A. Curriculum Vitae

1. Name

Stuart Oliver Anderson

2. College

College of Science and Engineering

3. Department

School of Informatics

4. Date of first Appointment at the University of Edinburgh

1 October 1986

5. Date of Promotion at the University of Edinburgh

To Professor 1 August 2011
To Senior Lecturer 1 October 1992

6. University education

1970-1977: Heriot-Watt University, Edinburgh

7. Degrees awarded

1970-1974: BSc (2(i)) in Computer Science, Heriot-Watt University, 1974.

8. Career since graduation

2011-present: Professor of Dependable Systems at Edinburgh University.
1992-2011: Senior Lecturer in Computer Science at Edinburgh University.
1986-1992: Lecturer in Computer Science at Edinburgh University.
1983-1986: Lecturer in Computer Science at Heriot-Watt University.
1982-1983: One year leave of absence to take up a visiting researcher position at the Programming Methodology Group led by Bengt Nordstrom and Jan Smith at Gothenburg University. This was the leading group working on Type Theory and Functional Programming at the time.
1979-1982: Lecturer in Computer Science at Heriot-Watt University.
1977-1979: Research Associate at Heriot-Watt University.
1974-1977: I undertook study towards a PhD 1974-1977 at Heriot-Watt University. I did not submit a thesis because my interests changed when I took up a research assistant post and I was fully occupied with my new project

9. Major research interests

I work on the design and analysis of complex systems and how we ensure they are fit for purpose. This includes both demonstrating fitness and influencing design in practice. This is crucial in the context of safety-critical or dependable systems where any failure can have unacceptable consequences. My goal is to analyse and transform the practice of: system design, deployment and use in order to create systems that evidently justify the trust we put in them. The management and perception of risk and trust is a recurring theme in this work. Over the past 20 years my

group has established the effectiveness of modelling in this domain and has demonstrated the effectiveness of multi-disciplinary approaches to achieving dependability.

My research interests lie at the intersection of the logic and semantics of systems, cognitive science, organisational science and sociology. My work is highly interdisciplinary and I have established a strong network across the disciplines, within the University, nationally and internationally. This was reflected in the award of the Dependability IRC (DIRC) by EPSRC in 2000. This was one of five IRCs awarded from an initial pool of over 120 proposals. Covering five Universities, with a budget in excess of £7m, DIRC ran until 2006 and was rated *internationally leading* in the final review. I led the Edinburgh DIRC activity. DIRC-style activity continues under my direction funded by the INDEED grant which runs until 2011.

Over the past twenty years I have sustained a significant, well-funded, research activity that has evolved from taking a predominantly technical viewpoint to my current work that emphasises the socio-technical nature of systems. My group has averaged 3 researchers and two PhD students over that time, often with researchers in other Schools being supported on projects I initiated. My work is both interdisciplinary and highly applied to specific domains. This means that it can be difficult to publish in high impact forums. The impact of my work has mainly come from working directly with companies and through the diffusion of my RAs and PhD students into industry and the broader community.

Creating dependable systems involves controlling the interaction of many factors. My work has its origins in the attempt to control technical failure through *modelling and analysis*. This remains an ongoing concern and recent work on measuring quality of service of failure detection has direct relevance for Grid and Cloud architectures. It quickly became obvious that though this modelling activity has an important role to play, the *social and organisational setting* of a system is crucial in determining the priority given to different sources of potential failure. In addition the human organisation is a powerful source of resilience in systems and is also a significant source of failure. Finally, many failures arise in the process of *communication* between different specialists during the construction, implementation and operation of a system. These are the three key strands of my research:

Formal Modelling: Using logic and semantics of processes (particularly with extensions to take account of time, knowledge or other "non-standard" features, recently this has included "quality of service" in the work of my PhD student Tiejun Ma) this work provides models to allow more rigorous support of typical real-life system development practices. The impact of this work is best reflected in our interaction with companies, for example:

- Work with several companies on safety critical systems that included the successful analysis of real-world problems including the analysis of a recovery protocol in an air traffic information system with Praxis (a leading UK safety-critical software company), the analysis of failure in a key protocol at the heart of the control system for the Sizewell B nuclear reactor and a new method formally to check the safety of British Rail signalling systems.
- Consultancy with Lucas Aerospace on formal support for the work practices of both control engineers and software engineers in the development of aircraft engine control systems.
- Teaching Company Scheme with Adelard to transfer the capacity to carry out formal proof from the University. Adelard are now one of the few commercial providers prepared to formally verify systems under fixed price contracts.
- Consultancy with QinetiQ on the dependability issues for a new system intended to control and configure a global-scale communication system.
- Our recent work with Jane Hillston has looked at quality of service of failure detection. This has particular importance in large-scale infrastructures such as Grid or Cloud computing.

Representation and reasoning: Most system designers use a variety of special purpose, often diagrammatic, representations. In collaboration with Keith Stenning, Corin Gurr and other members of the Institute for Communicating and Collaborating Systems (ICCS), we have worked to develop formal theories of diagrammatic notations that help clarify how diagrams support reasoning. As part of this activity we developed prototype tools embodying this theory and experimented with their application. These prototypes have influenced the design of the ASCAD tool developed by Adelard (a UK safety consultancy).

Diagrammatic programming languages for programmable logic controllers used in process control of safety critical systems, have helped guide this work. More recently we have considered graphical notations for expressing safety cases as an example of structures intended to expose flaws in reasoning.

Errors predicted by our theory have arisen in practice in these languages with the potential to cause accidents. The impact of this work is mainly through guidance on the use of Programmable Logic Controllers in safety critical systems. I co-authored this guidance with other members of EWICS (European Workshop on Industrial Computer Systems) working group on the Safety of PLCs. The guidance was widely disseminated and used in industry.

