Institution: Royal Holloway, University of London

Unit of Assessment: 11 Computer Science and Informatics

a. Overview

This submission comprises the Computer Science Department (**CS**) along with six members of the Information Security Group (**ISG**, which is constituted as a separate department). This reflects increased collaboration including joint grant income and outputs as well as the coordination of research and third-stream activities in general. Teaching, technical and space resources have been pooled leading to increased efficiency and collaboration to the benefit of staff and students at all levels and to the quality of the services we provide to society and the economy in general.

In the REF period, eight new academics (italicised below) were recruited. All research activities from RAE2008 have been retained, enhanced by new activities in cloud and service-based computing and the synergies created between CS and ISG.

Staff are organised into these five groupings and centres; in each case the director is listed first.

- Centre for Algorithms and their Applications **(CAA)** Gutin, Cohen, Crampton, *Wahlström*.
- Centre for Software Language Engineering **(CSLE)** Scott, *Hague, Kinder*, Johnstone, Zhaohui Luo.
- Computational Learning Research Centre **(CLRC)** Vovk, Gammerman, Kalnishkan, Zhiyuan Luo, Paccanaro, Shanahan, Watkins.
- Distributed and Global Computing Group **(DGC)** *Chockler, Deniélou, Fiadeiro, Legay*, Stathis.
- Information Security Group **(ISG)** Martin, *Cavallaro*, Cid, Crampton, Murphy and Paterson

The CSLE and CAA staff were submitted as the Theory of Computing Group at RAE2008; the 2008 Bioinformatics Group is now part of the CLRC. The DGC group is new with most staff appointments made since 2012. All ISG staff were submitted to the mathematics panel in 2008; one ISG member is submitted to UoA10 at REF2014 in addition to the six submitted here.

b. Research strategy

Achievement of strategic aims for research during the assessment period

In our 2008 submission, we said *'Our research strategy emphasizes continuity of planned investment so as to ensure the credibility and vitality of our research base'.* In the REF period, the unit invested in the recruitment of eight new academics. Four ECRs were appointed to expand or strengthen research in areas where critical mass was missing:

- CAA appointed Wahlström, with expertise in parameterised algorithmics, following Yeo's relocation to the Far East for personal reasons.
- CSLE appointed Hague and Kinder to expand its research to verification and correctness – growth areas also identified by EPSRC, creating synergies with DGC in concurrency (Hague) and ISG in detecting malware based on semantic descriptions (Kinder).
- ISG appointed Cavallaro to expand its research to malware analysis and detection, exploiting synergies with CLRC in mining techniques.

Four posts were used to create the new DGC group in order to supplement existing work in agent-oriented systems with expertise in distributed middleware and cloud computing (Chockler, ex-IBM Haifa), service-based computing (Fiadeiro, ex-Leicester, and Deniélou, ECR), and resource-based computing (Legay, INRIA). The creation of the DGC has enabled the unit to mount a credible strategy in 'Big Data' in collaboration with CAA, CLRC, and ISG.

In our 2008 submission, we also said *'Our strengths are in theoretical work but during the period there has been a broadening into cross-disciplinary and applications oriented areas'*. During this REF period, the shift from mainly-theoretical core research to a 'mixed economy' that includes applied research has significantly accelerated.

- CAA obtained significant funding for work in resource allocation, in particular on applications in information security including workflow problems.

- CLRC invested on the study of medical and biological problems, which has allowed our machine-learning expertise to be exploited in applications as diverse as the compilation of the first atlas of human soluble proteins and the early diagnosis of cancer.
- ISG broadened the scope of their research activities, given the increasingly multi-disciplinary nature of the subject and the increasing importance of cyber security.
- ISG are also working with colleagues from Criminology, Economics, Management and Psychology to provide a richer understanding of the human factors in information security; this multi-disciplinary and inter-disciplinary research within Royal Holloway recognises that human factors that are amongst the most difficult and important aspects of cyber security.
- The critical mass achieved by CAA, CLRC, DGC and ISG in 'Big Data' is generating many approaches from potential users and collaborators as diverse as IBM, HCL Axon, the England and Wales Cricket Board, and the Bill and Melinda Gates Foundation.

