Curriculum Vitae: David Robertson

Date of completion: 16th October 2008

A. CURRICULUM VITAE

1. Name

David Stuart Robertson

2. College

Science & Engineering

3. School

Informatics

4. Date of first appointment in The University of Edinburgh

1st October 1984

5. Dates of promotions in The University of Edinburgh

October 1988 : lecturer

October 2002 : senior lecturer

October 2008 : professor

6. University education

BSc Hons (2.1) Ecological Science : University of Edinburgh, 1984.

PhD Artificial Intelligence : Autonomous University of Barcelona, 2000 (external registration while staff member of University of Edinburgh).

7. Career since graduation

October 1984 – October 1988 : Research fellow, Department of Artificial Intelligence, University of Edinburgh.

October 1988 – September 2002 : Lecturer, Department of Artificial Intelligence, University of Edinburgh.

October 2002 – date : Senior Lecturer, School of Informatics, University of Edinburgh.

October 1994 – October 1999 : EPSRC Advanced IT Fellow, School of Informatics, University of Edinburgh.

August 2001 – date : Director, Centre for Intelligent Systems and their Applications, School of Informatics, University of Edinburgh.

9. Major research interests

Throughout my academic carer, my interest has been in executable specifications at the intersection of knowledge engineering (where the emphasis is on knowledge representation and problem description) and software engineering (where the emphasis is on architecture and design).

My main contribution to research in recent years has been to invent a new approach to coordinated knowledge sharing in distributed systems. To support this, I defined an executable specification language (the Lightweight Coordination Calculus, LCC) for describing models of interactions, combining a process calculus specification language with an execution model drawn from logic programming. Using this language, my research group has developed new, practical solutions to problems such as: ontology mapping; service matchmaking; adaptive dialogue and distributed constraint management. The focus of this activity was created within the Advanced Knowledge Technologies IRC (see grants section below) which was the main UK research initiative, and one of the largest ever EPSRC projects, in this area. With these experiments as proof of concept, I obtained funding for a large EU project (OpenKnowledge) that uses my style of interaction modelling in an operational system for discovering, sharing and enacting complex coordinations in a peer-to-peer environment. The project has produced the first "Skype-like" system for sharing knowledge across peer networks via interactions. These methods have been applied to a wide variety of domains, such as astrophysics, protein structure prediction, emergency response and virtual gaming environments. The results are of importance from three viewpoints:

Technological importance : Traditional approaches to automated knowledge sharing (such as those used in the Semantic Web) have not scaled to large, complex, open systems. We have opened a new route to tackling this scaling problem, in which a richer interaction context allows new forms of automation to be applied to problems that have resisted traditional methods. For example, our paper at the International Semantic Web Conference (ISWC-2007, the primary outlet for research publication in this area) demonstrates that a significant part of the ontology matching problem that traditionally is tackled by (costly) ontology alignment can be inferred automatically from interaction context (available to users of our system at no cost).

Theoretical importance : Different sub-fields of computing "owned" parts of our solution (social norms in the multi-agent systems community; service specifications in the Semantic Web community; process modelling in the formal specification community; context logics in the knowledge representation community) but we have brought these together for the first time within a uniform and compact computational system. This provides a unifier for theory across sub-fields in a style that is accessible to engineers as well as abstract theoreticians. Our use of an executable specification language has enabled us to show not only commonality in abstract specification of the generic problem but also to show commonality of computational solutions to it. This has enabled us to gain acceptance of different facets of our (applied) theory at the major semantic web, multi-agent systems, and artificial intelligence communities via their main international conferences (ISWC, AAMAS and IJCAI respectively).

Application importance : We have exceptionally rapid growth in almost every aspect of distributed computing (number of devices, diversity of devices, bandwidth, *etc.*) We need systems that take advantage of this phenomenon in order to produce new forms of application that stimulate, and then are themselves stimulated by, large and open user communities. Traditional systems like web browsers and Skype demonstrate that this can be achieved for very narrow tasks but, before our research, nobody had shown how a similar route to application could be achieved for more complex forms of service interaction and knowledge sharing. This not only changes the available technology but, more fundamentally, enlarges the range of applications we can build. We have demonstrated this effect across many domains. For example, we invented a radical new style of data sharing and analysis that has enabled proteomics experts to discover new results; our methods enabled astrophysicists to develop styles of experiment design that they had not hitherto contemplated; we developed a new model of customer behaviour prediction later used as part of their core business by First Choice Travel (one of the major UK tour operators); and Cancer Research UK is extending its clinical protocol system to the emerging world of internet-based clinical service provision using our languages and infrastructure.