My main RA working in this area left the University to join Adelard, a safety-critical consultancy company, to work on visual tools for representing and reasoning about safety cases and on the visual representation of smart controllers. His work there had a strong influence on the shaping of guidance on the use of smart sensors. This work continues with one of my RAs is actively engaged in the development of visual safety case tools. This work was funded under EPSRC grants *Domain-Specific Representation And Reasoning* and *Understanding Software Architecture*. The study of the match between representation, task and solution method remains an active area of interest.

Social embedding of systems: Accidents rarely have a single cause and arise from complex interactions between systems and their contexts. My work in this area involves characterising contexts and how they influence the dependability of systems. Since 1982 I have worked closely with Donald MacKenzie, Robin Williams and other members of the Institute for Social Studies of Science and Technology (ISSTI). The following areas are typical of the impact of this work:

- Ethnographic work, funded by DIRC, on the detailed use of classification in patient information management systems within the NHS. This has already changed practices in the study project in Lothian.
- Currently we are developing a training tool for mammographers who will work in the screening program. The development has involved detailed ethnographic work that has resulted in a system that is likely to be adopted by the Scottish Breast Screening program as part of its training in the switch to digital mammography.
- Study of the social process of standardisation, funded by SERC/ESRC grant *Social Processes in the Development of High-Integrity Computer Systems*. This comparative study across different domains influenced standards formation through links with Adelard, who authored both the military software safety standards and the UK SafeIT policy[1]. This work begun in 1992 is a strong contribution to the work on standardisation in ISSTI.
- MacKenzie's work on the stability of global financial markets under the DIRC and INDEED projects has stimulated work on how market mechanisms could be used to create efficient, stable, and diverse collaboration mechanisms. This is an active area of work in the development of social computing.

[1]The military standards are the safety-critical software standard DefStan 00-55 and related standards. The UK Safe IT policy was promulgated in the 1990s and set the framework for the UK approach to safety in Information Technology

These three technical themes are complemented by my commitment to interdisciplinary working and industrial interaction. These are essential to my style of working. Over the past 20 years I have facilitated the creation of a strong interdisciplinary cluster drawing on ISSTI, the Business School, Engineering, EPCC and Informatics. The Social Informatics Cluster has weekly meetings that bring the group together and supports joint working. I collaborate with groups in General Practice, Sociology, Economics and Management Science, ISSTI, and the Learning Technology Section together with a range of collaborators inside Informatics and in other leading Universities. This collaboration provides a strong foundation for problem-centred research and knowledge transfer that has been successful in taking forward a strong research programme over the last 20 years. I also have interdisciplinary links to the natural sciences through my role in the writing team for the proposal that brought the National e-Science Centre to Edinburgh. In particular, I have a strong relationship with EPCC and continue to work closely with them on a range of initiatives.

I am committed to fostering Industry Interaction. My work as a member of the European Workshop on Industrial Computer Systems (EWICS TC7) led to the production of guidelines on: safety of medical devices, risk analysis, and the safety applications of programmable logic controllers which was particularly successful. Through projects, I interact with a range of companies including: *Shell, Lucas TRW, Rover, British Rail, Barclays Capital, Praxis, Harlequin, Adelard, Motorola, NHS, SUN, QinetiQ, Deep Blue, Proctor and Gamble, and the Royal Bank of Scotland.* For example, in association with my PhD student Matthew Morley, we worked with British Rail on a scalable approach to formally verifying the safety of track interlocking systems. I was coordinator for Informatics relations with Sun Microsystems, this led to collaborative projects on SUN's fault finding processes and on the risks associated with process transfer. Recently my group has been working with Eurocontrol on air traffic controllers risk perception of new systems.

Healthcare is a key domain for the application of my work. Medical systems are embedded in complex, overlapping, organisations and have particular sensitivities in terms of confidentiality, ethics and trust. As part of my work on the Dependability Interdisciplinary Research Collaboration and other projects I have instigated and participated in studies of the dependability of organisational and diagnostic systems including mammography, neo-natal intensive care and patient information systems. The complex nature of healthcare organisations and their information need makes this one of the most challenging environments for information systems. I have also worked with the World Health Organisation in Geneva on defining a programme of research that addresses their needs in the area of Public Health Education and Disease Surveillance and Control. Developing these contacts is slow work but we have a useful long-term collaboration with WHO HQ in Geneva. The relationship with the Disease Control Unit has led to the deployment of some software developed in Edinburgh and to an MoU to work jointly with Health Protection Scotland on their approach to Disease Control Software. Our mammographic training tool is regarded as a success by the users and we are looking at rolling it out to be used in the Scottish training programme to convert to digital mammography.

In 2004-5 I took a sabbatical year. During that year I developed my interest and activity in e-health. This included: developing our relationship with the World Health Organisation in the area of the Health Academy and Disease Surveillance and Control and e-Health policy. We now have an ongoing relationship with WHO in the area of Disease Control and have good relations with Health Protection Scotland. I also built relationships in the area of e-Health with the Deputy Chief Medical Officer for Scotland, the Scottish Science Advisory Committee and the Chief Scientist Office. Health is an important challenge area for European Funding and I am pursuing e-health projects in the next Framework 7 call.

10. Principal grants

I have subdivided my grants into research and infrastructure. Since the late 1980s I have pursued a programme of work focused on the safety and dependability of systems. The sequence of grants for which I have PI responsibilities reflect the increasingly interdisciplinary nature of my work. My work is of direct relevance to industry. For example the three small awards in 2005

arose from demand from companies for consultancy based on the results of the DIRC project. I believe this grant portfolio demonstrates I have: the capacity to act as a role model and focus for interdisciplinary research in the University; extensive experience in the design of successful, funded, projects; and that I have the ability to plan and lead the delivery of a high-quality research programme.