Cross-collaboration inside the unit has also flourished:

- Cohen, Gutin (CAA) and Crampton (ISG) were awarded an EPSRC grant to develop new algorithms for solving the workflow satisfiability problem and related questions that arise when enforcing complex business rules using authorization policies.
- Gutin (CAA), Johnstone and Scott (CSLE) work on customisable hardware architectures, which led to new optimal algorithms for computing convex subgraphs of control flow graphs.
- Cavallaro (ISG), Gammerman, Zhiyuan Luo, Shanahan and Vovk (CLRC) were awarded an EPSRC grant on mining the network behaviour of bots.
- Paterson (ISG) and Kinder (CSLE) have received funding from GCHQ for a PhD student.
- Cavallaro (ISG) and Kinder (CSLE) work on malware analysis using symbolic execution.
- Legay (DGC) and Vovk (CLRC) collaborate on enhancing stochastic model-checking with machine learning techniques.

Evaluation of the unit's current position with reference to RAE2008

The pursuit of the strategy devised for the REF period as described above strengthens the research position of the unit, which we now outline for each group.

- The **CAA** was formed in early 2013 around Gutin's work in graph theory and parameterised complexity. The group was strengthened with the appointment of Wahlström in 2013 (who replaced Yeo), Cohen's expertise in constraint satisfaction and algorithmics, and Crampton's research in access control in workflow-management systems. The research reported at RAE 2008 has been consolidated into a very large number of theoretical publications in recent years – including five papers in the *Journal of Computer and System Sciences* and four papers in *Algorithmica* – and publications of a more applied nature in the *ACM Conference on Computer and Communications Security* and *ACM Transactions on Information and Systems Security*, two of the leading venues in information security; that work has also led to an EPSRC funded project reported above.
- The **CSLE** was created in response to the recent EPSRC review that identified *Programming Languages and Compilers* as one of only six growth areas within the 30-area ICT portfolio. The Centre (with Swansea and City universities) received almost £1,500,000 of EPSRC funding under the PLanCompS project, which exploits our expertise in generalised context-free translation and algebraic methods to deliver pragmatic formal semantic specifications and implementation of standard programming languages and domain-specific languages, together with relevant development tool support. Shortly after his appointment, Hague was awarded a five-year EPSRC research fellowship to work on verification of concurrent and higher-order recursive programs. The institution re-invested the freed post, allowing the appointment of Kinder who works in dependable software with specific interests in malware allowing links between CSLE and ISG to be created. Zhaohui Luo continues to make significant contributions to the development of type theory and its applications to verification based on proof assistants with support from Leverhulme and the EU.
- The **CLRC** is pursuing its overarching goal to provide rigorous analyses of the types of

predictions that can be made from data, the grounds for making them, and the nature of the theoretical guarantees of correctness that can be given. Gammerman, Zhiyan Luo and Vovk have continued to develop research on conformal prediction with applications ranging from medical diagnosis to time series forecasting, network traffic classification, coal quality analysis and indoor localisation; in work funded by the EU, MRC and BBSRC applications of conformal predictors have led to a new way of predicting 1) neuroimaging markers for psychiatric disorders based on fMRI images; 2) post-translational modifications in a search of cancer biomarkers; and 3) protein-protein interactions and ranking them by the confidence measures. Kalnishkan and Vovk have continued to work on competitive on-line prediction, which has led to an application of defensive forecasting to prediction with expert advice. Vovk developed with Zhdanov a prediction algorithm with the best-known competitive performance guarantees for the Brier game (the most popular setting for on-line classification) and, together with colleagues, established the optimality of existing algorithms using new performance guarantees specified in terms of adaptive regret. Watkins' research combines techniques from machine learning and information theory with applications in a wide range of domains, including: the visualisation of high-dimensional data (with Briscoe at the National Institute of Medical Research); a method for defining learnable formal languages (with Clark, Honorary Research Fellow, now at KCL); and the understanding of how news of an epidemic can affect the spread of that epidemic (with Jansen, Biological Sciences at Royal Holloway). Paccanaro and Shanahan work on applications of machine learning to computational biology, including early diagnosis of cancer and an analysis of large transcriptomic data sets for plant systems.

