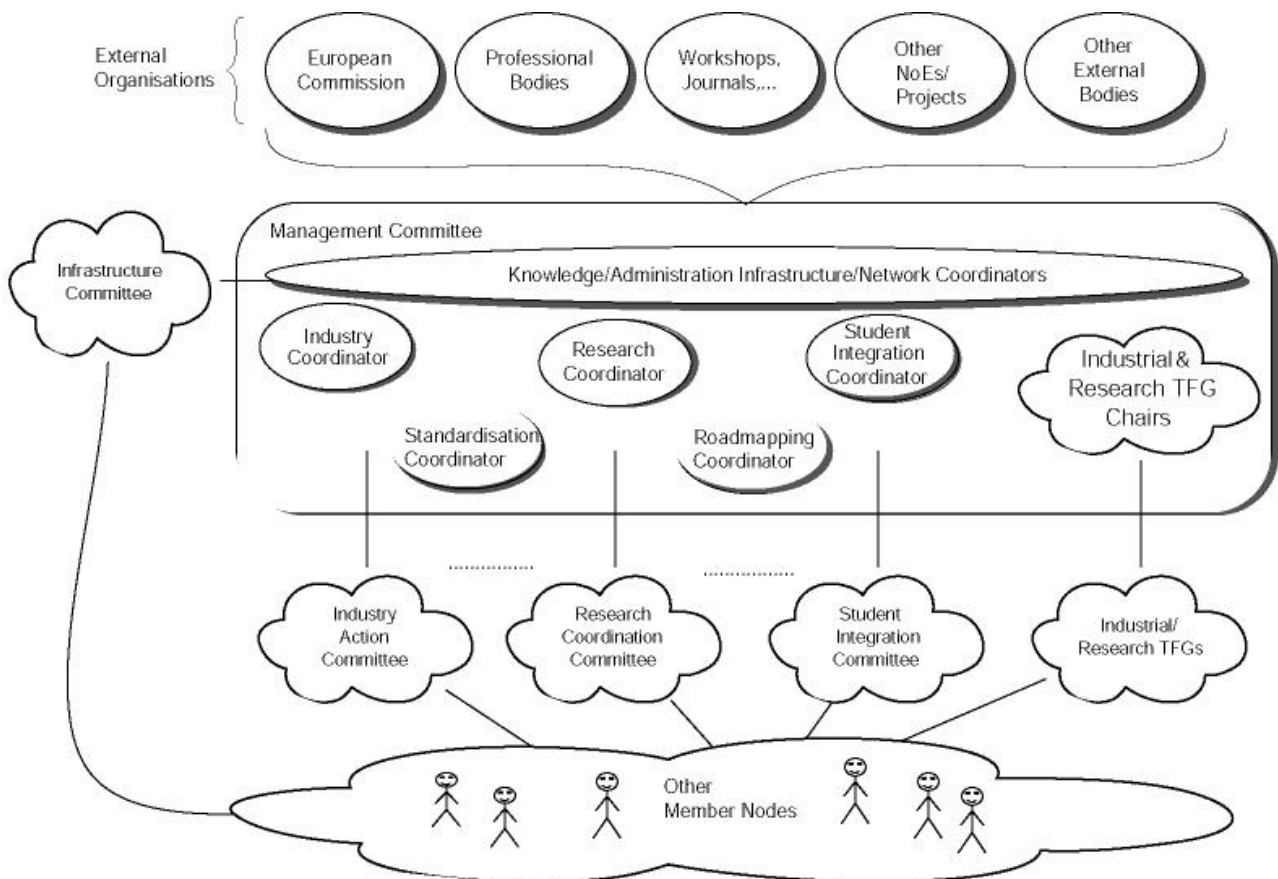
## B.5 Project management

The management structure of AgentLink III has been designed with the following goals in mind:

- AgentLink III should be flexible and responsive to the needs of the community it serves;
- Decision making should, wherever possible, be distributed across the member nodes of AgentLink III, and not lie with a small group of individuals;
- As many nodes as possible should be involved in carrying out the actions of AgentLink III, in order to prevent bottlenecks and to ensure that nodes recognise that AgentLink III is a network in which they play an active part.

In summary, the intention is that AgentLink III will *engage the entire community*, and *not* simply serve the interests of an elite few. Experience with AgentLink II indicates that a distributed management structure can achieve this goal while at the same time dynamically meeting the needs of the community, as these needs arise. In the subsections that follow, the makeup and role of the various management committees are described in detail. The management structure of AgentLink III is illustrated below.

### The Management Committee



Overall management of AgentLink III will be achieved through the *management committee*, which will meet approximately twice annually throughout the life of the project. The basic goal of the management committee is to make major policy and strategic decisions for the network, and to approve large funding requests. The management committee will not be responsible for the day-to-day running of the network, which will fall to the network coordinators and network administrators. The management committee has

overall responsibility for ensuring that the work of the network is carried out efficiently, effectively, and in the best interests of the community, and for taking whatever action is required to ensure that this remains the case.

Meetings of the management committee will be called by the *chair* of the committee (one of the network coordinators). The agenda of each management committee meeting will be set and distributed by the committee chair at least one month in advance of the meeting. Agenda items may be requested (at least a month in advance of the meeting) by AgentLink III members, and where possible will be scheduled for discussion. In addition to requested agenda items, the management committee will also normally discuss the following items:

- report on membership, status, progress, finances, and issues arising from the administrative coordinator;
- report on information infrastructure, information resources and issues arising from the information coordinator;
- report on status, progress, and issues arising from each workpackage coordinator.

Decisions on the allocation of resources over 5K Euro by the network must be made by the management committee. For such a decision to be resolved by the committee, a majority will be required from a quoral meeting; a meeting will be considered quoral if no less than *half* of those eligible to attend are present.

Decisions not related to finance, the organisation of the network, or membership of the network will be made by the relevant workpackage coordinator, and will be reported at the following management committee meeting. If no workpackage is deemed appropriate for a particular decision, then decision making will fall to the management committee.

The network coordinators of AgentLink III will reserve the right to take executive action on decisions in extraordinary circumstances (by majority of the network coordinators and executive directors, when a quoral vote or meeting cannot be arranged where the relevant coordinator is for some reason unavailable, or where the decision must be made before feedback can be obtained from the remainder of the management committee). Such decisions will be reported at the following management committee meeting.

The management committee will be made up of the following individuals, totalling 14 people:

- the AgentLink III administrative coordinator, and information coordinator;
- the AgentLink III executive directors;
- the coordinators or associate coordinators for each workpackage;
- Technical Forum Group chairs for that year.

The make-up of the management committee may be extended, by vote of the committee, as and when required. All management committee members will be expected to attend committee meeting unless extraordinary circumstances arise to prevent them doing so. Where committee members regularly fail to meet this commitment, the committee will reserve the right to ask them to stand down, and vote a replacement.

### **The AgentLink III Network Coordination Team**

Because of the size of the network, coordination in AgentLink III will be divided into distinct roles. The network coordinators will have overall responsibility for ensuring that the activities of AgentLink III are carried out. In particular, day-to-day management of the financial and administrative aspects of project maintenance, and overall coordination between sites (WP8) will be the responsibility of the Administrative Coordinator. Provision of the communication infrastructure (WP5) will be the responsibility of the Information Coordinator. Together, the two coordinators will run the network, supported by the two Executive Directors who will have an advisory role. The AgentLink III coordinators will be helped in their respective duties by the administrative assistants. The role of the executive directors is to provide strategic guidance to the coordinators and to ensure continuity with previous organisation in AgentLink and AgentLink II.

### **Workpackage Coordinators and Committees**

Each workpackage coordinator will have overall responsibility for ensuring that the activities of their respective workpackage are carried out. Workpackage coordinators may each choose to convene a *workpackage committee* to carry out the actions of their workpackage. Where problems arise, the workpackage coordinator will have immediate responsibility for rectifying the situation, typically by reallocating responsibilities within the committee. In the case of problems that cannot be resolved within the workpackage (for example, requiring resources not available to the committee), the workpackage coordinator shall report this to the management committee, who will take such action as is necessary to resolve the problem.

Some workpackages, particularly those such as WP1 and WP3, have strategic importance in relation to broadening the community of stakeholders within AgentLink. These workpackages have also been assigned one or more Associate Coordinators. The role of Associate Coordinator is to provide advice and guidance to the Coordinator (sometimes also providing continuity with AgentLink and AgentLink II, and making use of experience and expertise), and combined they effectively represent a more formal workpackage committee.

### **Reporting**

The AgentLink III Administrative Coordinator and the Management Committee will prepare an annual report at the end of each 12 month period, to include details of the progress of AgentLink III and cost statements. In addition, each full management committee meeting will result in the preparation of a management report. In line with management committee meetings, these will be produced at least twice annually throughout the life of AgentLink III.

## B.6 Workplan

### General Description

The workplan of AgentLink III is similar to the AgentLink II workplan, but with several points of difference. The division of activities into nine workpackages is based around the experience gained with AgentLink and AgentLink II, and many tasks within these workpackages are broadly the same. However, the AgentLink III structure recognises the heavy administrative workload and the various supporting activities needed for effective coordination of a network over 150 organisations. It will also carry out some additional activities.

The eight work packages are:

- *WP1 – Industry Action*

Focussing primarily on the transfer of agent technology from academia to industry, the transfer of user requirements from industry to academia, and promoting best practice in agent systems development.

- *WP2 – Standardisation Activity*

Focussing primarily on the transfer of agent technology from academia to industry, the transfer of user requirements from industry to academia, and promoting best practice in agent systems development.

- *WP3 – Research Coordination*

Focussing primarily on the promotion of excellence in European agent research, and establishing new research communities in promising, valuable areas of research.

- *WP4 – Student Integration Programme*

Focussing on building agent technology development and research skills in students and researchers, and providing an infrastructure for teaching and research in agent-based systems.