The research impact achieved by the combination of the AKT and OpenKnowledge projects is now carrying through into high-impact application areas, so my future aim is to maintain involvement in a cluster of these

areas as the empirical base upon which to validate my theoretical work. The grants section (Section 10, below) lists future projects in preparation, in healthcare, bioinformatics, emergency response and e-Science.

Prior to my work on coordination, the main contribution of my research was in synthesis of executable, high level specifications of software. The impact of this earlier research has been in two areas:

- Synthesis of complex simulation models. I developed the first system for synthesising complex ecological simulation models as logic programs, based on problem descriptions given by non-mathematical ecologists using a domain-specific language. When we began (in the mid-1980s) the modelling paradigms available to ecologists were those of conventional simulation modelling, yet the natural style of description in ecological modelling often is closer to a relational model. We showed how this sort of model could be described precisely and used directly in predictive tasks. My first book (MIT Press 1991) was a landmark in this area and was cited in the Artificial Intelligence review journal (the key review journal for the field at that time) as a paradigmatic text on applied logic programming. In the longer term, the research led to numerous ecologically-oriented grants and a thriving spin-off company (Simulistics) by "mainstream" ecological modellers.
- Lightweight formal methods. The contribution of my research in the early 1990s was to show how precise methods of logic and automated deduction could help engineers to structure the messy process of early software design and connect it more closely to requirements description activities (giving traceability as requirements and design evolve). I developed a "lightweight" approach to applied logic, in which the barrier to adoption of logic created by the mathematical complexity of formal methods is dramatically reduced by applying logics in ways which mesh with existing engineering practises - hence the resulting methods are lightweight in the sense that they are easy for engineers to pick up. At that time only a few researchers worldwide were advancing such ideas, although this is now part of the mainstream. My 1999 book was written to summarise a logic-based approach in a manner accessible to software engineers - a task which seemed ambitious at the time but has had a practical impact (for example it is a recommended formal methods text by the International Association of C and C++ Users). Although no researcher can lay sole claim to the idea of lightweight formal methods, my group was in the vanguard of this movement and our work has been cited remarkably widely across computing sub-disciplines (for instance Berry *et.al.* in software requirements engineering; Menzies *et.al.* in knowledge engineering; Fox *et.al.* in safety-critical systems).

My current research group, described in detail at `www.cisa.inf.ed.ac.uk/ssp`, has as its focus the use of declarative specification (of the sort used to synthesise and reason about programs) to provide the theory and practice needed for large scale, distributed knowledge sharing. The group comprises 10 dedicated researchers and PhD students at Edinburgh, with an additional 40 researchers contributing directly on funded research that I coordinate outside Edinburgh (the main sites being Amsterdam, Barcelona, the Open University, Southampton and Trento - see `www.openk.org` for details). We also collaborate with researchers in Oxford (John Fox, on multi-agent clinical protocol specification and enactment); the National Centre for High Performance Computing in Taiwan (Fang Pang Lin, on distributed computation for ecological modelling), City University New York (Simon Parsons, on multi-agent protocols for argumentation), and MIT (Tim Berners-Lee, a founder member of the OpenKnowledge project).

10. Principal research grants

My principal research grants have attracted in excess of £2.7M in research funding to University of Edinburgh. Details are as follows:

The ECO project: Funded by EPSRC. I was a CoI in the latter part of this project with Bundy and Muetzelfeldt. Edinburgh funding £60,000. Duration 1988-1991.

The Intelligent Authoring Project: Funded by EPSRC, involving three universities and the Scottish Office. I was the Edinburgh PI. The other PIs were Tweed (Queens, Belfast) and Summerville (Leeds). Edinburgh funding £90,000. Duration 1991-1994.