- The **DGC** was formed in 2012 and incorporates Stathis, returned in RAE 2008, who works on autonomous agents that may have independent and competing goals; this has led to the development of GOLEM, an infrastructure for distributed systems within which logic-based agents can be deployed to provide or otherwise support services in a distributed system. The four new researchers – Chockler, Deniélou, Fiadeiro and Legay – considerably extend this work towards large-scale computing, from distributed middleware to the foundations of the new computing paradigms that are emerging as a result of the global interconnectivity ensured by the Web. Chockler draws on his industrial experience at IBM Research to address problems in real-world systems such as data centres and cloud computing infrastructures; Deniélou collaborates with Bharghavan (INRIA, Paris) on the automatic generation of provably-secure implementations from specifications, and is a contributor to the development of the new distributed monitoring infrastructure that underpins the NSF-funded Ocean Observatories Initiative; Fiadeiro collaborates with Lopes (U Lisbon) on dynamically evolving networks of systems, namely the way those systems can interoperate and orchestrate their respective activities in a completely decentralised manner; Legay (who holds a post at INRIA) is developing research in heterogeneous and stochastic component-based systems with applications in software product lines and systems biology.
- The **ISG** continues to be at the forefront of information security research in the UK. Royal Holloway duly received recognition as one of 11 *Academic Centres of Excellence in Cyber Security Research* (ACE-CSR) awarded by EPSRC/GCHQ, and is the host of one of only two EPSRC Doctoral Training Centres in Cyber Security. Historically, staff in the ISG had trained as mathematicians and applied their expertise in number theory, discrete mathematics and information theory to information security, notably cryptography. In recent years, the scope of ISG's research has broadened considerably, embracing many aspects of computer science and the social sciences as evidenced by the EPSRC-funded Cyber Security Cartographies project that explores the problems faced by security administrators from a number of complementary perspectives. Meanwhile, the core research of the ISG has continued with a strong focus on the security of systems and technologies, including the foundations of trust (such as key management infrastructures and trusted computing), the development of secure, large-scale applications and systems (such as workflow management systems, mobile telephone networks, computational grids and national infrastructure), and applications such as payment and identity-management systems. Paterson has received an EPSRC leadership fellowship aimed at bridging the gap between theory and practice in cryptography, which is having significant impact on secure Internet

protocols.

Vision and strategic plans

Over the next REF period, our strategy will focus on the presentation of our research work to external funders and industrial and organisational stakeholders under the new overarching theme of *Big Data*, which pools our long-standing strengths – in Information Security, Machine Learning, and Algorithm Design and Analysis – with the creation of the DGC group. We are now in a strong position to offer a full spectrum of activity from cloud physical infrastructure and middleware through to machine learning-based data analytics and information security. We will target the new class of highly dynamic (systems of) systems that are starting to operate in cyber-space where applications coexist with physical artefacts and people in networks where they produce, process and exchange data and compete for resources (e.g., energy). We will also engage in multi-disciplinary collaborations to address the socio-economic contexts in which such systems operate.

The development and implementation of our research strategy is overseen by the Computer Science and the Mathematics & Information Security Research Management Committees. These groups also manage postgraduate-student recruitment and progression.

The research strategy is constructed using two main mechanisms: (i) periodic strategic reviews at institutional level involving colleagues from other departments and advisers from outside the institution; and (ii) consolidation of research strategies produced by individual research groups. The purpose of the institutional review is to decide on major changes in research orientation in order to ensure that our research programmes focus on relevant and timely problems identified by research councils, government, industry or other stakeholders. Within the current REF period, this has led to the creation of three new research groupings (DGC, CSLE and CAA), the consolidation of our bioinformatics research into CLRC, and the establishment of ISG as an autonomous department.

c. People, including:

i. Staffing strategy and staff development

Staff recruitment proceeds from the strategic reviews described in the previous section with priorities set by the results of the review. In the current REF period, this has led to the recruitment of three new staff in ISG (including one academic submitted here), and 7.2 new academics in Computer Science at professorial, reader and lecturer levels (one on a teaching-only post). The departments are able to select from a broad field of high-quality researchers and have maintained their high international credentials; of the 26 individuals (24.45 FTE) submitted here, eight are of UK origin, four are from the ex-Soviet republics, two each from China and Germany, and the remainder from Brazil, Belgium, Eire, France, Greece, Italy, Israel, Portugal, Sweden and the USA.

All new staff attend an induction day which describes the institutional mission and objectives, its values and philosophy, and operational matters including Health & Safety and Equal Opportunities policies. These one-day workshops are run at least once a term and supported by an Induction Handbook and online guidance. After attending a workshop, staff establish their development plan in terms of basic training, personal development and career development.