- *WP5 – Technical Forum*

Special interest groups are one of the key activity areas of AgentLink III, and provide the main conduit through which strategic direction for the network will be determined, and the technological roadmap generated.

- *WP6 – Technological Roadmap*

Special interest groups are one of the key activity areas of AgentLink III, and provide the main conduit through which strategic direction for the network will be determined, and the technological roadmap generated.

- *WP7 – Knowledge Infrastructure*

Focussing primarily on the creation of a communications infrastructure through which the work of AgentLink III can be efficiently carried out.

- *WP8 – Administrative Infrastructure*

Focussing primarily on the creation of a management infrastructure through which the work of AgentLink III can be efficiently carried out, and the management and audit of its operation.

In the subsections that follow, these workpackages are described in detail. For each workpackage, we describe its *aims*, and then a detailed specification of the particular tasks of the workpackage. Each

workpackage will last three years (the duration of the proposed funding). As with AgentLink II, each work package is managed by a *coordinator*.

### Work Package 1: Industry Action

**Coordinator:** Michal Pechoucek, Czech Technical University (Czech Republic)

**Associate Coordinators:** Jörg Müller, Siemens (Germany) and Simon Thompson, BT (UK)

The main aim of this workpackage is to put European industry at the leading edge of international competitiveness in the agent area, by:

- raising awareness within industry of the value and appropriateness of agent-based computing techniques and solutions, and demonstrating the potential of this technology for solving real industrial problems;
- facilitating the transfer of agent technology, skills, standards, and best-practice from academia to industry; and finally
- focussing European research on agent-based systems on industrial problems, by facilitating the transfer of user requirements from industry to agent researchers, and the transfer of research results to industry.

In order to realise these aims, the following programme of work will be carried out:

- *Task T1.1:* Industrial awareness programme.

The industrial awareness programme established in AgentLink and continued in AgentLink II sought to raise awareness of agent technology primarily through *ad hoc* events and interactions with industrial organisations. The aim was: (i) to bring the activities of AgentLink to the attention of an industrial audience, and (ii) to promote awareness of agent research and development activities in the European region. In AgentLink III, this activity will continue, but will provide a more sustained and structured programme by targetting industrial conferences and exhibitions, with appropriate resource to ensure a strong impact. Typically, this work will involve taking a stall at an industrially-oriented conference, distributing leaflets and other promotional material, and giving presentations on aspects of agents and agent technology.

- *Task T1.2:* Agent systems & technology database.

A database of developed agent systems, technologies, and products was established in AgentLink and AgentLink II, and is available via the project's WWW site. In addition, AgentLink II developed a database of agent-related expertise available. These databases are freely available via the WWW site. In AgentLink III, we will continue to build upon this activity, ensuring that a requirement for membership is to provide such information and ensure that it is kept up-to-date and accurate. We will develop and expand the databases to cover new areas of agent technology as they emerge.

- *Task T1.3:* Case studies.

As identified in the Agent Technology Roadmap, commercial deployment of agent systems is currently confined to early adopters in some segments of industry and government, such as utility companies, and agent systems have yet to achieve widespread deployment in operating environments. One reason for this is that despite efforts to raise awareness in general, there is still a lack of awareness of the *potential applications* of agent systems. To facilitate greater awareness, the Roadmap recommends that a set of early adopter case studies be prepared, both successful and unsuccessful, with an analysis of the reasons for success or failure. In AgentLink III, we will prepare such case studies, and include assessments of the resources and timescales required, and the factors critical to their successful deployment. These case studies will then be distributed to potential user

organisations, such as large corporations and government agencies throughout Europe, and publicised to national computer industry associations and societies.

- *Task T1.4: Agent technology conference for commercial organisations*

In AgentLink II, an Agent Technology Conference was established to bring the potential value of agent technologies to the attention of a wider IT audience. Two successful events took place in London and Barcelona, each attracting around 100 participants from industry and commerce. AgentLink III will continue and expand this programme of events, ensuring a sustained programme to reach out to industry and commerce beyond the normal reach of IST efforts. While the success enjoyed by such events in AgentLink II was substantial, a lack of resource limited the possibilities for providing extensive materials to delegates, and also constrained the degree of post-event follow-up of contacts that was merited. AgentLink III will seek to use this activity to establish long-term relationships with companies, to identify their needs and to use this in directing the overall workprogramme of the network.

**Criteria for success:**

The success of this workpackage will be assessed by measuring:

- the number of industrial nodes taking part in AgentLink III;
- the scale of distribution of agent technology reports;
- the number of systems included in the technology database;
- the number of participants in the Agent Technology Conferences.

## Work Package 2: Standardisation Activity

**Coordinator:** Monique Calisti, Whitestein Technologies (Switzerland)

The main aim of this workpackage is to contribute to European take-up of agent technology through the support of relevant and appropriate standardisation initiatives, by:

- contributing to the development of agent-specific standards activities, notably through efforts such as FIPA – the Foundation for Intelligent Physical Agents; [www.fipa.org](http://www.fipa.org) – (the premier agent standardisation body);
- facilitating the dissemination of relevant standards initiatives in the area of agent technology through academia and industry; and finally
- focussing European research on standards-related issues, especially in relation to the adoption of agent-based systems in industrial contexts, by facilitating the transfer of user requirements from standards bodies to agent researchers, and research results to standards activities.

In order to realise these aims, the following programme of work will be carried out:

- *Task 2.1:* Standardisation liason.

The lack of appropriate communication, cooperation, and negotiation standards is one of the main obstacles in the way of wider deployment of agent systems technology. AgentLink and AgentLink II sought to address this by disseminating news about current standardisation activities to members of the network through the newsletter and website. AgentLink III will seek to expand these activities by becoming affiliated with standards organisations, building on relationships already established. A liason officer will establish broader and more substantial links with standardisation efforts and bodies, and will provide a formal channel for interaction between them and AgentLink III.

- *Task 2.2:* Standardisation participation.

To date, standards initiatives have developed side-by-side with other community activities. The aim of this task will be to ensure community representation in the standards efforts themselves, and to contribute directly to ongoing standardisation activity. Resources will be made available for AgentLink III members to attend meetings and report upon standardisation initiatives.

- *Task T2.3:* Standardisation awareness initiatives.

Despite efforts to ensure regular reporting of ongoing standardisation activity, through AgentLink publications, this has been rather ad hoc. This task will seek to establish stronger *dissemination* links with standards initiatives, through reports and articles generated by T2.1 and T2.2, which will be included in regular columns in the newsletter, and to find other dissemination routes. These will involve the distribution of e.g. FIPA newsletters with AgentLink newsletters, and the possibility for publishing review reports on the range of standards activities as well as on specific agent-related specifications.

### Criteria for success:

The success of this workpackage will be assessed by measuring:

- the level of European participation in standards activities;
- the level of take-up of agent-related standards through systems and publications.

### Work Package 3: Research Coordination

**Coordinator:** Steve Willmott, UPC (Spain)

**Associate Coordinator:** Onn Shehory, IBM Research Laboratories (Israel)

The main aim of this work package is to promote excellence in European agent systems research, by:

- encouraging the development of links between research communities in new and promising areas, especially those of cross-disciplinary interest;
- providing a high-quality infrastructure for disseminating research results, issues, datasets, and software; and
- encouraging cross-fertilisation of research skills across the European region.

In order to realise these aims, the following programme of work will be carried out:

- *Task T3.1:* Research database.

AgentLink II established a research database, mapping areas of research in the scope of AgentLink II to AgentLink II nodes with expertise in these areas. This database is available via the AgentLink II WWW site, and provides at-a-glance information on the major areas of strength within AgentLink II. This information is known to have been used in several documents reviewing the scale and nature of European expertise. In AgentLink III, this activity will be consolidated by ensuring that the database is kept up-to-date, by expanding it with new areas of research and development activity as they emerge, and by producing a survey of such activity for distribution to the broader IST community.

- *Task T3.2:* Clearinghouse for agent-related papers, articles, datasets, & software.

Currently, there are no central repositories (in the world) where students and researchers can expect to find pre-prints or reprints of agent-related research material, datasets, electronic bibliographies, freely available research software, and so on – despite the fact that all of these are available in one form or another across the WWW. AgentLink II sought to establish such a repository, and while relatively successful, this has relied on manual population by interested researchers in a selective manner. AgentLink III will create an online clearinghouse that allows researchers to keep such materials in a single, central place. Materials will be obtained through a more rigorous requirement on members to populate the database, a more proactive effort, and by researchers submitting electronically. Materials will be indexed wherever possible using the AgentLink III research classification (see Table 1), with the goal of allowing users rapid, easy access to relevant materials. The database will be made available via the AgentLink III WWW site (T7.1).

- *Task T3.3:* Support for agent workshops & conferences.

Financial support will be provided for workshops and conferences that explicitly cover areas of interest to AgentLink III. The goal of this support is to pump-prime research in strategically important areas of agent R&D, as indicated in AgentLink's primary objectives. Support will be provided primarily for innovative, novel areas, with a focus on the establishment of inter-disciplinary links and a clear potential for the development of strong research communities within Europe. It will also be provided for under-resourced regions and to support students to travel to globally leading events. Requests for support of conferences and workshops will be directed to the workpackage coordinator, who will make recommendations to the management committee. Events supported by AgentLink III will be required, as a condition of funding, to write a report on the event for subsequent inclusion in the AgentLink III newsletter (T7.3) and the AgentLink III WWW site (T7.1).

#### Criteria for success:

The success of this workpackage will be assessed by measuring:

- the number of active researchers joining AgentLink III;
- the number of research profiles disseminated by AgentLink III;
- the number of papers included in the publications clearinghouse;
- the number of events supported by AgentLink III.

## Work Package 4: Student Integration Programme

**Coordinator:** Wiebe van der Hoek, University of Liverpool (United Kingdom)

The main aim of this workpackage is to integrate students into the community to focus on important areas of research, and to promote excellence in the teaching of agent-related issues throughout the European region. In order to realise this aim, the following programme of work will be carried out:

- *Task T4.1:* Agent systems summer school.