The Techniques Editor project: Funded by an ESRC/MRC/EPSRC Joint Initiative in Cognitive Science and Human Computer Interaction, involving 3 universities. I was the coordinator. The other

PIs were Pain, Brna (Edinburgh), Ormerod (Loughborough), Kahney (Open University). Edinburgh funding £85,000. Duration 1991-1994.

The Indigenous Knowledge project: Funded by the Overseas Development Agency. I was one of the PIs at Edinburgh. The other PIs were Sinclair (Bangor) and Muetzelfeldt (Institute for Ecology & Resource Management, Edinburgh). Edinburgh funding £80,000. Duration 1991-1994.

Frameworks for Reasoning in Safety Cases: Funded by the EPSRC. Involved PIs at a number of Edinburgh departments: the Laboratory for Foundations of Computer Science (Anderson,Clelland); the Human Communications Research Centre (Stenning); the Department of Artificial Intelligence (Bundy, myself); and the Department of Sociology (MacKenzie). Funding to my department £178,000. Duration 1993-1996.

Advanced IT Fellowship: Funded by the EPSRC to support my personal research. Funding £123,000. Duration 1994-1999.

Sustainable Lifecycles in Information Ecosystems: Funded by the EC (Framework 5) involving 3 universities. I was the coordinator. The other PIs were Anderson,Fourman,Sannella (Edinburgh), Parsons, Wooldridge (Liverpool), Agusti and Sierra (Barcelona). Total funding £631,800. Edinburgh funding £262,600. Duration 2000-2003.

Communication of Knowledge from Synthesised Web Sites: Funded by the EPSRC and involving 2 universities. I was the coordinator. The other PIs were Lee (Edinburgh) and Johnson (Glasgow). Total funding £276,200. Edinburgh funding £155700. Duration 2000-2003.

Advanced Knowledge Technologies Interdisciplinary Research Collaboration: Funded by the EPSRC involving 5 UK universities. I was one of the two PIs at Edinburgh. The other PIs were Tate (Edinburgh), Shadbolt, Hall (Southampton), Sleeman (Aberdeen), Motta (Open University) and Wilks (Sheffield). Total funding £7 million. Edinburgh funding £1,289,000. Duration 2000-2006. At its final EPSRC peer review this project scored 34 out of a potential 35 (rated "internationally leading" on six out of the seven EPSRC impact dimensions, and "nationally leading" on the seventh which was public involvement). I am aware of no EPSRC project that betters this rating.

Open Knowledge: Funded by the EC (Framework 6) involving 6 universities. I am the coordinator. The other PIs are van Harmelen (Amsterdam), Sierra (Barcelona), Motta (Open University), Shadbolt (Southampton) and Giunchiglia (Trento). Total funding £2.6 million. Edinburgh funding £636,000. Duration 2006-2009. This project was rated top amongst approximately 120 competing European grant proposals and is the largest EC funded research project (a STREP in EC parlance) currently in its area.

Safe and Sound: ICT Services to Ensure Quality and Safety of Patient Care : Funded the EPSRC Grand Challenges in Information Driven Health initiative, with Fox (Oxford), Glasspool (Edinburgh) and Vincent (Imperial College).

National e-Science Centre Research Platform : Funded by EPSRC's e-Science Platform call, with Clarke, Berry, van Hemert, Atkinson, Mann (Edinburgh) Sinnott and Ford (Glasgow).

I was a founder member of the Edinburgh component of the Dependability Interdisciplinary Research Collaboration, an EPSRC project (similar to the AKT IRC above). The PIs on this grant were Anderson (Edinburgh), Jones (Newcastle), Sommerville (Lancaster), Littlewood (City) and Burns (York).

With Leung, I developed the initial programme of research for the new Centre for Biomedical Informatics at the University of Macao. This is intended to provide a focus for automated knowledge sharing and analysis in Chinese Medical research (it supports the Journal of Chinese Medicine) and already has stimulated a cluster of research project proposals in Hong Kong, Beijing and elsewhere.