Research Grants

Start	End	Body	Value	Ed Value	PI	Title
2007	2010	EPSRC	300,000	300,000		Distributed Intelligent Learning Environment for Mammographic Screening
2006	2011	EPSRC	393,000	393,000	PI	Interdisciplinary Design and Evaluation of Dependability (INDEED)
2005	2007	QinetiQ	30,000	15,000	PI	Consultancy on D3C Project
2005	2005	RBS	20,000	5,000		Consultancy on Strategy and Architecture
2005	2005	QinetiQ	26,000	13,000	PI	Review of Dependable Service-Oriented Architectures
2002	2005	EPSRC	140,112	140,112		"Powerful yet fragile instruments of change": Understanding the Development, Deployment and Use of Electronic Health Records
2002	2005	EPSRC	560,645	280,000	PI	Dependable, Service-centric Grid Computing
2000	2006	EPSRC	7,331,719	1,500,000	PI	Interdisciplinary Research Collaboration In Dependability Of Computer-Based Systems
2000	2006	EPSRC	200,000	200,000	PI	5 DIRC PhD Studentships
2000	2003	EPSRC	186,839	186,839	PI	Domain-Specific Representation And Reasoning
2000	2003	EU	1 MEu	500 KEu		EU FP5 FET Programme: SLIE
1998	2000	EU	200 KEu	10,000		EU ESSI Project 23743: Proof by Construct using Formal Methods
1997	2000	EPSRC	174,728	174,728	PI	Understanding Software Architecture
1995	1998	EPSRC	187,240	187,240		The Value-Passing Concurrency Workbench
1995	1998	EU	1 MEu	120 KEu	PI	EU FP3 Training Network: OLOS
1993	1996	EPSRC	604,834	604,834	PI	Communication In Safety Cases - A Semantic Approach
1993	1997	EPSRC	139,956	139,956	PI	T.C. Programme Between The University of Edinburgh And Adelard
1992	1996	SERC/ ESRC	139,118	139,118		Social Processes in the Development of High-Integrity Computer Systems
1989	1992	SERC	241,343	241,343	PI	Mathematically Proven Safety Software

Infrastructure Projects

I have been a core participant in initiatives that have brought significant infrastructure projects to Edinburgh. These awards are listed separately. Although they do not directly fund research, all the proposals have brought support for research infrastructure. Funding for e-Science has helped raise the international profile of the University and has contributed indirectly to the success of a range of other projects related to the e-Science. Business development support has allowed us to develop the concept of BDEs embedded in Schools rather than operating from ERI. This has been widely adopted and was the basis for our approach to the ProspeKT project – I made significant contributions to the early drafts of the ProspeKT proposal. I worked jointly on this proposal with our embedded BDE, Richard Wheeler. This thread of work grew out of my contribution to

the early development of the "Stanford Bridge" over a period of 18 months or so. After a long gestation this project funded research in the School in the area of Natural Language Processing for a period of five years.

Infrastructure Grants

2004	2005	SEEL	78K	28K		SEEL support for WHO relationship development
2004	2005	SEEL	26K	26K		Additional SEEL support for BDE effort in Informatics
2003	2005	UoE	250K	250K		KTG funding for BDEs
2002	2005	SHEFC	2.3M	2.3M		e-Science Data Information and Knowledge Transformation (eDIKT)
2001	2004	SRIF	1.67M	1.67M		e-Science Networking
2001	2004	EPSRC	5.5M	5.5M		National e-Science Centre
2000	2002	EPSRC	128,000	128,000	PI	SEI: Beowulf

Strategic Research Bids

Since 2008 I have taken a leading role in developing the School's approach to leading in bids for strategic large-scale, or large impact, projects and programmes. I have also initiated a development plan for the School's approach to increasing engagement and success in the EU Framework 7 and Framework 8 programmes. I have worked closely with Dean of Research in Science and Engineering on this and am currently a member of the University Framework 8 strategy group that is drafting the University strategy for Framework 8 and is working jointly with senior members of Scotland Europa on the preparation of the Scottish Government response to the Framework 8 consultations. Recent specific initiatives include:

Knowledge and Innovation Community (KIC), TransFICS: I led the Scottish bid for the TransFICS KIC in the first European Institute of Technology call for KIC proposals. This initiative involved a Scottish lead on a six-nation European bid for a 25 MEuro per year, fifteen-year duration, project. I spent all of 2009 working on this proposal. This required me to interact with senior members of the University, Scotland Europa, senior civil servants, politicians and senior researchers across Europe. Our bid was highly rated and won through to the final round where we were head-to-head against one other bid at interviews in December 2009 in Budapest. The other bid had been five years in preparation and finally won, but our bid was very highly regarded and it resulted in a significant rise in Edinburgh's profile both with the EU Commission and the Scottish Government.

Regions of Knowledge: These are bids for regional research planning, led by Scottish Enterprise. We are currently engaged in a bid for a Regions of Knowledge project to plan research in sustainable transport in the area of intelligent transport systems. This involves strategic interaction with Scottish Enterprise.

e-LSA: I was involved in aligning Edinburgh's engagement with a strong consortium bidding for the BBSRC e-Learning for Systems Approaches grant to provide re-training material for all BBSRC researchers in Systems Approaches. My contacts and help with strategic positioning gained us access to a very high quality consortium. Under the leadership of Stephen Gilmore, we have been shortlisted and go for interview in November. This will enable a strategic relationship with BBSRC.

Future and Emerging Technology Flagship: For most of 2010 I have been engaged in close collaboration with University of Trento and other partners in preparing a bid for a pilot activity to prepare a bid for a Future and Emerging Technology Flagship. These are 100 MEuro per year programmes over 10 years. We believe we have a very strong consortium and the bid will be submitted in early December.