A centrepiece of AgentLink II's student-focused activities was the establishment of an annual summer school, originally run as a single event in AgentLink. This first of these summer schools took place in Utrecht, The Netherlands, in July 1999, and offered 18 courses on all aspects of agent technology, delivered by the very best international lecturers. About 40 AgentLink II members were funded to attend, and no less than 120 other paid registrations were received, from both industry and academia. This made the 1999 summer school easily the largest agent teaching event ever, and AgentLink II continued this activity with four subsequent schools in Saarbrücken, Germany; Prague, The Czech Republic; Bologna, Italy; and Barcelona, Spain. Each event attracted 100-150 participants, with AgentLink II continuing to support at least 20 students each year. AgentLink III will build on this success by continuing the regular summer schools and ultimately moving towards a self-funding model of operation. Courses will be presented by international experts, from both inside and outside Europe. Support will be provided to fund travel, accommodation, and subsistence for both lecturers and a limited number of students. Additional attendance will be encouraged, and a fee charged for such attendees, with the aim of making the summer schools self-financing. Where possible, lecture materials will subsequently be made available via the AgentLink III WWW site (T7.1).

- *Task T4.2:* Curricula database for agent-related teaching.

To encourage the teaching of agent-based computing, AgentLink II established a WWW-based database of agent teaching materials and curricula, covering all aspects of agent-based computing. Each curriculum summarises the teaching aims of the course, teaching plans, and pointers to reading material. Curricula are classified with reference to the AgentLink III research and development areas (see Tables 1 and 2). AgentLink III will continue to build and refine this database.

In addition, as was the case with AgentLink II, each member of the network will receive a copy of the *International Journal of Autonomous Agents and Multi-Agent Systems* (published by Kluwer). This is the only academic journal in the agents field, and its dissemination therefore provides an important means of communicating the latest research within the agent community.

### Criteria for success:

The success of this workpackage will be assessed by measuring:

- the level of participation in the AgentLink III summer school;
- the number of universities offering agent-related courses;
- the number of curricula for agent-related teaching that are developed and disseminated by AgentLink III.

## Work Package 5: Technical Forum

**Coordinator:** Andrea Omicini, University of Bologna (Italy)

One of the main activities of AgentLink and AgentLinkII was to establish a number of *special interest groups* (SIGs). A SIG is a group of researchers and developers sharing an interest in a specific sub-area of agent technology. SIGs were funded to meet between once and twice annually, with AgentLink II funding about 10-12 AgentLink II members to attend each SIG meeting, and typically the same number funding themselves to attend. SIGs were not established in a top-down manner: they were formed as a result of unsolicited, refereed proposals made by AgentLink II members. However, the SIGs of AgentLink II largely continued in the same structure as those of AgentLink.

In an effort to ensure effective and appropriate representation, and to reflect the dynamism of the field, as well as to establish links to related disciplines, AgentLink III will establish an annual Technical Forum, in which technical forum groups (TFGs) will meet to discuss issues of key interest. These groups will be selected on a *per event* basis, in response to bids for individual symposia, with decisions being made in relation to links to related areas, industrial relevance and contribution to roadmapping. New areas that have no obvious forum for discussion of important issues will be prioritised. The aims are:

- to facilitate the dynamic development of communities around specific areas of strategic importance for European agent R&D, enabling them to share common problems, issues, and results in a manner that other forums (e.g., academic workshops and conferences) do not allow;
- to respond dynamically to fast-changing developments;
- to develop and update the technological roadmap from AgentLink II;
- to provide the AgentLink III management committee with “bottom-up” input to its decision-making process, and hence ensure that the strategic direction of the network is reactive to the needs of its members;
- to establish links with related areas within computing, and related areas in other research disciplines, such as economics and biology.

In order to realise these aims, the following programme of work will be carried out:

- *Task T5.1:* Application-area technical forum groups.

Application area TFGs are intended to focus on promising application areas for agent technology. These will extend and develop the work of related SIGs formed within AgentLink II, which included

- agent-mediated electronic commerce;
- intelligent information agents; and
- agents for telecommunications applications and the internet.

AgentLink III will continue to expand upon AgentLink II's programme of application-area SIGs. In addition, TFGs will be encouraged to find support from other (national and European) sources in addition to AgentLink III, and to form collaborations for projects, particularly with respect to the IST programme.

- *Task T5.2:* Research-area technical forum groups.

As in task T5.1 (Application area technical forum groups), one of the key activities of AgentLink II was the instigation of a number of *research SIGs*. The corresponding TFGs in AgentLink III are collections of nodes, working on closely related underlying technologies. Particular emphasis here will be given to establishing links with related areas and to other disciplines, in an effort to draw together the critical mass of researchers across relevant domains. Relevant SIGs established in AgentLink II include:

- software engineering and design methodologies;
- agent-based simulation; and

- agents which learn, adapt and discover.

As in AgentLink II, the TFG infrastructure will (indirectly) promote collaborative projects by putting groups with related interests in touch with one-another, providing information about national and international project support for these areas of interest, workshops and conferences of interest, and so on. Other support will be provided in the form of funding to support meetings of the TFGs and dissemination of information. Requests for support of research TFGs will be directed to the workpackage coordinator, who will make recommendations to the management team. Preference will be given to groups in new and promising areas of development, and to TFGs that form new collaborations to fulfill the recommendations of the AgentLink II Roadmap (36-41). Information on research TFGs will be made available via the AgentLink III WWW site, with a web presence ensuring the life of the group beyond the meeting itself. Research TFGs supported by AgentLink III will be required, as a condition of funding, to write a report on the TFG meeting, and on activities resulting from the meeting, for subsequent inclusion in the AgentLink III newsletter (T7.3) and the AgentLink III WWW site (T7.1). Each TFG will have a chairperson, responsible for liaising with AgentLink III and managing the activities of the TFG. The chair of each TFG will sit on the AgentLink III management committee for the following year.

- *Task T5.3: Inter-network TFGs*

One aspect of AgentLink II's activities that proved to be of great interest to the wider IT and telecommunications communities was a number of meetings held in cooperation with other networks of excellence – in particular, *COMPULOGNET* (the network of excellence for computational logic), *ONTOWEB* (the network of excellence for ontology-based information exchange for knowledge management and electronic commerce), and *I3NET* (the network of excellence for intelligent information interfaces). These meetings provided researchers and developers working in both communities with the opportunity to meet, exchange ideas, and identify issues of common interest. This activity area will be continued and expanded in AgentLink III, with links to related networks of excellence (such as *OntoWeb II*) and to related integrated projects (such as *OpenNet*).

**Criteria for success:**

The success of this workpackage will be assessed by measuring:

- the number of presentations at TFGs;
- the number of participants at TFGs.

## Work Package 6: Technological Roadmap

**Coordinator:** Michael Luck, University of Southampton (United Kingdom)

In trying to raise awareness and to promote take-up of agent technology, there is a need to inform the various audiences of the current state-of-the-art and to postulate the likely future directions the technology and the field will take. This is needed if commercial organisations are to invest in the technology and its deployment, and also for policy makers to target areas of particular importance. More broadly, presenting a coherent vision of the development of the field, its application areas and likely barriers to adoption of the technology is important for all stakeholders. In AgentLink II an initial technology roadmap was developed for exactly this purpose, and achieved much acclaim. However, the pervasive nature of agent technology across many areas of IST suggests that a more intense and engaging effort to continue and augment this work is needed for AgentLink III. In particular, the pace of technology development and its crucial role in supporting visions of Ambient Intelligence, the Semantic Web and Grid Computing, for example, demands that these efforts be continued with a sustained programme of consultation and roadmap revision. The roadmap is a living document. Its value relies on contribution from the community, which will assess the AgentLink II roadmap against the AgentLink III period, and engage in correction and refinement.

The key tasks in this Workpackage will be:

- *Task 6.1:* The Technological Roadmap.

The key deliverable of workpackage 6 will be the *technological roadmap*. The aim of the AgentLink III technological roadmap is to provide a focussed, up-to-date assessment of how the agent field can and should develop. In so doing, it will specify:

- 1 briefly, the background to agent technology - where it came from, what it is all about;
- 2 the state of the art in agent technology – where we are today, in terms of technology and applications, including commercial success stories and failures;
- 3 a long-term vision for the field – where will we be if agent technology succeeds? what is the long term problem (or whatever) that agents are trying to solve? what commercial opportunities can be expected from this success? what social impact (if any) will the success of agent technology have? what other impact will the success of agent technology have?
- 4 what the technology gaps are, between the state of the art and the long-term vision; what problems do we need to solve in order to realise the long-term vision? what different techniques are being applied in order to bridge these gaps? what are the most promising of these, and what are their drawbacks?
- 5 a discussion of the implications of the study in specific terms for each set of stakeholders, for example:
  - what regulatory implications are there?
  - what are the implications for research (e.g., content gaps, funding gaps, etc)?
  - what are the implications for industry (e.g., skills gaps, collaboration opportunities, etc)?

Implications analysis should also include the consequences of not implementing the recommendations.

### *Task 6.2:* Roadmap Consultation

AgentLink III will establish a core roadmapping group to work on the development of the roadmap for the duration of the project. To facilitate the work of the core group, they will meet periodically

for brainstorming sessions at which they will collate inputs received from the community, identify strategic areas of importance, frame questions and directions for discussion with the community, and draft the roadmap text. These meetings will be intense work efforts, and will require travel support and payment on a consultancy basis for effective results. This mode of operation has proven successful and cost-effective in AgentLink II after several other models for roadmapping were tried.

#### *Task 6.3: Roadmap Dissemination*

To gain maximum impact, and make the greatest possible contribution to the development of the field in particular, and to the broader IST community more generally, the roadmap must gain as wide a distribution as possible, to academia, industry, policy-makers, etc. In order to do so, it will be developed both as a document available from the AgentLink III web site, continually revised and updated, and as a professionally designed and printed document that will be distributed at conferences and workshops and sent to as diverse and inclusive a range of relevant organisations as possible. Experience gained in AgentLink II suggests that this effort can create a very substantial impact and contribute to a stronger appreciation of the potential value of the technology and of the important issues to tackle and invest in.