New established staff have a three-year probation period during which they have additional support from a nominated probation adviser who they meet with at least four times per year for feedback and guidance. Probationers receive a 50% reduction in teaching load. Institutional policy requires that probationers complete the Postgraduate Certificate in Academic Practice In Teaching And Learning (CAPITAL), which is accredited by the Higher Education Academy and delivered by current academics and staff from Royal Holloway's Educational Development Unit. A major goal of this programme is to help staff become confident as teachers quickly, thus avoiding the gap in research output often experienced by researchers in their first academic post.

During and after the probation period, all staff participate in an annual appraisal cycle. At Royal Holloway, appraisal is a reflective process, independent of formal promotion processes, involving a review of the previous year's achievements and the setting of research and other work goals for the coming year. The record of this conversation is held by the appraisee and an identified list of training and development needs must be returned to HR for each appraisee.

The Staff Development team offers general training on topics including *Disability Awareness, Stress Awareness, Equality, Meeting Management, Appraisal, Bribery and Fraud* and *Interview Skills.* The *Springboard* personal and work development programme is offered for female staff. In addition, Royal Holloway offers the *On Track* researcher development programme – a series of 15 workshops led by a mixture of external facilitators and internal experts. The sessions are particularly valued for their networking opportunities. Topics include *Grant Writing in the Sciences, Research Collaboration and Finding External Partners, Academic Project Management and Leadership, Impact Engagement and Media Relations, Maximising Career Potential, Publication in the Sciences, Time Management and Goal Setting* and *Mentoring Skills.*

Royal Holloway offers a research-focussed mentoring scheme that is particularly valuable for ECRs and mid-career staff; experienced researchers act as mentors and work with the Director of Research and the Head of Department as well as liaising with the Research and Enterprise Office to offer feedback, suggestions and advice.

All research-active academics are expected to use sabbatical leave to develop their research portfolios and to develop impact opportunities at the rate of one term for every nine terms of service. Coordination of sabbatical leave timing is through the Research Committees, which makes recommendations to the Science Faculty Board. Post-sabbatical, results are monitored via reports to the Directors of Research.

Normally, staff members are expected to divide their time roughly 40:40:20 between research, teaching and administration. Teaching loads in the Computer Science and Information Security departments are low by sector norms, so as to support the research culture. The departments provide extensive support for teaching via teaching assistants, demonstrators, a permanent full-time teaching focussed lecturer and experts from industry. It is usually possible to concentrate all teaching in a single term so as to allow for extended research periods. A workload model is used to balance the demands of intensive core teaching with the needs of research projects.

Royal Holloway was one of the first institutions in Europe for the higher education of women, and that tradition of opportunity for women continues. Senior management oversees the implementation of the Women in Science Action Plan 2010 – 2013 which focuses on ensuring gender balance in a wide range of areas including flexible working, promotions, equal pay, recruitment and selection, childcare, probation, mentoring, communication, networking and profile. Royal Holloway achieved Athena SWAN institutional Bronze status in July 2010. Currently all science departments are working towards Athena Departmental Bronze/Silver status. The Department of Computer Science achieved Bronze status in September 2013.

Royal Holloway actively endorses the seven principles outlined in the *Concordat to Support the Career Development of Researchers* and has policies and practices at both institutional and departmental level designed to facilitate full implementation of these principles, for example: mandatory training for all members of selection panels including equal opportunities training; equitable treatment for part-time and fixed-term staff; and a clear and equitable promotions process. Extensive staff development opportunities are offered including a centrally administered mentoring programme (supplemented by departmental mentoring for early career staff), which is open to all research staff, and a comprehensive annual equality and diversity data-monitoring and review exercise.

ii. Research students

We offer PhD and MSc by research programmes (operationally similar to the first year of the PhD programme) with 53 PhD degrees awarded since 2008. There is an annual allocation of institutional scholarships to support both HEU and overseas students; these are distributed competitively within the departments taking into account the potential of the applicant student and the match to the department's research strategy. Departments offer financial supplements from their own resources so as to provide matching funding for PhD students supported by external sponsors or research grant overheads. In April 2013 the Information Security Group was awarded one of only two EPSRC Doctoral Training Centres (DTC) in Cyber Security. The DTC will host three successive annual cohorts of around 10 students each, starting in October 2013.

Each student is associated with one research group and has both a supervisor and an advisor, the

latter having specific responsibility for pastoral care. Departmental financial support guarantees student attendance at one conference and any further conferences at which they present their research. Students have their own desk and computer in open-plan offices within the core departmental space to which they have 24-hour access via secure swipe cards. All printing is free; software licenses are provided by the departments and there is adequate budget for library provision including online subscriptions to conference proceedings and journals published by ACM, Elsevier, IEEE and Springer, inter alia.