Centre for Doctoral Training in Computer Science: At short notice I provided strategic input and solicited high-quality company engagement in this proposal. I believe my contribution significantly enhanced the novelty and interest of our proposal. The proposal was shortlisted and went to interview on 12 Nov 2010. Unfortunately the proposal was unsuccessful. However, I believe the proposal is a good source of innovative ideas for PhD training.

11. RAE Status

I have been included in all the School's RAE returns to date.

12. Postgraduate Students

The two students listed as MPhil were students whose supervision I took over after they were in difficulties. For both, the completion of an MPhil thesis was a significant achievement.

Name	**Awarded**	**Degree**	**Title**
Jose Neves	1984	PhD	The Application of Logic Programming to Databases
Paul Chisholm	1987	PhD	A Theory of Finite Sets in Constructive Type Theory
Eloina Pelaez	1988	PhD	A Gift from Pandora's Box: The Software Crisis
Carolyn Brown	1991	PhD	Linear Logic and Petri Nets: Categories, Algebra and Proof (CIO, Travis Perkins)
Kees Goosens	1993	PhD	Embedding Hardware Description Languages in Proof Systems (Full professor Eindhoven)
Chen Liang	1993	PhD	Timed Processes: Models, Axioms and Decidability
Matthew Morley	1996	PhD	Safety Assurance in Interlocking Design (Consulting on safety systems verification and design)
Savitri Maharaj	1997	PhD	A Type-Theoretic Analysis of Modular Specifications (Lecturer Stirling University)
Neil MacDonald	1997	PhD	Engineering the Performance of Parallel Systems
Alex Mifsud	1997	PhD	Control Structures (CEO of his own company)
Hayo Thielecke	1997	PhD	Categorical Structure of Continuation Passing Style (Lecturer Birmingham)
Budi Ling	1998	MPhil	Applicative Notions in ML-like Programs
Saif Kahn	1997	MPhil	Machine Assisted Proofs for Generic Semantics to Compiler Transformation Correctness Theorems (Developer in Deitica)
Alan Paxton	1999	PhD	Connecting Programs to Proofs about Models of Systems (Developer in Edinburgh)
Kostantinos Tourlas	2000	PhD	Diagrammatic Representations in Domain-Specific Languages ((Deceased) – former employee of Adelard a safety-critical consultancy)
Carsten Führmann	2000	PhD	The structure of call-by-value (Software engineer in Germany)
Massimo Felici	2004	PhD	Observational Models of Requirements Evolution, EDI-INF-IP040037 (RA in Edinburgh)
Teijun Ma	2007	PhD	Quality of Service of Crash-Recovery Failure (RA in Southampton)
Kate Ho	2010	PhD	*Understanding Requirements Work in E-Science Projects – submitted Nov 2009, currently being revised – will complete by summer 2011*
Mark McGillivray		PhD	*New student - yet to finalise topic*
Howard Lin		PhD	*New student, started Oct 2011, working on Telecare*
Yin Liang	2005	MSc(Res)	Monitoring Grids using peer-to-peer databases

13. Teaching Experience

Teaching has been a major element of my contribution to School of Informatics. I will subdivide my contribution into strategic aspects and direct teaching experience.

Strategic Contribution to Teaching

I have been Director of Teaching in the School of Informatics since August 2006. At that time our undergraduate intake had reached an all time low (we had an intake of 95 undergraduates in 2006). There were also substantial issues around the provision of support for teaching and fragmented cultures and delivery patterns caused by multi-site working.

We have seen a transformation in our teaching due to a well-planned transition to a single consolidated site and the effective exploitation of the benefits of collocation of all components of the School of Informatics. This year we have seen:

1. the recruitment of around 100 this year (180 last year) despite very tight constraints on recruitment together with around 220 MSc students. We have the highest conversion rates in the College and have amongst the most able students. We have also greatly reduced failure rates and most students now complete their degree programme.

2. A large number of nominations of courses and lecturers in the EUSA teaching awards culminating in being voted Best School and an individual e-learning award.

3. Coming top in the Guardian League table for Computer Science in the UK (we have been in the top four for the last four years).

4. A Chancellor's award for teaching going to John Lee for his innovative YouTute tutorial support system based on his work on vicarious learning.

5. Winning a third Young Software Engineer of the Year award over the last four competitions.

This stems from a step change in the Teaching ethos of both students and lecturers in the School. I believe this change of ethos has been enabled by a series of strategic initiatives we have taken over the last four years:

Recruitment Strategy: Jointly with Barbara Webb (chair of recruitment committee) we developed an outreach and recruitment strategy that engages strongly with College level recruiters and SRA. This has borne fruit and we have moved from weak to very strong recruitment over the past four years.

Proactive Management of the Collocation Move: I led the committee of colleagues that planned the move of all Informatics teaching to the city centre. This involved coordinating with colleagues in Informatics and externally with College, Estates and Buildings and other agencies. Driven by the original Informatics Forum timetable we moved in a year before the completion of the Forum to surrender needed space at KB and ran Teaching and Learning as a "vanguard" of Informatics collocation.

Design of Teaching Spaces: I led on the design of the learning spaces, using a variety of innovations in the size, layout and equipment in the rooms to create a very popular teaching space that supports a wide range of activities and has been used as a model throughout the University. We have received several international visitors keen to see our learning spaces in Appleton Tower.

Engagement and Communication with Students: I have led a transformation in communication and engagement with students that has led to much earlier resolution of issues and a policy directed to enabling student participation in the life of the School. This has resulted in significant improvements in Learning and Teaching.

Allocation of Duties: I led a new approach to allocation of teaching that is more transparent and requires staff typically to teach 15 points of courses per year and run two tutorials. This reduction in load has led to improvements in quality, more joint teaching and more innovation in teaching.