Other smaller research grants include: the Logics for Knowledge Sharing project (3 years, British Council/CAPES-Brazil funded, collaborative with Sao Paulo and Fortaleza); the MODELOGOS project (3 years CICYT Spain funded, collaborative with Barcelona); and two EU Marie Curie fellowships to support visiting research fellows. I have also have occasional consultancy projects with government and industrial organisations (*e.g* Lucas Aerospace, UNESCO, the UK Health and Safety Executive) and have been a mentor under the Edinburgh Pre-Incubator Scheme (EPIS) for stimulating commercial spinoffs from academic research.

11. RAE status

I am included in the 2008 RAE (and was included in all those preceding it). My research was highlighted in the impact statement made by the School.

12. Research supervision experience

The following are the doctoral students who have completed their theses under my (1st) supervision (no student who I have supervised has failed to complete). Listed for each is the year of award of doctorate, student name, and last known occupation.

1. 1992, Flavio Correa da Silva, *Automated Reasoning with Uncertainties* (Reader in the Department of Computer Science, University of Sao Paulo).
2. 1993, Xindong Wu, *Knowledge Acquisition from Databases* (Department Chair in Computer Science at the University of Vermont).
3. 1994, Keiichi Nakata, *A Causal Reasoning Approach to Behaviour-oriented Design* (Dean of School of IT, International University in Germany).
4. 1994, Maria Vargas-Vera, *Guidance During Program Composition in a Prolog Techniques Editor* (Research Fellow at the Knowledge Media Institute, the Open University).
5. 1995, Wamberto Vasconcelos, *Extracting, Organising Designing and Reusing Prolog Programming Techniques* (Lecturer in Computer Science, University of Aberdeen).
6. 1995, Soon-Ae Yang, *A Case Based Reasoning System for Building Regulations* (Chief of Staff, Minister for Technology, South Korea).
7. 1996, Mandy Haggith, *A Meta-level Argumentation Framework for Representing and Reasoning about Disagreement* (Forestry researcher and campaigner, Lochinver, Scotland).
8. 1997, Nam Seog Park, *A Connectionist Representation of First-order Formulae with Dynamic Variable Binding* (Research scientist at General Electric Labs, New York).
9. 1998, Alberto Castro, *A Techniques Based Framework for Domain-specific Synthesis of Simulation Models* (Lecturer in the Department of Computer Science, University of Manaus).
10. 1998, Peter Funk, *CABS: A Case-Based and Graphical Requirements Capture, Formalisation and Verification system* (Senior Lecturer at the Department of Computer Engineering, Malardalen University).
11. 1998, Edjard Mota, *Time Granularity in Simulation Models Within a Multi-agent System* (Senior Research Scientist, Hewlett Packard Research, Brazil).
12. 1999, Renaud Lecoeuche, *Formalisation and Evaluation of Focus Theories for Requirements Elicitation Dialogues in Natural Language* (Research Scientist, Microsoft Speech Processing Group, Seattle).
13. 2000, Yannis Kalfoglou, *Deploying Ontologies in Software Design* (Research Fellow, Department of Electronics and Computer Science, University of Southampton).
14. 2001, Daniela Carbogim, *A Formal System for Dynamic Argumentation* (Consultant, Mackenzie Consulting, Sao Paulo).
15. 2001, Jessica Chen-Burger, *Formal Support for Business Process Modelling* (Research Fellow, Informatics, Edinburgh).
16. 2003, Virginia Brilhante, *Ontology and Re-use in Model Synthesis* (Senior Lecturer in the Department of Computer Science, University of Manaus).
17. 2003, Joao Cavalcanti, *Web Site Synthesis from Domain-specific Problem Descriptions* (Head of Department of Computer Science, University of Manaus).

18. 2006, Mark Collins *An Algorithm for Evolving Protocol Constraints* (Research Scientist, Level E, Edinburgh)
19. 2006, Jarred McGinnis *On the Mutability of Protocols* (Research Fellow, Computer Science, Royal Holloway, London)
20. 2007, Guo Li *Enacting a Decentralised Workflow Management System on a Multi-agent Platform* (Research Fellow, Computer Science, Imperial College, London)
21. 2007, Fadzil Hassan, *Managing Finite Domain Constraints in Multi-agent Interactions*, (Lecturer, Petronas University, Malaysia).
22. 2007, Adam Barker, *Distributed Multi-agent Protocols in Support of Grid Experimentation*, (Research Fellow, University of Oxford)
23. 2007, Siu-wai Leung, *Automated Synthesis in Support of Internet Based Experimentation*, (Executive editor Journal of Chinese Medicine)
24. 2008, Nardine Osman *Model checking for multi-agent coordination*, (Research Fellow, CSIC AI Research Institute, Barcelona).