Overall student progress is monitored by the Directors of Graduate Studies and the Postgraduate Management Committees, which report to the Research Committees. There are regular progress reviews that involve the student, their supervisor and their advisor, and an annual formal review at which the student presents a written report: progression to full PhD registration is conditional on the outcome of a first-year review.

Students' training needs are met by a combination of the departmental subject-specific graduate programmes and Royal Holloway's Generic Skills Programme. The latter is based on Vitae's Researcher Development Framework and offers a varied mix of workshops delivered by both internal experts and external facilitators, as well as a number of online courses – Royal Holloway subscribes to the Epigeum 'Research Skills Master Programme' which offers 18 on-line courses on diverse topics and is especially valued by students remote from the Campus. The Generic Skills Programme has separate discipline strands where appropriate and is supplemented by provision at Faculty level. For research students who intend to make a career in HE, we offer the INSTIL programme, which develops skills as a university teacher and is accredited by the Higher Education Academy. Research students may also attend PGT or UG courses, as appropriate.

Students are expected to attend all research seminars organised by their department and encouraged to attend those of the other. There is also a separate CS seminar series organised by the research students with the support of the Director of Graduate Studies and, in ISG, a mix of study groups and a student-led seminar; both culminate in an annual one-day research-student colloquium at which all students present their work to the department. Research students and PDRAs are also encouraged to present their work at the weekly *Advanced Topics* lecture strand; this is an optional extra-curricular activity designed to foster a research-aware culture amongst our undergraduate students. There is a strong social dimension including a weekly social event to which all students, research assistants and staff are invited.

d. Income, infrastructure and facilities

All CS and ISG staff in this submission are based in one building. Dedicated space is available for seminars, meetings and as social space. Royal Holloway also has sites in Central London where space may be booked for meetings and seminars.

A unified team of 5.8 full-time system staff support the computing infrastructure across Computer Science, Information Security and Mathematics departments, backed by the institution's Computer Centre staff. Our servers run SUSE Linux and are supported by 25TB of disc space. All users have free access to Matlab, Mathematica, the R statistical software and a complete suite of Microsoft applications. Bioinformatics research is supported by a dedicated 156-core Linux cluster supported by a 20TB disc store, which provides a Matlab Distributed Computing Server and uses the LSF package to manage the workload. Academic staff and research assistants have personal laptops provided by a mix of departmental and grant funds; individuals have a free choice of Apple, Microsoft or Linux- based systems. Our campus has full Wi-Fi coverage allowing complete mobility.

The Computer Centre provides training and ongoing support in the use of all the major software packages. The Library has information consultants with discipline-specific expertise to assist researchers in exploiting both printed and electronic resources to maximum advantage.

The institutional Research & Enterprise unit (R&E) is tasked with supporting (i) applications for external funding, (ii) exploitation of intellectual property, and (iii) distributing internal institutional funds to support pump-priming activities. Each department is allocated a named Research and Business Development Manager who assists with activities such as enhancing and diversifying sources of research and contract income from grants, consultancy, licensing, research sponsorship to spin-outs, identifying new funders, approaching lesser known sources of funding, building

research consortia, costing projects, pricing projects and negotiating with industrial funders and partners. Specialist staff within R&E provide support for the development of large consortia bids and EU grants, and assist with all aspects of pre- and post-award finances and research governance. Other specialists negotiate contractual terms and agreements; as well as helping seek finance for commercial projects, arranging input from external consultants as necessary and managing intellectual property protection as appropriate. R&E administers the institution's Research Strategy Fund which can award pump-priming grants to support proposals that in due course will attract funding from external sources and to provide support for the preparation and submissions of large multi-partner grant applications such as EU applications.

Our research income for the REF period totals just over £7,400,000 and derives mainly from EPSRC, BBSRC, Leverhulme and EU funds, with smaller industrial and charity components. Consultancy income is significant: some £1,357,000 during the REF period. The bulk of this derives from ISG members who act for a variety of high-profile clients in the financial, IT, telecommunications and governmental sectors. This work is covered by Non-Disclosure Agreements which preclude our presenting a detailed list of clients.

Recent-funding highlights include the following. In the **CAA** Gutin (PI), Cohen and Crampton were awarded an EPSRC grant of £744,000 in 2012 to fund development of new algorithms for solving the workflow satisfiability problem and related questions that arise when enforcing complex business rules using authorization policies. The project is a collaboration with the ISG.