Effective Structuring of the Teaching Organisation: Together with Teaching Organisation administrators we redesigned the operation of the ITO to provide very high levels of service to students and staff by providing a "one-stop shop" where office staff share responsibilities to ensure most queries get an immediate response. We have also innovated in the use of support management systems and in the further development of the School database.

MSc Platform: We have developed a very effective MSc delivery system that can deal with large classes and offer choice and quality to the students. The wide range of leading-edge courses combined with a flat structure and efficient administration make our Masters course highly attractive and reconfigurable to meet student demand. This is being exploited now by other Schools e.g. Biology, Physics and Engineering all make use of level 11 courses run by Informatics.

There is still much to do and we are continuously monitoring ourselves against best practice and innovating where we see an opportunity significantly to improve the students' learning experience. In particular we are working on:

Programme Restructuring: to fully Bologna-ize our courses to allow a two-year MSc, a response to threats to cuts in first year, and to explore routes to increase numbers of MInf students. This will also include a revision of the Mathematics curriculum, some resolution of issues over programming teaching and a possible redesign of the Inf 3 curriculum.

Feedback Improvement: We have a program to address low NSS scores on Feedback.

Open Courseware: We plan to have open courseware in place by 2012 for all courses.

Capture of Learning and Teaching: We are widening video capture, ideally we will have full capture by 2012.

Aligning Learning and Research: There are many opportunities further to align Learning and Research (e.g. around Inspace). We aim to see more use of the Learning environment as an experimental space.

New Programme Directions: We are exploring joint ventures with the Business School and with the Design group in Edinburgh College of Art.

Direct Teaching Experience

My primary direct involvement has been in the development of the core curriculum and teaching delivery in the first three years. Since 1986 I have played a major role in shaping the Edinburgh approach to the teaching of Computer Science and Informatics. As a relatively young discipline, the Computer Science (and now Informatics) curriculum requires revision on a regular basis. This is unlike many other disciplines whose core topics remain relatively stable. For example, I have piloted and brought into mainstream teaching the introduction of two major changes in the initial programming language taught to our first-year students and have recently been participating as part of the working group exploring our future aapproach to programming education.

First and second year: I have taught pre-honours courses almost continuously since 1986 and have made substantial contributions to shaping the style and content of the first year courses. I have led two major revisions of syllabus and course structure in that time. I have been responsible for many innovations in the sub-honours curriculum and delivery and have been course organiser on several occasions.

Third year: I have taught a range of third year courses in theory and Software Engineering. My teaching has delivered much of the material required for BCS accreditation and I have innovated in approaches to teaching and learning. Most recently I introduced a new course in Software Testing that strengthen our Software Engineering offering. It has been well received by students and companies. I was deeply engaged in two revisions of UG3 curriculum and was responsible for leading one of the revisions.

Fourth year: I have supervised approximately 2-3 final year student projects per year since 1986. This is a significant task since students devote approximately 40% of their time to their project.

Graduate level: I taught the course "Formal Programming Language Semantics" to our post-graduate theory course. This course was also presented in industrial short courses and was given off-site at Hewlett-Packard Research in Bristol.

14. Postgraduate Student Supervision

I have supervised around 30 MSc student projects (all successful).

15. Administrative experience

As Director of Teaching and Deputy Head of School my primary roles are concerned with Learning and Teaching, as described in the Teaching section, on large-scale research strategy as described in the Research section and on the day-to-day running of the School. Beyond these activities, I am also on the University level FP8 strategy group and the EUCLID Strategy and Quality Assurance group tasked with delivering an operational student record system for the University – as part of this I chair the generic interface group involving those schools that require a richer interface to EUCLID so they can run their own databases using EUCLID data.

Prior to taking on Director of Teaching in 2006, I took a one-year sabbatical in 2004-5 and before that was Deputy Head of School from 2000 to 2004. Because of the size and complexity of the School at the time that entailed a heavy administrative workload with significant strategic impact within the University. In particular we were working on distributed sites and I was the representative of the management team at Kings Buildings. I worked very closely with the School Officer on matters that required academic input. In addition, Head of School, School Officer and I were responsible for the strategic planning of the development of the newly formed School.

Here is a summary of my administrative contribution:

Deputy Head of School: I was responsible, in collaboration with the School Officer and Head of School, for developing and implementing many aspects of the School's strategic policy:

- **Inside the University:** here I have worked at Faculty/College level and Principal and vice-Principal level on developing strategic initiatives involving Informatics. This involved writing proposals and strategy documents, presenting them and working to realise the proposals.
- **At National Level:** representing and negotiating on behalf of the School with Research Councils (particularly EPSRC). Briefing ministers from the Scottish Executive and senior members of Scottish Enterprise.
- **Internationally:** particularly around the British University of Dubai I have represented the University in negotiations involving government ministers, Foreign and Commonwealth Office representatives and representatives of industry and academia.

Teaching: I have chaired all of the teaching relevant committees inside Informatics at various times. I have chaired Boards of Examiners, been course organiser for various courses, led multiple curricular reviews and have served on committees at College and University level.

Fire Recovery: Post the 2002 fire I coordinated building works in Appleton Tower, Forrest Hill and JCMB that allowed the School to continue development in the aftermath of the fire and to meet demand for expansion prior to the completion of the new building.

Computing Officers: As part of my Deputy Head of School role I line managed our Computing Officers that comprise 25 people and around 20 FTE staff. In that time I was responsible for:

- Satisfactorily resolving some long-term issues that had been allowed to worsen over more than ten years that were leading to morale problems among some members of the group.
- Bringing three different service cultures together to form a more cohesive Informatics service.
- Overseeing the creation of DICE, the new computing infrastructure for the School that has been adopted by other Schools in the College.
- Encouraging Informatics involvement in computing policy that helped shape College policy during restructuring.
- Developing the System Administration Development group that has seen our computing officers become grant holders for awards from PPARC (£170K and £60K) and EPSRC (£70K that has been followed by a Knowledge Transfer Partnership). The group has an international profile contributing to e-Science in Europe and the US. This activity is a key retention factor for our most talented system administrators and helps fund work towards our next-generation systems.
- Retaining and developing talent by gaining appropriate promotions and effective management of Computing Officers' contributions.