I am currently the 1st supervisor for the following PhD students (listed with current year of study and thesis topic):

1. Paolo Besana (4th year) *Dynamic ontology mapping for multi-agent systems.*
2. Ana Costa e Silva (2nd year) *Task-specific ontology mapping in distributed environments.*
3. Philip Graham (1st year) *Multi-agent coordination in complex virtual environments.*
4. David Lambert (4th year) *Uncertainty in semantic web service provision.*
5. Paul Martin (2nd year) *Social group formation in multi-agent systems.*
6. Maciej Zurawski (3rd year) *A formal framework for multi-context knowledge management.*

13. Teaching experience

I have had a major involvement in teaching since the expansion of Artificial Intelligence undergraduate courses of the mid-1980s. My principal achievements in this time (interrupted by my EPSRC Advanced Research Fellowship) are as follows:

- I have maintained Edinburgh's reputation in computational aspects of logic by teaching courses in logic programming and by using logic as a *lingua franca* for courses in which it is less common (for example in knowledge management and in software engineering).
- I have been one of the key players in developing our teaching of knowledge based systems, both in the formative undergraduate years and in the more advanced Honours and Masters courses.
- I have promoted, by example, teaching of informatics across traditional sub-disciplines (in my case, between artificial intelligence and computer science). I believe this to be essential to achieving a deep understanding across the field.
- As a course organiser I have helped make key course integration occur, increasing course size while decreasing administrative overhead (for example in Artificial Intelligence 2 and our MSc). This, in my view, has been crucial to maintaining teaching excellence as Informatics has grown.

My main teaching responsibilities have been as follows:

- Artificial Intelligence 1: I have taught (in different years) components covering roughly half the course (Prolog Programming, Knowledge Representation, Experimental Methods)

- Informatics 1: I co-designed and co-taught two of the four components of this course which is the new (2004-5) foundation course for the majority of Informatics undergraduate degrees. My 2006-7 course on logic and computation is one of the first wave of University "vanguard" courses.
- Artificial Intelligence 2: I was course organiser(1989-1994, 1999-2000) and redesigned (and presented) its knowledge based systems component. I was responsible for coordinating and overseeing a major overhaul of this course in 1999-2000.
- Computer Science 2: I re-designed and taught the software engineering component.
- MSc in Informatics: I was the first course organiser for the combined Informatics MSc courses (2000-2001). This merged three MSc degrees (Artificial Intelligence, Cognitive Science and Computer Science. I have taught MSc/Honours courses in logic programming, knowledge based systems and software engineering - all of which I designed or re-designed and all of which were among the most heavily subscribed courses in their years.
- I led the team that re-designed the knowledge representation and reasoning theme for Informatics Honours and Msc courses, producing a suite of eight revised/new courses covering this research area.

I was external examiner for the Open University's Prolog programming course (1993 - 1998).

I am a member of the PhD Thesis External Review Committee of the International Graduate School in Information and Communication Technology of Trento, Italy.

14. Postgraduate student supervision

I have supervised approximately 50 MSc student projects (all successful).

15. Administrative experience

My major administrative role (from 2001 to date) is as Director of the Centre for Intelligent Systems and their Applications, one of the six research institutes comprising the School of Informatics. Other administrative duties include:

- 1989-1994: Course organiser, Artificial Intelligence 2.
- 1997-1998: Member of the Advisory Board for the Centre for the Study of Environmental Change and Sustainability, School of Geosciences.
- 1999-2000: Course Organiser, Artificial Intelligence 2.
- 2000-2001: Course Organiser, Informatics MSc.
- 2002-2004: Member of the University Management Information Committee.
- 2002-2005: Member of University Senatus
- 2004-date: Director of Studies.
- 2007-date: Member of University Website Development Project Board.

16. Membership of societies

I am a Fellow of the British Computer Society (FBCS).