As was the case for the AgentLink II Roadmap, the Roadmap for AgentLink III is expected to be read by at least four groups of individuals:

- 1 R&D policy makers at the European Commission;
- 2 National R&D policy makers;
- 3 industrial members of AgentLink III (typically technology-aware managers);
- 4 academic members of AgentLink III.

The document will be used by these groups to understand the current status and likely future directions of agent technology research, so as to prioritize research and development investment resources.

#### **Criteria for success:**

The success of this workpackage will be assessed by measuring:

- the number of contributing stakeholders involved in the development of the Roadmap;
- the number of downloads of the Roadmap from the AgentLink III web-site.

## Work Package 7: Knowledge Infrastructure

**Coordinator:** Terry Payne, University of Southampton (United Kingdom)

The success of AgentLink III, like its predecessors, will critically depend on the provision of a high-quality communications infrastructure. Therefore, the main aim of this workpackage is:

- to provide a communication and knowledge infrastructure through which both members of AgentLink III and other interested parties can communicate on aspects of AgentLink III.

In order to realise this aim, the following programme of work will be carried out:

- *Task T7.1:* Dedicated WWW site for AgentLink III.

As was shown with AgentLink II, the most important single communication mechanism for AgentLink III is a WWW site. The domain name `AgentLink.org` was registered under AgentLink for this purpose. The WWW site provides information both about all aspects of AgentLink: its purpose, mandate, organisation, mechanisms for entry to the network, work areas, reports, points of contact, and so on. In addition, it is the conduit through which all tasks intended to communicate information will flow (e.g., T1.2, T3.1, ...). All network-specific documents for AgentLink II are available via the WWW site, as is the newsletter (T7.3), and a collection of maintained resources of value to the community. As indicated earlier, the goal is for `http://www.AgentLink.org/` to become a “portal” site for agent-related activities, and this has been achieved for the AgentLink II web-site; this site is now the major portal in Europe for agent technologies. In order to provide an up-to-date, high-quality WWW site, it will be essential to appoint a dedicated WWW site manager.

- *Task T7.2:* Moderated, edited email list for AgentLink III.

An email list for AgentLink II was established, providing moderated, edited information about all issues relevant to the network. This email list, which is free to join, currently has approximately 600 subscribers. The list regularly provides up-to-date information on all aspects of AgentLink II's activities. This activity will be continued in AgentLink III.

- *Task T7.3:* Newsletter.

Electronic methods for dissemination, while they are both cheap and fast, are not appropriate for some audiences. In particular, electronic formats are not appropriate for dissemination at conferences, trade fairs, and so on, and can create an unprofessional impression in industry. For these reasons, AgentLink II established a professionally typeset and printed newsletter, published regularly throughout the life of the project. This newsletter has achieved widespread and influential distribution. In addition to containing details of what is happening in the network, the newsletter carries a range of articles including features, reports on conferences and workshops, informal descriptions of research results and new software, book reviews, short descriptions of projects, labs, and companies, and so on. The newsletter is distributed free to all members of AgentLink II, and beyond, and is also distributed at conferences, workshops, and industrial events. This activity will be continued in AgentLink III.

### Criteria for success:

The success of this workpackage will be assessed by measuring:

- the number of hits on the AgentLink III WWW site;
- the number of sites joining the AgentLink III email list;
- the number of copies of the newsletter distributed.

## Work Package 8: Administrative Infrastructure

**Coordinator:** Peter McBurney, University of Liverpool (United Kingdom)

The success of AgentLink III, like its predecessors, will critically depend on the provision of a high-quality administrative infrastructure. Therefore, the main aim of this workpackage is:

- to provide an administrative and management infrastructure through which the work of the network can be effectively and efficiently carried out.

This objective will be achieved through the following activities:

- *Task T8.1:* Annual report

As in AgentLink II, an annual report will be prepared by the management committee of AgentLink III, summarising the activities of AgentLink III (including financial and organisational matters, as well as reports on TFGs, workshops and conferences supported, and projects in progress) throughout the preceding year. The report is expected to be formal, but will not require the professional typesetting and printing services required by the newsletter.

- *Task T8.2:* External and inter-project coordination

In order to both encourage cross-fertilisation of research and development activities and make the most efficient possible use of available resources, AgentLink III will actively coordinate its activities with those of other relevant projects, including thematic networks (such as *Colognet*), networks of excellence (such as *OntoWeb II*) and integrated projects (such as *OpenNet*). In addition, AgentLink III will coordinate its activities with external professional and academic organisations at both national and pan-European levels, as well as with relevant journals, seminars, conferences, and workshops (such as the *International Joint Conference on Autonomous Agents and Multi-Agent Systems*, the *Central and Eastern European Conference on Multi-Agent Systems*, and the many other established AI, HCI, and software engineering conferences). Finally, AgentLink III will also coordinate with relevant funding bodies outside Europe: many representatives have expressed an interest in coordinating their activities with AgentLink III, to support, for example, researcher exchange programmes, dissemination activities, etc.

- *Task T8.3:* Administrative support

The work of AgentLink III cannot be carried out effectively without dedicated, full time administrative support. A qualified administrator will therefore be appointed, to be resident at the site of the coordinating proposer, in order to provide this support. The administrator will manage the administrative infrastructure of AgentLink III on a day-to-day basis, ensure that enquiries are directed to the appropriate persons, keep track of finances, and so on. The administrator will not have executive power within AgentLink III, but will primarily assist the network and workpackage coordinators, and deal with any issues that do not require management input. The administrator will also provide support to the various TFGs and workpackages active within the network, by providing help and advice on organising meetings, issuing meeting calls to the appropriate parties, and so on.

- *Task T8.4:* Openness

It is intended that AgentLink III will be an open network, in that any academic, industrial or other group sufficiently qualified should be able to join (see Appendix 1). This task will be directed at encouraging appropriate nodes to join; such encouragement will be given in part through industrial meetings (see T1.1), in part through awareness-raising activities (T8.2), and in part by encouraging all members of AgentLink III to actively promote the network at conferences, workshops, industrial events, and so on.

- *Task 8.5: Development and Evaluation of AgentLink III*

As AgentLink III develops, new problems and opportunities will arise for the communities it creates. This task will focus on ensuring that any problems which may arise are dealt with effectively (perhaps by modifications to the management or infrastructure), and that any opportunities are fully exploited. Evaluation and feedback from members will be sought through a plenary session to be held at one AgentLink III meeting, and through the annual distribution of a questionnaire for members to present their views. It is intended to explore the possibility of inviting external feedback from other networks through visits to AgentLink III meetings. Information from all these sources will be considered by the AgentLink III management committee in an *annual review* towards the end of each year.

- *Task 8.6: Management and audit of partner efforts*

Finally, this Workpackage will undertake management and audit activities necessary to ensure that all other workpackages are undertaken effectively, and that funds allocated to support various tasks in each other workpackage are expended according to plan. Partners with lead-responsibility for a workpackage will have to show that funds allocated for specific activities have been expended on these activities, and only on these activities. Any anomalies will be investigated, and funds spent on activities other than those for which they were designated will have to be returned by the lead partner concerned.

**Criteria for success:**

The success of this workpackage will be assessed by measuring:

- the number of extra-AgentLink III collaborations formed, e.g., with other networks;
- the number of requests to join AgentLink III.

### Project GANTT Chart

As mentioned above, all workpackages last the full 36 months of the project. Moreover, apart from Workpackages 7 and 8, which underpin all other activities, the various workpackages are relatively independent of one another. In other words, no workpackage requires inputs or deliverables from other workpackages. This independence will allow the workpackages to be managed efficiently by the respective lead-partners. The following Gantt chart shows the scheduling of deliverables (column 2), by quarter, over the lifetime of the project.

WP	Del.	Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WP1													
	D1.1				•								
	D1.2								•				
	D1.3												•
	D1.4						•						
	D1.5												•
WP2													
	D2.1				•								
	D2.2								•				
	D2.3												•
WP3													
	D3.1				•								
	D3.2								•				
	D3.3												•
WP4													
	D4.1				•								
	D4.2								•				
	D4.3												•
WP5													
	D5.1				•								
	D5.2								•				
	D5.3												•
WP6													
	D6.1						•						
	D6.2										•		
WP7													
	D7.1		•										
	D7.2		•										
	D7.3				•								
	D7.4						•						
	D7.5								•				
	D7.6										•		
	D7.7												•
WP8													
	D8.1				•								
	D8.2								•				
	D8.3												•

## B.7 Other issues

There are no ethical or gender issues raised by, or associated with, this project. However, it is clear that there is a responsibility to seek to address the gender imbalance in information society technologies. We will monitor the balance of researchers in the network and will seek to encourage a better gender balance across the project. This may involve tasking a Workpackage leader or another network member with identifying areas of concern and proposing any remedial action necessary. Clearly, technical excellence is uppermost, but we will seek to encourage and stimulate technical excellence across the gender divide.

The project partners confirm that they will comply with all national laws and regulations governing employment, labour relations, workplace health and safety, the use of funds, and all other applicable laws and regulations.

We believe profoundly that agent technologies will form, as the AgentLink II roadmap envisions, the basis for the next generation of computer technologies. Accordingly, a primary focus of the AgentLink III co-ordination action is support for the dissemination, trial and deployment of agent research and agent technologies, in industry, in government and in social domains, such as health and education. AgentLink II's network of 180 members comprise a broad cross-section of leading European industrial, research, Governmental and academic organizations, with both large and small enterprises represented. A better network for the dissemination of agent research and technologies could not be imagined.