Business Development Executives: I led on the introduction of BDEs in Informatics and by 2004 had acquired funding for three BDEs in Informatics. In collaboration with Richard Wheeler, our first BDE, I developed the concept of embedding BDEs in the Schools. Together with Richard Wheeler, I also developed the SEE&L Informatics Partnership that has brought approx £5m to the school in funds to aid knowledge transfer (this is now known as ProspeKT).

Stanford e-Bridge: I was a core member of the team that produced the proposal for Scottish Enterprise. This proposal formed the basis for the Stanford Link in speech and language. Working on the e-Bridge proposal established the working relationships that allowed an effective e-Science bid, and began to evolve our strategic relationships with IBM. The value of the cluster of projects around e-Science exceeded the £25M value of the original e-Bridge proposal.

e-Science: I was a core contributor to the many proposals and position papers that culminated in the successful e-Science bid. I was particularly heavily involved in the SRIF[2] Networking project that provided high speed networking on-campus in Edinburgh, the eDIKT project and the cluster of projects in configuration management as well as the core NeSC application. eDIKT was a SHEFC RDG[3] funded project and was a particularly high-profile project for SHEFC that provided novel infrastructure for Scottish science. The cluster of configuration management projects supplied Edinburgh infrastructure components as part of the European Data Grid. Recently, I also secured funding for a project in dependability of Grid services.

British University of Dubai: I carried out the initial visit to Dubai and worked closely with Vice-Principal International on the vision and detailed implementation plan for the University. The final outcome has been disappointing but I believe there is still scope for such projects that incorporate our learning from this experience.

[2] *SRIF* is the science research infrastructure fund

[3] SHEFC funded research development grants that are intended to provide infrastructure in support of research.

16. Membership of societies

Member of the British Computer Society, Member of the Association of Computing Machinery.

17. Membership of committees

- Non professorial representative on Senatus since 2000.
- Member of College Learning and Teaching Committee and Senatus Learning and Teaching Committee.
- Member of the University FP8 strategy group
- EUCLID Strategy and Quality Assurance Group
- I was programme co-chair for Safecomp 2002 (Catania, Italy) and programme co-chair and local organiser for Safecomp 2003 (Edinburgh, Scotland).
- I have been a member of the programme committee of Safecomp for the last 15 years.
- I co-organised seminar number 02451 at Schloss Dagstuhl, entitled *Dependability of Component-Based Systems*, 3–8 Nov 2002.
- I have refereed for the following journals: Theoretical Computer Science, Acta Informatica, Formal Aspects of Computer Science, Software Practice and Experience, Reliability Engineering and Safety Systems, Computer Journal.
- I have refereed for: Safecomp, TACAS, STACS, LICS, Concur, DSN.

18. Items of Esteem at Symposia and Congresses

SAFECOMP	Invited Pannelist: Safety of Medical Devices	2001
ETL (Osaka)	Invited Speaker: Formal Methods and Safety Critical Systems	2000
NPACI (San Diego)	Invited Speaker: eScience in the UK	2002

19. National invitations

1. External examiner, University of St Andrews.

20. Major Lectures given as Guest Lecturer

I have given guest lectures at conferences, meetings and seminars but have made no systematic collection of these.

21. Doctoral External Examining

Thomas Janowski	Warwick	1996
Tim Glover	Essex	2000

In addition I have acted as internal examiner for approximately 10 Edinburgh PhD candidates.

B. List of Publications

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

2. Books Edited

[1] S. Anderson, S. Bologna, and M. Felici, (Eds.) *Safecomp 2002: Computer Safety, Reliability and Security*, number 2434 in Lecture Notes in Computer Science. Springer, 2002.

[2] S. Anderson, M. Felici, and B. Littlewood (Eds.) *Safecomp 2003: Computer Safety, Reliability and Security*, number 2788 in Lecture Notes in Computer Science. Springer, 2003.

[3] S. Anderson, and M. Felici (Eds.) *Special Issue: Safety, Reliability and Security of Industrial Computer Systems.* Reliability Engineering & System Safety (RESS), Elsevier Ltd., Sept 2003, 81,3.

[4] S. Anderson, and M. Felici (Eds.) *Special Issue: Safety, Reliability and Security of Industrial Computer Systems.* Reliability Engineering & System Safety (RESS), Elsevier Ltd., Sept 2004, 89,1.

3. Articles Published as sole author

3.2 Refereed conference papers

[1] Stuart Anderson. Proving properties of interactive systems. In *Proceedings of the HCI'86 Conference on People and Computers II*, Formal Design Methods, pages 402–416, 1986.

3.4 Refereed workshop papers

[1] S. Anderson. Analysing A restricted class of functional programs. In *Declarative Programming Workshop*, pages 66–97, London, UK, 1983. University College.

4. Joint articles published

4.1 Journal articles

[1] * Tiejun Ma, Jane Hillston, and Stuart Anderson. On the quality of service of crash-recovery failure detectors. *IEEE Transactions on Dependable and Secure Computing*, 7:271–283, 2010.

[2] * J. Küster-Filipe and S. Anderson. On a time enriched OCL liveness template. *International Journal on Software Tools for Technology Transfer (STTT)*, 8(2):156– 166, Springer, April 2006.

[3] S. Anderson, and M. Felici *Special Issue Editorial: Safety, Reliability and Security of Industrial Computer Systems.* Reliability Engineering & System Safety (RESS), Elsevier Ltd., Sept 2003, 81,3, pp. 235–238.