17. Membership of committees

- Editor in Chief of the Artificial Intelligence Review Journal.
- Joint Editor in Chief of the Automated Experimentation Journal.
- Member of programme committees for: 2^{nd} IFAC/IFIP/EurAgEng Workshop on Artificial Intelligence in Agriculture (1995); IEEE Software Engineering and Knowledge Engineering conference (1997-2003); IEEE Knowledge and Data Engineering Exchange Workshop (1997); Logic Programming and Software Transformation Workshop (1998,1999); Workshop on Visual Issues for Formal Methods (1998); Year 2000 Integrated Design and Process Technology conference (2000); IEEE International Workshop on Rapid System Prototyping (2001 to 2005); The First International Workshop on Model-based Requirements Engineering (2001); Modelling and Methods for Agent Based Systems workshop (2001); The 16th International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems (2002); Formal Approaches to Multi-Agent Systems workshop (2003, 2007); 15th IEEE International Conference on Tools with Artificial Intelligence (2003,2004); IEEE International Conference on Machine Learning and Cybernetics - agent track (2003); AAAI Spring Symposium on Semantic Web Services (2004); ECAI workshop on the Semantic Grid (2004); AAAI Fall Symposium on Agents and the Semantic Web (2005); Young Researchers Workshop on Service Oriented Computing (2005); 4th International Workshop on Web Semantics (2005); User Aspects of the Semantic Web workshop at the European Semantic Web Conference (2005); End-User Semantic Web Interaction workshop at the International Semantic Web Conference (2005); 4th Mexican International Conference on Artificial Intelligence (2005); 2nd International Conference on Intelligent Computer Communication and Processing (2006); ECAI workshop on Contexts and Ontologies (2006); ECAI workshop on Formal Aspects of Multi-Agent Systems (2006); American Association for Artificial Intelligence, AAAI (2006); ISWC workshop on Uncertainty Reasoning for the Semantic Web (2006,2007,2008); Workshop on Context and Ontology Representation and Reasoning (2007); European Workshop on Multi-Agent Systems (2007); European Conference on Artificial Intelligence, ECAI (2008); International Workshop On Semantic Extensions to Middleware (2008); International Joint Conference on Autonomous Agents and Multi-Agent Systems, AAMAS 2009.
- Referee for the following journals: Artificial Intelligence; IEE Journal on Selected Areas in Communications; IEE Transactions on Systems, Man and Cybernetics; IEEE Software Engineering; IEEE Transactions on Knowledge and Data Engineering; The International Journal of Human Computer Studies; The International Journal of Agent-Oriented Software Engineering; The Journal of Ecological Modelling; The Journal of Expert Systems; The Journal of Software Engineering and Knowledge Engineering; The Journal of Software Practice & Experience; The Journal of Software and System Modelling; The Journal of Web Semantics; Knowledge Based Systems Journal; The Knowledge Engineering Review.
- Member of the editorial board of the Knowledge and Information Systems journal (published by Kluwer) from its inception in 1998 until 2006.
- Organiser of the following events: Association of Logic Programming workshop on Logic Programming Environments, Edinburgh (1994); ETAPS workshop on Multi-agent Simulation, Genova (2001); ETAPS workshop on Multi-agent Systems, Budapest (2002); Peer to Peer Knowledge Management workshop at the second Annual International Conference on Mobile and Ubiquitous Systems, San Diego (2005).
- Member of IT proposal review panel for the Science Foundation of Ireland (2005).
- Member of the UK Engineering and Physical Sciences Research Council (EPSRC) peer review college 2006-9.
- Project reviewer for the European Commission (including large scale Integrated Projects).

18. Items of esteem at symposia and congresses

The following are seminars given internationally by invitation (items 14,17 and 18 are keynote talks). Note that the ARO/NSF/ARPA/ONR/AFSOR meetings in 1994,1995,1998,2000 and 2002 are in the "Monterey

workshop" series. This is an annual US event, supported by the main US research funding bodies and held alternately in the US and Europe, targeting a different aspect of innovation in software engineering each year. All formal presentations at Monterey workshops are by invitation and it funds attendance by major international researchers in each chosen area.