AgentLink III will build on this network to realize the ambitious vision outlined in the AgentLink II Roadmap. Key means to achieving this vision will be:

- The Agent Technology Conferences, in which industry and academia meet (Workpackage 1).
- The development of case studies of commercial and social deployment of agent technologies (Workpackage 1).
- Facilitating standardisation activities in the agents field and in related areas (Workpackage 2).
- Support infrastructure for research on agent technologies (Workpackages 3, 7 and 8).
- The annual Agent Systems Summer School, where the next generation of agent technology researchers and practitioners can be integrated into the European agents community (Workpackage 4).
- The annual Technical Forum, where leading-edge research and applications experiences can be disseminated (Workpackage 5).
- The Agent Technological Roadmap, which enables a shared vision of the future path for agent research and deployment to be mapped by the European agents community (Workpackage 6).
- Effective management of all the activities (Workpackages 7 and 8).

**CA Project Effort Form**  
**Full duration of project**

(insert person-months for activities in which partners are involved)

Project acronym: AgentLink III

	Partner 1: Liv	Partner 2: Soton	Partner 3: Whitstein	Partner 4: UPC	Partner 5: CTU	Partner 6: UniBo	TOTAL PARTNERS
<b>Co-ordination activities</b>							
WP1: Industry Action					6		6
WP2: Standardisation Activity			6				6
WP3: Research Coordination				6			6
WP4: Student Integration Programme	6						6
WP5: Technical Forum						6	6
WP6: Technological Roadmap		6					6
WP7: Knowledge Infrastructure		69.6					69.6
WP8: Administrative Infrastructure (Tasks T8.1 – T8.5)	60.6						60.6
<b>Total co-ordination activities</b>	<b>66.6</b>	<b>75.6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>166.2</b>
<b>Management activities</b>							
WP8: Administrative Infrastructure (Task T8.6)	9	0	0	0	0	0	9
<b>Total management</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9</b>
<b>TOTAL ACTIVITIES</b>	<b>75.6</b>	<b>75.6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>175.2</b>

### Workpackage list (full duration of project)

Work-package No <sup>1</sup>	Workpackage title	Lead contractor No <sup>2</sup>	Person-months <sup>3</sup>	Start month <sup>4</sup>	End month <sup>5</sup>	Deliverable No <sup>6</sup>
WP1	Industry Action	5	6	1	36	D1.1 D1.2 D1.3 D1.4 D1.5
WP2	Standardisation Activity	3	6	1	36	D2.1 D2.2 D2.3
WP3	Research Co-ordination	4	6	1	36	D3.1 D3.2 D3.3
WP4	Student Integration Programme	1	6	1	36	D4.1 D4.2 D4.3
WP5	Technical Forum	6	6	1	36	D5.1 D5.2 D5.3
WP6	Technological Roadmap	2	6	1	36	D6.1 D6.2
WP7	Knowledge Infrastructure	2	69.6	1	36	D7.1 D7.2 D7.3 D7.4 D7.5 D7.6 D7.7
WP8	Administrative Infrastructure	1	69.6	1	36	D8.1 D8.2 D8.3
	<b>TOTAL</b>		<b>175.2</b>			

<sup>1</sup> Workpackage number: WP 1 – WP n.

<sup>2</sup> Number of the contractor leading the work in this workpackage.

<sup>3</sup> The total number of person-months allocated to each workpackage.

<sup>4</sup> Relative start date for the work in the specific workpackages, month 0 marking the start of the project, and all other start dates being relative to this start date.

<sup>5</sup> Relative end date, month 0 marking the start of the project, and all ends dates being relative to this start date.

<sup>6</sup> Deliverable number: Number for the deliverable(s)/result(s) mentioned in the workpackage: D1 - Dn.

## Deliverables list

Deliverable No <sup>1</sup>	Deliverable title	Delivery date <sup>2</sup>	Nature <sup>3</sup>	Dissemination level <sup>4</sup>
D1.1	Annual report on Industry Action programme: Year 1	12	R	PU
D1.2	Annual report on Industry Action programme: Year 2	24	R	PU
D1.3	Annual report on Industry Action programme: Year 3	36	R	PU
D1.4	Interim report on deployment case studies	18	R	PU
D1.5	Final report on deployment case studies	36	R	PU
D2.1	Annual report on Standardisation Activities: Year 1	12	R	PU
D2.2	Annual report on Standardisation Activities: Year 2	24	R	PU
D2.3	Annual report on Standardisation Activities: Year 3	36	R	PU
D3.1	Annual report on Research Co-ordination: Year 1	12	R	PU
D3.2	Annual report on Research Co-ordination: Year 2	24	R	PU
D3.3	Annual report on Research Co-ordination: Year 3	36	R	PU
D4.1	Annual report on Student Integration Programme: Year 1	12	R	PU
D4.2	Annual report on Student Integration Programme: Year 2	24	R	PU
D4.3	Annual report on Student Integration Programme: Year 3	36	R	PU
D5.1	Annual report on Technical Forum: Year 1	12	R	PU

<sup>1</sup> Deliverable numbers in order of delivery dates: D1 – Dn

<sup>2</sup> Month in which the deliverables will be available. Month 0 marking the start of the project, and all delivery dates being relative to this start date.

<sup>3</sup> Please indicate the nature of the deliverable using one of the following codes:

- R** = Report
- P** = Prototype
- D** = Demonstrator
- O** = Other

<sup>4</sup> Please indicate the dissemination level using one of the following codes:

- PU** = Public
- PP** = Restricted to other programme participants (including the Commission Services).
- RE** = Restricted to a group specified by the consortium (including the Commission Services).
- CO** = Confidential, only for members of the consortium (including the Commission Services).

D5.2	Annual report on Technical Forum: Year 2	24	R	PU
D5.3	Annual report on Technical Forum: Year 3	36	R	PU
D6.1	Draft Technological Roadmap	18	R	PU
D6.2	Final Technological Roadmap	30	R	PU
D7.1	Dedicated AgentLink III web-site	6	O	PU
D7.2	AgentLink III newsletter: Issue 1	6	R	PU
D7.3	AgentLink III newsletter: Issue 2	12	R	PU
D7.4	AgentLink III newsletter: Issue 3	18	R	PU
D7.5	AgentLink III newsletter: Issue 4	24	R	PU
D7.6	AgentLink III newsletter: Issue 5	30	R	PU
D7.7	AgentLink III newsletter: Issue 6	36	R	PU
D8.1	Annual Project Report: Year 1	12	R	PU
D8.2	Annual Project Report: Year 2	24	R	PU
D8.3	Annual Project Report: Year 3	36	R	PU

## Workpackage WP1: Industry Action

<b>Workpackage number</b>	WP1	<b>Start date or starting event:</b>					01
<b>Participant id</b>	1	2	3	4	5	6	
<b>Person-months per participant:</b>					6		

### Objectives

The main aim of this workpackage is to put European industry at the leading edge of international competitiveness in the agent area, by:

- raising awareness within industry of the value and appropriateness of agent-based computing techniques and solutions, and demonstrating the potential of this technology for solving real industrial problems;
- facilitating the transfer of agent technology, skills, standards, and best-practice from academia to industry; and finally
- focussing European research on agent-based systems on industrial problems, by facilitating the transfer of user requirements from industry to agent researchers, and the transfer of research results to industry.

### Description of work

In order to realise these aims, the following programme of work will be carried out:

- *Task T1.1:* Industrial awareness programme.
- *Task T1.2:* Agent systems & technology database.
- *Task T1.3:* Case studies.
- *Task T1.4:* Agent technology conference for commercial organisations

### Deliverables

D1.1 Annual report on Industry Action programme (including Awareness, database and Technology Conference): Year 1

D1.2 Annual report on Industry Action programme (including Awareness, database and Technology Conference): Year 2

D1.3 Annual report on Industry Action programme (including Awareness, database and Technology Conference): Year 3

D1.4 Interim report on Agent technology deployment case studies

D1.5 Final report on Agent technology deployment case studies.

### Milestones and expected result

Annual reviews of the Industrial Awareness programme, the technology database, the deployment case study collection, and the Agent Technology Conference will be undertaken to evaluate this workpackage, and to provide feedback to the Network members.

## Workpackage WP2: Standardisation Activity

<b>Workpackage number</b>	WP2	<b>Start date or starting event:</b>					01
<b>Participant id</b>	1	2	3	4	5	6	
<b>Person-months per participant:</b>			6				

### Objectives

The main aim of this workpackage is to contribute to European take-up of agent technology through the support of relevant and appropriate standardisation initiatives, by:

- contributing to the development of agent-specific standards activities, notably through efforts such as FIPA – the Foundation for Intelligent Physical Agents [www.fipa.org](http://www.fipa.org) – the premier agent standardisation body;
- facilitating the dissemination of relevant standards initiatives in the area of agent technology through academia and industry; and finally
- focussing European research on standards-related issues, especially in relation to the adoption of agent-based systems in industrial contexts, by facilitating the transfer of user requirements from standards bodies to agent researchers, and research results to standards activities.

### Description of work

In order to realise these aims, the following programme of work will be carried out:

- *Task 2.1:* Standardisation liason.
- *Task 2.2:* Standardisation participation.
- *Task T2.3:* Standardisation awareness initiatives.

### Deliverables

D2.1: Annual report on Standardisation Activities: Year 1

D2.2: Annual report on Standardisation Activities: Year 2

D2.3: Annual report on Standardisation Activities: Year 3

### Milestones and expected result

Annual reviews of the standardisation activities will be undertaken to evaluate this workpackage, and to provide feedback to the Network members.

## Workpackage WP3: Research Co-ordination

<b>Workpackage number</b>	WP3		<b>Start date or starting event:</b>			01	
<b>Participant id</b>	1	2	3	4	5	6	
<b>Person-months per participant:</b>				6			

### Objectives

The main aim of this work package is to promote excellence in European agent systems research, by:

- encouraging the development of links between research communities in new and promising areas, especially those of cross-disciplinary interest;
- providing a high-quality infrastructure for disseminating research results, issues, datasets, and software; and
- encouraging cross-fertilisation of research skills across the European region.