[4] S. Anderson, and M. Felici *Special Issue Editorial: Safety, Reliability and Security of Industrial Computer Systems.* Reliability Engineering & System Safety (RESS), Elsevier Ltd., Sept 2004, 89,1, pp. 1–5.

[5] P. Garbett, J.P. Parkes, M. Shackleton, and S. Anderson. A case study in innovative process improvement: code synthesis from formal specifications. *Microprocessors and Microsystems*, 1999.

[6] H. Thimbleby, S. Anderson, and P. Cairns. A framework for modelling Trojans and computer virus infections. *The Computer Journal*, 41(7):444–458, 1998.

[7] * S. O. Anderson and A. J. Power. A representable approach to finite nondeterminism. *Theoretical Computer Science*, 177(1):3–25, April 1997.

[8] Glenn Bruns and Stuart Anderson. A logical approach to data fusion. *Journal of Computer and Software Engineering*, 1995.

[9] * Glenn Bruns and Stuart Anderson. The formalization and analysis of a communications protocol. *Formal Aspects of Computing*, 6(1):92–112, 1994.

[10] S. O. Anderson, R. C. Backhouse, E. H. Bugge, and C. P. Stirling. An assessment of locally least-cost error recovery. *The Computer Journal*, 26(1):15–24, February 1983.

[11] S. O. Anderson and R. C. Backhouse. An alternative implementation of an insertion-only recovery technique. *Acta Informatica*, 18(3):289–298, December 1982.

[12] R. C. Backhouse and S. Anderson. Least-cost repair of syntax errors. *ACM SIGPLAN Notices*, 14(1):102–104, January 1979.

[13] * S. O. Anderson and R. C. Backhouse. Locally least-cost error recovery in Early's algorithm. *ACM Transactions on Programming Languages and Systems*, 3(3):318–347, July 1981.

4.2 Refereed conference papers

[1] Paul Taylor, Mark Hartswood, Lilian Blot, Rob Procter, and Stuart Anderson. Scoring systems in computer-based training for digital mammography. In *Digital Mammography / IWDM*, pages 490–496, 2010.

[2] S. Rabold, S. Anderson, J. Lee, and N. Mayo. Youtute: Online social networking for vicarious learning. In *Proceedings of ICL2008, Villach, Austria*, 2008.

[3] * Tiejun Ma, Jane Hillston, and Stuart Anderson. Evaluation of the QoS of crash-recovery failure detection. In *SAC '07: Proceedings of the 2007 ACM symposium on Applied computing*, pages 538–542, New York, NY, USA, 2007. ACM.

[4] Tiejun Ma, Jane Hillston, and Stuart Anderson. On the quality of service of crash-recovery failure detectors. *Dependable Systems and Networks, International Conference on*, 0:739–748, 2007.

[5] Laura Korte, Stuart Anderson, Helen Pain, and Judith Good. Learning by game-building: a novel approach to theoretical computer science education. In *ITiCSE*, pages 53–57, 2007.

[6] Stuart Anderson and Massimo Felici. How democratic will e-democracy be? In *COMPSAC (1)*, page 499, 2005.

[7] J. Küster Filipe, M. Felici and S. Anderson. Timed Knowledge-based Modelling and Analysis: On the Dependability of Socio-technical Systems. In *Proceedings of HAAMAHA 2003, 8th International Conference on Human Aspects of Advanced Manufacturing: Agility & Hybrid Automation* ISBN 88-85059-14-7, 27-30 May, Rome, 2003, pp. 321–328.

[8] J. Power S. Anderson and K. Tourlas. Zooming-out of higraph-based diagrams: Syntactic and semantic issues. In *Proceedings of CATS 2002, the Australasian Symposium on Computing.*

[9] S. Anderson and M. Felici. Quantitative aspects of requirements evolution. In *Proceedings of the IEEE 26th Annual International Conference on Computer Software and Applications Conference, COMPSAC 2002.*

[10] S. Anderson and M. Felici. Requirements evolution from process to product oriented management. In *Proceedings of the 3rd International Conference on Product Focused Software Profess Improvement, Profes 2001,* Kaiserslautern, Germany, September 10-13, 2001, LNCS 2188, Springer-Verlag 2001.

[11] J. Power S. Anderson and K. Tourlas. Reasoning in higraphs with loose edges. In *Proceedings of the Conference on Visual Languages and Formal Methods (VLFM), IEEE Symposium on Human-centric Computing Environments.*

[12] Stuart Anderson and Massimo Felici. Requirements changes risk/cost analysis: An avionics case study. In M.P. Cottam, D.W. Harvey, R.P. Pape, and J. Tait, editors, *Foresight and Precaution, Proceedings of ESREL 2000, SARS and SRA – European annual conference*, 2000.

[13] Stuart Anderson and Massimo Felici. Controlling requirements evolution: an avionics case study. In *Safecomp 2000: Computer Safety, reliability and security, 19th International conference*, volume 1943 of *Lecture Notes in Computer Science*, pages 361–370, 2000.

[14] P. Garbett, J. P. Parkes, M. Shackleton, and S. Anderson. Secure synthesis of code: A process improvement experiment. In Jeanette M. Wing, Jim Woodcock, and Jim Davies, editors, *FM'99—Formal Methods, Volume II*, volume 1709 of *Lecture Notes in Computer Science*, pages 1816–1835. Springer, 1999.

[15] P. Garbett, J.P. Parkes, M. Shackleton, and S. Anderson. A case study in innovative process improvement: code synthesis from formal specifications. In *Proceedings Avionics 1998.*

[16] * S. Anderson and K. Tourlas. Design for proof: An approach to the design of domain-specific languages. *Formal Aspects of Computing*, 1998.