1. "Applications of Computational Logic to Ecological Modelling", invited seminar, San-Diego Supercomputing Centre, California, USA, 1994.
2. "Argumentation in Support of Software Design", invited seminar, ARO/NSF/ARPA/ONR/AFOSR Workshop on Increasing the Practical Impact of Formal Methods for Computer-Aided Software Development, Monterey, USA, 1994.
3. "Lightweight Methods of Formal Specification", invited seminar, ARO/NSF/ARPA/ONR/AFOSR Workshop on Increasing the Practical Impact of Formal Methods for Computer-Aided Software Development, Monterey, USA, 1995.
4. "A Requirements Specification System for Logic Programs", invited seminar, CSIC Institute for Artificial Intelligence, Autonomous University of Barcelona, Spain, 1995.
5. "Domain Specific Problem Description", invited seminar, Institute for Informatics, University of Zurich, Switzerland, 1997.
6. "Pitfalls of Formal Methods in Program Synthesis", invited seminar, ARO/NSF/DARPA workshop on Engineering Automation for Computer Based Systems, Carmel, USA, 1998.
7. "Formal Methods From Requirements to Implementation", invited seminar, Department of Computer Science, University of Rouen, France, 1998.
8. "Formal Methods in Modelling Populations of Agents", invited seminar, ARO/NSF workshop on Modelling Software Systems in Fast Moving scenarios, Liguria, Italy, 2000.
9. "A Framework for Multi-agent Simulation", invited seminar, CSIC Institute for Artificial Intelligence, Autonomous University of Barcelona, Spain, 2000.
10. "Reliable Design of Agent Systems", invited seminar, ARO/NSF workshop on Radical Innovations in Software and Systems Engineering, Venice, Italy, 2002.
11. Invited panelist, Dagstuhl Seminar: Semantic Interoperability and Integration, Schloss Dagstuhl, Germany, 2004.
12. "A Lightweight Coordination Calculus: Its Use in Deployment and Analysis", invited seminar, Department of Computer Science, University of Trento, Italy, 2004.
13. "Knowledge Sharing in Distributed, Open Environments", invited seminar, National Centre for High Performance Computing, Taiwan, 2005.
14. "What we Don't Know about Semantic Systems", keynote talk, Inauguration of Austrian Federal Ministry of Innovation research programme on Semantic Systems and Services, Vienna, Austria, 2005.
15. "Applications of Peer to Peer Knowledge Sharing", invited seminar, Tsinghua University, China, 2006.
16. "Opportunities and Limits for Open, Peer to Peer Knowledge Sharing", invited seminar, UN University of Macao, China, 2006.
17. "The Key role of Context in Peer to Peer Knowledge Sharing", keynote talk at 3rd International Workshop on Contexts and Ontologies: Representation and Reasoning, Roskilde, Denmark, 2007.
18. "Agency, Peer to Peer and the Internet - More Than the Sum of Their Parts?", keynote talk at Multi-Agent Logics, Languages, and Organisations Federated Workshops(MALLOW), Durham, UK, 2007.

19. National invitations

1. "Model Based Requirements Analysis", invited paper, Future Customer Facing Systems Workshop, British Telecom, Martlesham, UK, 1990.
2. Invited panelist, Inaugural meeting of IFIP working group 2.9 on requirements engineering, London, UK, 1995.
3. "Multi-agent Specification for Clinical Protocols", invited seminar, Advanced Computation Laboratory, Imperial Cancer Research Fund, London, UK, 1998.
4. "Synthesis of Logic Programs From Domain-Specific Problem Descriptions", invited paper, The 8th International Workshop on Logic-Based Program Synthesis and Transformation, Manchester, UK, 1998.
5. "Design Automation Using Formal Methods", invited seminar, Department of Computer Science, University of Glasgow, UK, 1999.
6. "Synthesis of Logic Programs", invited seminar, Department of Computer Science, University of Aberdeen, UK, 1999.
7. "In Defence of Formal Methods in Early Requirements Engineering", invited seminar, RESG/FACS workshop on Formal Methods & Requirements Engineering, London, UK, 1999.
8. "Multi-agent Simulation", invited seminar, British Telecom, Martlesham, UK, 2000.
9. "Domain-specific Program Synthesis", invited seminar, Department of Computer Science, University of Surrey, UK, 2001.
10. "Lightweight Formal Methods for Multi-agent Coordination", invited seminar, Department of Computer Science, University of Bath, UK, 2002.
11. Invited panelist, Foundations of Interactive Computation workshop at the European Joint Conferences on Theory and Practice of Software, Edinburgh, UK, 2005.
12. "Coordination Oriented Programming", invited seminar, School of Computer Science, University of Manchester, UK, 2005.
13. "Open Ontologies for Peer to Peer Systems", invited seminar, e-science workshop "The Closed World of Databases Meets the Open World of the Semantic Web", National e-Science Centre, Edinburgh, UK, 2006
14. "Open, Peer to Peer Knowledge Sharing", invited seminar, University of Durham, UK, 2006.
15. "Reconstructing Argumentation and Trust in the OpenKnowledge Project", invited seminar, Imperial College, London, 2007.
16. "Open, Peer to Peer Knowledge Sharing", invited seminar, Department of Computer Science, University of Aberdeen, UK, 2007.