### Description of work

In order to realise these aims, the following programme of work will be carried out:

- *Task T3.1:* Research database.
- *Task T3.2:* Clearinghouse for agent-related papers, articles, datasets, & software.
- *Task T3.3:* Support for agent workshops & conferences.

### Deliverables

D2.1: Annual report on Research Co-ordination: Year 1

D2.2: Annual report on Research Co-ordination: Year 2

D2.3: Annual report on Research Co-ordination: Year 3

### Milestones and expected result

Annual reviews of the research database, the agent publications clearing and conference support activities will be undertaken to evaluate this workpackage, and to provide feedback to the Network members.

## Workpackage WP4: Student Integration Programme

<b>Workpackage number</b>	WP4	<b>Start date or starting event:</b>					01
<b>Participant id</b>	1	2	3	4	5	6	
<b>Person-months per participant:</b>	6						

### Objectives

The main aim of this workpackage is to integrate students into the community to focus on important areas of research, and to promote excellence in the teaching of agent-related issues throughout the European region.

### Description of work

In order to realise this aim, the following programme of work will be carried out:

- *Task T4.1:* Agent systems summer school.
- *Task T4.2:* Curricula database for agent-related teaching.

### Deliverables

D4.1: Annual report on Student Integration Programme: Year 1

D4.2: Annual report on Student Integration Programme: Year 2

D4.3: Annual report on Student Integration Programme: Year 3

### Milestones and expected result

Annual reviews of the Agent Systems Summer School and the curricula database will be undertaken to evaluate this workpackage, and to provide feedback to the Network members.

## Workpackage WP5: Technical Forum

<b>Workpackage number</b>	WP5	<b>Start date or starting event:</b>					01
<b>Participant id</b>	1	2	3	4	5	6	
<b>Person-months per participant:</b>						6	

### Objectives

The aims of this workpackage are:

- to facilitate the dynamic development of communities around specific areas of strategic importance for European agent R&D, enabling them to share common problems, issues, and results in a manner that other forums (e.g., academic workshops and conferences) do not allow;
- to respond dynamically to fast-changing developments
- to develop and update the technological roadmap from AgentLink II;
- to provide the AgentLink III management committee with “bottom-up” input to its decision-making process, and hence ensure that the strategic direction of the network is reactive to the needs of its members.
- to establish links with related areas within computing, and related areas in other research disciplines, such as economics and biology.

### Description of work

In order to realise these aims, the following programme of work will be carried out:

- *Task T5.1:* Application-area technical forum groups.
- *Task T5.2:* Research-area technical forum groups.
- *Task T5.3:* Inter-network TFGs

### Deliverables

D5.1: Annual report on Technical Forum: Year 1

D5.2: Annual report on Technical Forum: Year 2

D5.3: Annual report on Technical Forum: Year 3

### Milestones and expected result

Annual reviews of the Technical Forum will be undertaken to evaluate this workpackage, and to provide feedback to the Network members.

## Workpackage WP6: Technological Roadmap

<b>Workpackage number</b>	WP6	<b>Start date or starting event:</b>					01
<b>Participant id</b>	1	2	3	4	5	6	
<b>Person-months per participant:</b>		6					

### Objectives

In trying to raise awareness and to promote take-up of agent technology, there is a need to inform the various audiences of the current state-of-the-art and to postulate the likely future directions the technology and the field will take. This is needed if commercial organisations are to invest in the technology and its deployment, and also for policy makers to target areas of particular importance. More broadly, presenting a coherent vision of the development of the field, its application areas and likely barriers to adoption of the technology is important for all stakeholders. In AgentLink II an initial technology roadmap was developed for exactly this purpose, and achieved much acclaim. However, the pervasive nature of agent technology across many areas of IST suggests that a more intense and engaging effort to continue and augment this work is needed for AgentLink III. In particular, the pace of technology development and its crucial role in supporting visions of Ambient Intelligence, the Semantic Web, and Grid Computing, for example, demands that these efforts be continued with a sustained programme of consultation and roadmap revision. The roadmap is a living document. Its value relies on contribution from the community, which will assess the AgentLink II roadmap against the AgentLink III period, and engage in correction and refinement.

### Description of work

The objectives of this workpackage will be realized through the following tasks:

- *Task 6.1:* The Technological Roadmap
- *Task 6.2:* Roadmap Consultation
- *Task 6.3:* Roadmap Dissemination

### Deliverables

- D6.1 Draft Agent Technological Roadmap
- D6.2 Final Agent Technological Roadmap

### Milestones and expected result

Annual reviews of the Agent Technological Roadmap will be undertaken to evaluate this workpackage, and to provide feedback to the Network members.

## Workpackage WP7: Knowledge Infrastructure

<b>Workpackage number</b>	WP7	<b>Start date or starting event:</b>				01
<b>Participant id</b>	1	2	3	4	5	6
<b>Person-months per participant:</b>		69.6				

### Objectives

The success of AgentLink III, like its predecessors, will critically depend on the provision of a high-quality communications infrastructure. Therefore, the main aim of this workpackage is:

- to provide a communications and knowledge infrastructure through which both members of AgentLink III and other interested parties can communicate on aspects of AgentLink III.

### Description of work

In order to realise these aims, the following programme of work will be carried out:

- *Task T7.1:* Dedicated WWW site for AgentLink III
- *Task T7.2:* Moderated, edited email list for AgentLink III
- *Task T7.3:* Newsletter

### Deliverables

- D7.1 Dedicated AgentLink III web-site
- D7.2 AgentLink III newsletter: Issue 1
- D7.3 AgentLink III newsletter: Issue 2
- D7.4 AgentLink III newsletter: Issue 3
- D7.5 AgentLink III newsletter: Issue 4
- D7.6 AgentLink III newsletter: Issue 5
- D7.7 AgentLink III newsletter: Issue 6

### Milestones and expected result

Annual reviews of the web-site, the email list and the newsletter will be undertaken to evaluate this workpackage, and to provide feedback to the Network members.

## Workpackage WP8: Administrative Infrastructure

<b>Workpackage number</b>	WP8	<b>Start date or starting event:</b>					01
<b>Participant id</b>	1	2	3	4	5	6	
<b>Person-months per participant:</b>	69.6						

### Objectives

The success of AgentLink III, like its predecessors, will critically depend on the provision of a high-quality administrative infrastructure. Therefore, the main aim of this workpackage is:

- to provide an administrative and management infrastructure through which the work of the network can be effectively and efficiently carried out.

### Description of work

The objective of this workpackage will be realized through the following activities:

- *Task T8.1:* Annual report.
- *Task T8.2:* External and inter-project coordination.
- *Task T8.3:* Administrative support.
- *Task T8.4:* Openness.
- *Task 8.5:* Development and Evaluation of AgentLink III.
- *Task 8.6:* Management and audit of partner efforts

### Deliverables

D8.1 Annual Project Report Year 1

D8.2 Annual Project Report Year 2

D8.3 Annual Project Report Year 3

### Milestones and expected result

Annual reviews of the administrative activities will be undertaken to evaluate this workpackage, and to provide feedback to the Network members.

## Appendix 1: Members of AgentLink II

This proposal is being submitted by the core partners named in the proposal on behalf of the AgentLink community. Listed below are the full members of AgentLink II at 15<sup>th</sup> April 2003, each having signed a formal membership agreement with the network. We expect the vast majority of the 180 members to participate in the new project, but will leave the establishment of formal arrangements until later.

The type of each organisation is given as University, Research or Industry.

Organisation Name	Department	Country	Type	Title	Forename	Surname
University of Southampton	Electronics and Computer Science	UNITED KINGDOM	U	Dr	Michael	Luck
LIRMM	ARC	FRANCE	R	Prof	Jaques	Ferber
Deutsche Forschungszentrum fur Kunstliche Intelligenz (DFKI) Gmbh	Deduction and Multi-Agent Systems	GERMANY	R	Dr	Klaus	Fischer
Daimler Benz Aktiengesellschaft	Multi Agenten Systeme	GERMANY	I	Dr	Kurt	Sundermeyer
Technical University Berlin	KIT/FLP, FR 6-10	GERMANY	U	Dr	Robert	Tolksdorf
Chemnitz University of Technology	Fakultaet fuer Informatik	GERMANY	U	Dr	Otmar	Goerlitz
Technische Universitaet Muenchen	Institut fuer Informatik	GERMANY	U	Dr	Michael	Beetz
Odense University	The Maersk Mc-Kinney Moller Institute for Production Technology	DENMARK	U		John	Perram
Universidad Politecnica de Madrid	School of Computer Science	SPAIN	U	Dr	Ana Garcia	Serrano
Consejo Superior de Investigaciones Cientificas	Institut d'Investigacio en Intelligencia Artificial	SPAIN	R	Dr	Carles	Sierra
Telefonica Investigacion y Desarrollo		SPAIN	I	Dr	Francisco	Garijo
Labein	TI Information Technologies	SPAIN	R	Mr	Inaki	Laresgioti
INPG/CNRS	Laboratoire Leibniz	FRANCE	R	Dr	Yves	Demazeau
Universite Pierre et Marie Curie (Paris 6)	Laboratoire d'Informatique de Paris 6	FRANCE	U		Jean-Pierre	Briot
University of York	Dept of Computer Science, Artificial Intelligence Group	UNITED KINGDOM	U	Dr	Daniel	Kudenko
Computer and Automation Research Institute, MTA SZTAKI	Informatics Department	HUNGARY	R	Dr	Laszlo Zsolt	Varga
Motorola Paris	Centre de Recherche	FRANCE	I		Patricia	Charlton
Instituto Trentino di Cultura (ITC)	IRST	ITALY	R	Dr	Anna	Perini
University "Politehnica" of Bucharest	Department of Computer Science	ROMANIA	U	Prof	Adina Magda	Florea
Univerita di Ancona	Instituto di Informatica	ITALY	U	Mr	Aldo	Dragonì
Broadcom Eireann Research Ltd	Intelligent Systems	IRELAND	I	Dr	Richard	Evans
Bar-Ilan University	Dept Maths and Computer Science	ISRAEL	U	Prof	Sarit	Kraus
Hebrew University	Institute of Computer Science	ISRAEL	U	Dr	Jeffrey	Rosenschein
Universiteit Utrecht	Dept of Computer Science	THE NETHERLANDS	U	Prof	John-Jules	Meyer
Vrije Universiteit Amsterdam	Faculty of Maths and Computer Science	THE NETHERLANDS	U	Prof	Jan	Treur
Faculdade de Engenharia da Universidade do Porto	DEEC	PORTUGAL	U	Prof	Eugenio	Oliveira
Universidade de Lisboa	Department de Informatica	PORTUGAL	U	Prof	Helder	Coelho
University of Karlskrona/Ronneby (HK/R)	Dept of Computer Science and Business Administration	SWEDEN	U	Prof	Rune	Gustavsson
Stockholm University	Computer and Systems Sciences	SWEDEN	U	Dr	Harko	Verhagen
BT Labs	Applied Research & Technologies	UNITED KINGDOM	I	Dr	Lyndon	Lee
Hewlett-Packard Laboratories	Trusted E-Services	UNITED KINGDOM	I		Michael	Yearworth