[17] S. Anderson and K. Tourlas. An assessment of the iec 1131-3 standard on languages for programmable controllers. In *Proceedings SafeComp.*

[18] Stuart Anderson and Konstantinos Tourlas. Diagrams and programming languages for programmable controllers. In John Fitzgerald, Cliff B. Jones, and Peter Lucas, editors, *FME'97: Industrial Applications and Strengthened Foundations of Formal Methods (Proc. 4th Intl. Symposium of Formal Methods Europe, Graz, Austria, September 1997)*, volume 1313 of *Lecture Notes in Computer Science*, pages 1–19. Springer-Verlag, September 1997. ISBN 3-540-63533-5.

[19] Glenn Bruns and Stuart Anderson. Using data consistency assumptions to show system safety. In *Dependable Computing for Critical Applications 4.*

[20] G. Bruns and S. Anderson. Validating safety models with fault trees. In Janusz Gorski, editor, *SAFECOMP'93: 12th International Conference on Computer Safety, Reliability and Security*, pages 21–30, Poznan-Kiekrz, Poland, 1993. Springer-Verlag.

[21] G. Bruns and S. Anderson. A case study in the analysis of safety requirements. *SAFECOMP '92: Safety of Computer Control Systems1992*, pages 1–6, 1992.

[22] Glenn Bruns and Stuart Anderson. The formalization and analysis of a communications protocol. In *Proceedings of SAFECOMP.*

[23] H. Thimbleby, S. Anderson, and I. H. Witten. Reflexive CSCW: Supporting long-term personal work. In *Interacting with Computers*, volume 2, pages 330–336. 1990.

[24] M. H. Williams, J. C. Neves, and S. O. Anderson. Security and integrity in logic databases using query-by-example. In *Proc. of 1th International Logic Programming Conference*, June 1983.

[25] J. Neves, R. Backhouse, and S. Anderson. A prolog implementation of query-by-example. In *Proc. of 7th International Computing Symposium*, pages 318–332, March 1983.

4.3 Book Chapters

[1] S. Anderson, G. Hardstone, R. Procter and R. Williams. Down in the (Data)base(ment): Supporting Configuration in Organisational Information Systems In Ackerman, Mark S., Christine Halverson, Thomas Erickson, and Wendy A. Kellogg (eds.). *Resources, Co-Evolution, and Artifacts: Theory in CSCW*. Springer, London, 2007

[2] Glenn Bruns and Stuart Anderson. *Applications of Formal Methods*, chapter Gaining assurance with formal methods. Prentice Hall, 1995.

4.4 Refereed workshop papers

[1] S. Anderson and M. Felici, Heterogeneous Modelling of Evolution for Socio-technical Systems. In the *Supplemental Volume of the 2004 International Conference on Dependable Systems and Networks, Workshop on Interdisciplinary approaches to achieving and analysing system dependability*, Florence, Italy, June 29, 2004, pp. 210-215.

[2] J. Küster-Filipe and S. Anderson, Using OCL for expressing temporal validity constraints. In *Proceedings of the International Workshop on Specification and Validation of UML models for Real Time and Embedded Systems (SVERTS 2003), held in conjunction with the Sixth International Conference on the Unified Modeling Language, UML 2003*, October 20 - 24, 2003, San Francisco, California, USA.

[3] S. Anderson and J. Küster Filipe. Guaranteeing temporal validity with a real-time logic of knowledge. In *Proceedings of the 23rd IEEE International Conference on Distributed Computing Systems Workshops - First International Workshop on Data Distribution for Real-Time Systems (DDRTS 2003).* Providence, Rhode Island, USA, 19-22 May 2003, pages 178-183, IEEE Computer Society Press.

[4] S. Anderson, M. Hartswood, R. Procter, M. Rouncefield, R. Slack, J. Soutter. and A. Voss. Making Autonomic Computing Systems Accountable: The Problem of Human-Computer Interaction, *Proceedings 14th IEEE International Workshop on Database and Expert Systems Applications (DEX 2003)*, pp. 718–724, Prague, Czech Republic, September 2003.

[5] S. Anderson and K. Tourlas. Design for proof: An approach to the design of domain-specific languages. In *Third FMICS (Formal Methods for Industrial Critical Systems) Workshop*.

5. Important notes and review articles

[1] S. Anderson, M. Felici, *How democratic will e-Democracy be?*. In Proceedings of the 29th Annual International Computer Software and Applications Conference, COMPSAC 2005, Edinburgh, Scotland, 26-28 July 2005, IEEE Computer Society, p. 499.

[2] S. Anderson, G. Hardstone, R. Procter, and R. Williams. Down in the (data)base(ment): supporting configuration in organisational information systems, 2002. Presented at DIRC research workshop.

[3] S. Anderson and J. Küster-Felipe. Knowing what to do, 2002. Presented at DIRC research workshop.

[4] H. Thimbleby, S. O. Anderson, and P. A. Cairns. Reply to "Comment on 'A Framework for Modelling Trojans and Computer Virus Infection' by E. Mäkinen". *The Computer Journal*, 44(4):324–325, 2001.

[5] EWICS. Safety aspects of distributed systems. available from EWICS TC7, 1996.

[6] EWICS. Guideline on the use of PLCs in safety systems. available from EWICS TC7, 1996.

[7] EWICS. Guidance on the use of formal methods in safety systems. available from EWICS TC7, 1997.

[8] S. Anderson and G. Cleland. Adopting mathematically-based methods for safety-critical systems production. *Safety Systems: The Safety-Critical Systems Club Newsletter*, 1(2):6, January 1992.

7. Articles under consideration for publication

I am working on a book jointly with my RA Massimo Felici on Risk in Socio-technical systems. Springer have accepted it for publication in principle. I believe it will be published next year. This is a major output of our work on the DIRC project.