20. Major lectures given as guest lecturer

See sections 18 and 19 above.

21. Doctoral external examining

- 1995: Julian Smart, PhD (Dundee)
- 2001: Xin Hong, PhD (Ulster)
- 2002: Panayiotis Periorellis, PhD (Newcastle)
- 2003: Martin Dzbor, PhD (Open University)

- 2003: Marc Esteva, PhD (Barcelona)
- 2003: Jordi Sabater, PhD (Barcelona)
- 2004: Thomas Norlander, PhD (Aberdeen)
- 2006: Lee Onn Mak, PhD (Surrey)
- 2006: Martin Gill, PhD (Stirling)
- 2006: Luke Teacy, PhD (Southampton)
- 2007: Fan Zhang, PhD (Surrey)

B. LIST OF PUBLICATIONS

In the lists below, in all joint publications where I am first author I am also the main originator.

An asterisk is placed against those publications I consider the most significant.

1. Books published

1. ∗ D. Robertson, A. Bundy, R. Muetzelfeldt, M. Haggith, and M Uschold. *Eco-Logic: Logic-Based Approaches to Ecological Modelling*. MIT Press (Logic Programming Series), 1991. ISBN 0-262-18143-6. 243 pages.
2. ∗ D. Robertson and J. Agusti. *Software Blueprints: Lightweight Uses of Logic in Conceptual Modelling*. Addison Wesley/ACM Press, 1999. ISBN 0-201-39819-2. 220 pages.
3. Y. Chen-Burger and D.Robertson. *Automating Business Modelling*. Springer Verlag, 2004. 322 pages.

2. Books edited

None.

3. Articles published as sole author

3.1. Journal articles

1. D. Robertson. Multi-level cooperative dialogue in intelligent front ends. *Journal of Artificial Intelligence in Engineering*, 6(1), 1990.
2. ∗ D. Robertson. An empirical study of the LSS specification toolkit in use. *Journal of Systems and Software*, 42:115–123, 1998. one of the selected papers from SEKE-96.
3. D. Robertson. Pitfalls of formality in early system design. *Science of Computer Programming*, 42(1):29-38, 2002.

3.2. Refereed conference papers

1. D Robertson. A simple Prolog techniques editor for novice users. In G.A. Wiggins, C. Mellish, and T. Duncan, editors, *Proceedings of 3rd Annual Conference on Logic Programming*, pages 190–205, Edinburgh, April 1991. Springer-Verlag Workshops in Computing Series.
2. ∗ D. Robertson. Distributed specification. In *Proceedings of the 12th European Conference on Artificial Intelligence*, Budapest, Hungary, August 1996.

3. D. Robertson. An empirical study of the LSS specification toolkit in use. In *Proceedings of the 8th International Conference on Software Engineering and Knowledge Engineering, Nevada, USA*. Knowledge Systems Institute, Illinois, 1996. ISBN 0-9641699-3-2.

4. D. Robertson. Domain specific problem description. In *Proceedings of the 8th International Conference on Software Engineering and Knowledge Engineering, Nevada, USA*. Knowledge Systems Institute, Illinois, 1996. ISBN 0-9641699-3-2.

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