Bristol	Laboratory					
Imperial College	Electrical & Electronic Eng	UNITED KINGDOM	U	Dr	Jeremy	Pitt
Czech Technical University in Prague	Department of Cybernetics	CZECH REPUBLIC	U	Prof Dr	Vladimir	Marik
Queen Mary, University of London	Department of Electronic Engineering	UNITED KINGDOM	U	Dr	Rachel	Bourne
Siemens AG	ZT IK 6	GERMANY	I	Dr	Jörg	Müller
Instituto Superior de Ciências do Trabalho e da Empresa	Unidade de Investigação em Desenvolvimento Empresarial	PORTUGAL	U	Asst Prof	Luis	Botelho
Austrian Research Institute for Artificial Intelligence	Austrian Society for Cybernetic Studies	AUSTRIA	R	Dr	Paolo	Petta
AEGIS	Agentworks	FRANCE	I	Dr	Denis	Pierre
University of Pau	Departement d'Informatique	FRANCE	U	Dr	Nabil	Hameurlain
University of Salford	Centre for Virtual Environments	UNITED KINGDOM	U	Prof	Ruth	Aylett
Institut AIFB, University of Karlsruhe	Faculty of Economic Science	GERMANY	U	Prof Dr	Rudi	Studer
Fac Univ Notre-Dame de la Paix	Institut d'Informatique	BELGIUM	U	Prof	Pierre-Yves	Schobbens
Eindhoven University of Technology	Dept of Technology Management, I & T	THE NETHERLANDS	U	Dr	Gerd	Wagner
Institute of Computer Science of the Polish Academy of Sciences	Dept of Theoretical Foundations of Computer Science	POLAND	R	Dr	Stanislaw	Ambroszkiewicz
University of Hertfordshire	Dept of Computer Science, Adaptive Systems Research Group	UNITED KINGDOM	U	Dr	Kerstin	Dautenhahn
Manchester Metropolitan University	Centre for Policy Modelling	UNITED KINGDOM	U	Prof	Scott	Moss
University of Potsdam	Department of Computer Science	GERMANY	U	Prof	Erika	Horn
Instituto Superior de Engenharia do Porto (ISEP/IPP)	Departamento de Informatica	PORTUGAL	U	Eng	Paulo	Sousa
IKV++ GmbH Informations und Kommunikationstechnologie		GERMANY	I	Dr	Thomas	Magedanz
PopNet Agentscape AG	Software Development	GERMANY	I	Dr	Stefan	Covaci
QinetiQ	Malvern Technology Park	UNITED KINGDOM	I	Dr	Jeremy	Baxter
Cambridge Consultants Limited		UNITED KINGDOM	I	Mr	Roberto	Zanconato
Politecnico de Milano (POLIMI)	Department of Electronics and Information	ITALY	U	Prof	Giuseppina	Gini
Universite Joseph Fourier - Institut Albert Bonnoit	Laboratoire TIMC - IMAG - Integrated Cognitive Systems	FRANCE	U	Dr	Catherine	Garbay
University of Keele	Department of Computer Science	UNITED KINGDOM	U	Prof	Sayyed	Deen
City University	Computing Department	UNITED KINGDOM	U	Dr	Michael	Schroeder
Ibermatica	New Technologies Department	SPAIN	I	Mr	Aureo	Diaz-Carrasco
University of the West from Timisoara (UvT)	Department of Computer Science	ROMANIA	U	Dr	Viorel	Negru
Universitat Politecnica de Catalunya	Lenguatges i Sistemes Informatics	SPAIN	U	Dr	Ulises	Cortes
Ecole Nationale Supérieure des Mines de Saint-Etienne	Industrial Cooperative Systems Department	FRANCE	U	Dr	Olivier	Boissier
University of Aberdeen	Department of Computing Science	UNITED KINGDOM	U	Dr	Peter	Edwards
Computas AS	Technical Director	NORWAY	I	Mr	Roar	Fjellheim
Universidade de Coimbra	Departamento de Engenharia Informatica	PORTUGAL	U	Dr	Luis	Moura e Silva
University of Parma	Dipartimento di Ingegneria dell'Informazione	ITALY	U	Prof	Agostino	Poggi
Universita di Bologna	Dept. Scienze dell'Informazione	ITALY	U	Prof	Paolo	Ciancarini
University of Essex	Department of Computer Science	UNITED KINGDOM	U		Maria	Fasli
Sonera	Mobile Communications, TSCD	FINLAND	I	Mr	Heimo	Laamanen

Universitat Rovira I Virgili	Electronics, Electrics and Automation Engineering	SPAIN	U	Mr	Albert	Oller
Universita' di Torino	Dipartimento di Informatica	ITALY	U	Prof	Leonardo	Lesmo
University of Warwick	Department of Computer Science	UNITED KINGDOM	U	Dr	Nathan	Griffiths
Universidad de Zaragoza	Informatica e Ingenieria de Sistemas	SPAIN	U	Dr	Eduardo	Mena
Albert-Ludwigs-Universitaet	Telematics/Cognitive Science Department - Institut fuer Informatik und Gesellschaft	GERMANY	U	Mr	Torsten	Eymann
University Rey Juan Carlos	School of Engineering (ESCET)	SPAIN	U	Dr	Sascha	Ossowski
University of Maribor	FERI - Laboratory for System Design	SLOVENIA	U	Prof Dr	Peter	Kokol
University of Toulouse 1	CERISS Laboratory	FRANCE	U	Dr	Chihab	Hanachi
University of Hull	Department of Computer Science	UNITED KINGDOM	U	Dr	Darryl N	Davis
Rheinische Friedrich-Wilhelms-Universität	Institute of Computer Science III	GERMANY	U	Prof	Armin	Cremers
Technical University of Denmark	Department of Manufacturing Engineering	DENMARK	U	Asst Prof	Gilad	Langer
CIRAD	TERA	FRANCE	R	Dr	Francois	Bousquet
Thompson-CSF Communications	Common Techniques and Technologies Unit	FRANCE	I	Dr	Vania	Conan
Lost Wax Ltd.		UNITED KINGDOM	I	Mr	Ken	Woghiren
NCR Financial Solutions Group Limited	Self Service Strategic Solutions	UNITED KINGDOM	I	Mr	Mike	Coutts
Universität Koblenz-Landau	Institut für Sozialwissenschaftliche Informatik	GERMANY	U	Prof	Klaus	Troitzsch
University of Westminster	Cavendish School of Computer Science	UNITED KINGDOM	U	Prof	Mark	d'Inverno
Katholieke Universiteit Leuven	Werktuigkunde, Faculty of Engineering - PMA	BELGIUM	U	Dr	Paul	Valckenaers
Norwegian University of Science and Technology	Department of Computer and Information Science	NORWAY	U	Prof	Mihhail	Matskin
University of Manchester	Computer Science Department	UNITED KINGDOM	U	Dr	Jurgen	Dix
Universitat de Girona	Electronica, Informàtica i Automàtica	SPAIN	U	Prof	Beatriz	López Ibáñez
Universitat Jaume I	Departamento de Ingenieria y Ciencia de los Computadores	SPAIN	U	Dr	Luis Amable Garcia	Fernandez
INTRACOM SA	Development Programmes Department	GREECE	I	Mrs	Didoe	Prevedourou
University of Bath	Mathematical Sciences	UNITED KINGDOM	U	Dr	Julian	Padget
Friedrich-Schiller-Universität Jena	Fakultat fuer Mathematik und Informatik	GERMANY	U	Prof Dr	Wilhelm	Rossak
Universite Paris IX Dauphine	LAMSADE	FRANCE	U	Prof	Suzanne	Pinson
Technical University Ilmenau	Department of Economics & Management Science	GERMANY	U	Prof Dr	Stefan	Kirn
Fraunhofer Institute for Computer Graphics	Department of Animation and Image Communication	GERMANY	R	Mr	Ralf	Dörner
ICCC Group A S	RelationaNet Division	CZECH REPUBLIC	I	Mr	Ivan	Sonka
University of Surrey	Department of Sociology	UNITED KINGDOM	U	Prof	Nigel	Gilbert
Universita di Modena e Reggio Emilia - Sede di Modena	Dipartimento di Scienze dell'Ingenieria	ITALY	U	Prof	Sonia	Bergamaschi
Universita di Brescia	Elettronica per l'Automazione	ITALY	U	Ing	Pietro	Baroni
University of Lille	LIFL/SMAC Team	FRANCE	U	Prof	Philippe	Mathieu
Universite de Picardie Jules Verne	IUP Genie Electrique et Informatique Industrielle	FRANCE	U	Dr	Ouiddad	Labbani-Igbida
University of Bayreuth	Lehrstuhl Philosophie	GERMANY	U	Prof Dr	Rainer	Hegselmann
Universidad Politecnica de Valencia	Departamento de Sistemas Informaticos y Computacion	SPAIN	U	Dr	Vincente	Botti
Consiglio Nazionale Delle	LADSEB - CNR	ITALY	R	Dr	Nicola	Guarino

## Recherche

University Paris XIII	Laboratoire d'Informatique de Paris-Nord	FRANCE	U	Asst Prof	Amal	El Fallah-Segrouchni
Ecole Polytechnique Federale de Lausanne	Artificial Intelligence Lab, Computer Science	SWITZERLAND	U		Boi	Faltings
Universita di Genova	DISI - Dip. Di Informatica e Scienze dell'Informazione	ITALY	U	Prof	Maurizio	Martelli
Applied Intelligence (UK) Limited		UNITED KINGDOM	I	Dr	Alan N	Fish
Institut de Recherche en Informatique de Toulouse	Equipe Systemes Multi-Agents et Cooperatifs	FRANCE	R	Mr	Pierre	Glize
Achmea	Intelligent Systems Group	THE NETHERLANDS	I	Dr	Virginia	Dignum
Humboldt-Universitaet zu Berlin	Institut fur Informatik	GERMANY	U	Prof Dr	Hans-Dieter	Burkhard
Linkoeplings Universitet	Computer and Information Science	SWEDEN	U	Asst Prof	Nancy	Reed
Universita di Roma "La Sapienza"	Dipartimento di Informatica e Sistemistica	ITALY	U	Prof	Maurizio	Lenzerini
Universita' Degli Studi di Bari	Dipartimento di Informatica	ITALY	U	Prof	Fiorella	De Rosis
University of Edinburgh	Artificial Intelligence Applications Institute	UNITED KINGDOM	U	Prof	Austin	Tate
University of Liverpool	Department of Computer Science	UNITED KINGDOM	U	Prof	Mike	Wooldridge
CoCo Software Engineering GmbH	Scientific Research	AUSTRIA	I		Walter	Binder
University of Oviedo	Computer Science Department	SPAIN	U	Dr	Jesus	ArturoPerezDiaz
iSOCO SA	iSOCO Lab	SPAIN	I		Juan A	Rodriguez-Aguilar
Swedish Institute of Computer Science	HUMLE + ISL	SWEDEN	R	Dr	Magnus	Boman
Agent Oriented Software Limited		UNITED KINGDOM	I	Dr	Andrew	Lucas
Universite de Technologie de Belfort Montebeliard	Laboratoire Systemes et Transports	FRANCE	U	Prof	Vincent	Hilaire
University of Mining and Metallurgy (AGH)	Institute of Computer Science	POLAND	U	Professor	Edward	Nawarecki
Emorpha Limited	Corporate Headquarters	UNITED KINGDOM	I	Mr	Phil	Buckle
University of Dundee	Department of Applied Computing	UNITED KINGDOM	U	Dr	Chris	Reed
University of Ioannina	Department of Computer Science	GREECE	U	Prof	Evaggelia	Pitoura
Tryllian BV	Engineering Manager	THE NETHERLANDS	I		Menno	Jonkers
Living Systems AG	Director - Technology Research	GERMANY	I	Dr	Klaus	Dorer
Jozef Stefan Institute	Department of Intelligent Systems	SLOVENIA	U	Prof Dr	Matjaz	Gams
Whitestein Technologies AG	VP Business Development	SWITZERLAND	I	Mr	Stefan	Brantschen
Sharp Laboratories of Europe Limited	Information and Language Technology	UNITED KINGDOM	I	Miss	Claire	Green
St Petersburg Institute for Informatics & Automation of the Russian Academy of Sciences (SPIIRAS)	Laboratory of Applied Informatics, Group of Artificial Intelligence Research	RUSSIA	R	Prof	Vladimir	Gorodetski
Macaulay Land Use Research Institute	Land Use Change	UNITED KINGDOM	R	Dr	Nick	Gotts
ThinkinGolem psrcl	Artificial Life, Intelligent Agents, Web and Java Technology	ITALY	I		Mario	Paolucci
Universidad Complutense Madrid	Dep de Sistemas Informaticos y Programacion	SPAIN	U	Dr	Juan	Pavon
Rolls-Royce plc	Strategic Research Centre, Information Engineering Team	UNITED KINGDOM	I		Mark J	Cheeseman
Xerox Research Centre Europe	Coordinatiuon Technologies Group	FRANCE	I		Jean-Marc	Andreoli
National University of Ireland, Galway	Department of Information Technology	REPUBLIC OF IRELAND	U		Colm	O'Riordan
Gruppo Formula Spa	Supply Chain Management Group	ITALY	I		Davide	Gazotti
University of Trento	Department of Mathematics	ITALY	U	Dr	Paolo	Giorgini

Mathematiques Appliquees S A Group	Vice-President Corporate Development	FRANCE	I	Dr	Emmanuel	Chiva
INTERSHOP Software Entwicklungs GmbH	Communications Research	GERMANY	I	Dr	Ryszard	Kowalczyk
Agents Inspired Technologies SA [AITSA]	Masia Can Rajoler	SPAIN	I	Dr	Josep	Lluís de la Rosa Esteva
Acklin BV		THE NETHERLANDS	I		Ruud F	Pels
Almende bv		THE NETHERLANDS	I	Dr	Hans	Abbink
MagentaA Corporation Ltd		UNITED KINGDOM	I	Prof	George	Rzevski
Volterra Consulting Limited		UNITED KINGDOM	I		Paul	Ormerod
Medi-Labs Consulting	E-Learning	FRANCE	I	Mr	Hafidi	Abdelali
University of Cagliari	Faculty of Engineering, Department of Electrical and Electronic Engineering	ITALY	U	Asst Prof	Guiliano	Armano
TNO - TPD	Instrumentation and Information Systems	THE NETHERLANDS	I	Dr	André	Meyer
Core Convergence AS		NORWAY	I		Arne	Birkeland
University of Wales, Cardiff (UWC)	Department of Computer Science	UNITED KINGDOM	U	Dr	Omer	Rana
Wittmann & Partner Computer Systems		ROMANIA	I		Ciprian	Candea
Robonetics NV	RIDL	BELGIUM	I		Filip	Verhaeghe
Ludwigs-Maximilians- Universität Würzburg	Institute of Computer Science, Department of Artificial Intelligence and Applied computer Science	GERMANY	U	Dr	Franziska	Klügl
De Montfort University	Centre of Computational Intelligence, School of Computing	UNITED KINGDOM	U	Dr	Aladdin	Ayesh
Université Claude Bernard - Lyon 1	Laboratoire d'Ingénierie des Systèmes d'Information (LISI)	FRANCE	U	Prof	Salima	Hassas
Freie Universität Berlin	Institut für Informatik	GERMANY	U	Prof Dr Ing	Robert	Tolksdorf
Institute of Informatics, Slovak Academy of Sciences (II-SAS)	Department of Parallel and Distributed Computing	SLOVAKIA	R	Dr	Ladislav	Hluchy
King's College London	Department of Computer Science	UNITED KINGDOM	U	Dr	Alessio	Lomuscio
Delft University of Technology	Computer Engineering Laboratory	THE NETHERLANDS	U	Prof Dr	Koen	Bertels
University of the Aegean	Department of Information and Communication Systems Engineering	GREECE	U	Prof	George	Vouros
University of the Basque Country	Department of Computer Languages and Systems, Facultad de Informatica	SPAIN	U	Prof	Arantza	Illarramendi
Vrije Universiteit Brussel (VUB)	Department of Computer Science	BELGIUM	U	Prof Dr	Ann	Nowé
TIGA Technologies		FRANCE	I	Mr	Jacques	Gouimenou
Universidad de Murcia	Departamento de Ingenieria de la Informacion y las Comunicaciones	SPAIN	U	Dr	Juan A	Botia-Blaya
Lucian Blaga University	Department of Computer Science and Automatic Control	ROMANIA	U	Prof	Boldur-Eugen	Barbat
Universität Augsburg	Institut für Informatik	GERMANY	U	Prof Dr	Bernhard	Bauer
CERTH - ITI	ISSEL	GREECE	R	Prof	Pericles	Mitkas
Morpheus Software	Agent-Technology	THE NETHERLANDS	I	Dr	Gabriel	Hopmans
Centrum voor Wiskunde en Informatica (CWI)	Software Engineering (SEN)	THE NETHERLANDS	U	Dr	Leon	van der Torre
Royal Institute of Technology (KTH)	Laboratory of Electronics and Computer Systems	SWEDEN	U	Profes sor	Mihhail	Matskin
Technical University of Crete	Department of Production and Management Engineering	GREECE	U	Asst Profes sor	Nikolaos F	Matsatsinis
Profactor Produktionsforschungs GmbH		AUSTRIA	I	Mag.	Georg	Weichhart
Calico Jack Limited	Argyll House	UNITED KINGDOM	I	Mr	Brian	Boswell

Salzburg Research Forschungsgesellschaft mbH	Advanced Networking Centre	AUSTRIA	R	Dipl- Ing (FH)	Martin	Herfurt
SILOGIC	R&D dept	FRANCE	I	Dr	Anastase	Adonis
Universidad de Salamanca	Facultad de Ciencias	SPAIN	U	Dr	Juan Manuel	Corchado Rodríguez
University of Twente	Department of Computer Science	THE NETHERLANDS	U	Dr.	Job	Zwiers



### ***Non-European Participants***

AgentLink III has not yet sought to establish formal relations with external countries. However, initial contact has been sought from several outside Europe who want to engage with new AgentLink III activities in FP6. These include:

University of Melbourne	Dept of Information Systems	AUSTRALIA	U	Prof	Liz	Sonenberg
Griffith University	School of Microelectronic Engineering	AUSTRALIA	U	Prof	Ljubo	Vlacic
University of Montreal	Département d'informatique et de recherche opérationnelle	CANADA	U	Prof	Peter	Kropf