The **CSLE** collaborated with Swansea and City Universities to develop pragmatic formal semantics for programming languages; this led to an award of just under £1,500,000 of which the Royal Holloway component is £597,000 to Johnstone (PI) and Scott. Shortly after Hague's appointment to the CSLE he was awarded a five-year EPSRC research fellowship worth £470,00. Also in the CSLE, Zhaohui Luo is supported by the Leverhulme grant F/07-537/AA and the EU grant 510996.

CLRC research, particularly its more applied aspects, has been supported by EPSRC, BBSRC, the Royal Society, the Veterinary Laboratories Agency, Thales Group, the European Union, the Cyprus Government, and the National Natural Science Foundation (China). In 2009 Royal Holloway made a major investment derived from SRIF funds in systems and synthetic biology, investing approximately £1,000,000 in mass spectrometry and computational facilities. Subsequently Paccanaro obtained two BBSRC grants, one Newton Fellowship, and two Marie Curie Fellowships.

In the **DGC**, Stathis received total support worth £465,155 from two EU grants and from other sources, including the Centre for Defense Enterprise, the South East England Development Agency and the London Development Agency.

In addition to the collaboration with CAA noted above, the **ISG** has been awarded just over £680,000 by EPSRC along with members of the CLRC: Cavallaro (PI), Vovk, Gammerman, Shanahan and Zhiyuan Luo are using advanced techniques from machine learning to improve our ability to detect and classify malware in network traffic. Cavallaro is also co-PI of the Cyber Security Cartographies EPSRC grant worth £753,394. Paterson has received an EPSRC leadership fellowship to bridge the gap between theoretical and practical cryptography (£1,239,000, 2010-2015); Paterson was also PI on the EPSRC-funded project “Novel Security Architectures and Policy Management Techniques for e-Science”, and, with various co-investigators from the ISG, also acquired funding in excess of £1,000,000 as part of the International Technology Alliance (ITA) funded by the US Department of Defence and the UK Ministry of Defence. ISG’s involvement with the ITA continues, with Cid taking the lead on the project task concerned with security in mobile ad-hoc networks. ISG is also involved in the EU-funded project “Internet of Energy” worth almost £500,000 and were funded under the EU European Network of Excellence in Cryptology II (£135,000, 2008-12). The recently announced EPSRC Doctoral Training Centre in Cyber Security and will receive almost £4,000,000 in funding over the next six years to support three cohorts of doctoral students.

e. Collaboration and contribution to the discipline or research base

Royal Holloway encourages staff to make contributions to the national research base and to policy. At professorial level, promotion is through a banding scheme with four elements: research; teaching; external engagement and impact; and leadership and enhancement. To progress

through the five bands, new achievements in at least three of the elements are required. External engagement means contributions to the wider society, the economy or other areas of public practice; leadership and enhancement criteria include significant contributions to learned societies, national and international bodies. These criteria, suitably moderated are also applied at lecturer, senior lecturer and reader level. By rewarding wider engagement, we seek to ensure that the institution makes a significant contribution to society.

EPSRC College and panel membership: Cohen, Fiadeiro, Gutin, Johnstone, Zhaohui Luo, Paterson, Watkins.

BCS and IMA fellows: Cohen, Fiadeiro, Johnstone, Scott, Martin, Paterson.

Editorial Board membership: Journal of Machine Learning Research (Watkins), Artificial Intelligence (Cohen), Designs, Codes and Cryptography (Cid), ACM Transactions on Information and System Security (Crampton); The Law, Probability and Risk Journal, The Computer Journal (Gammerman); Proceedings of the European Association for Software Science and Technolology, Electronic Proceedings in Theoretical Computer Science, (Fiadeiro), Information Processing Letters (Fiadeiro and Chockler); IEEE Transactions on Information Theory (Martin); Journal of Cryptology (Paterson); Discrete Optimization, Memetic Computing and Order (Gutin). Paterson is co-editor-in-chief of the book series Information Security and Cryptography published by Springer.

Programme committee chairing: Gutin was co-chair of the International Symposium on Parameterized and Exact Computation (IPEC) 2013; Cohen was PC for the 16th International Conference on Principles and Practice of Constraint Programming and chair of the 2012 International Conference on Constraints; Crampton was PC co-chair for ESORICS 2013 and for SACMAT 2011; Paterson was PC chair for Eurocrypt 2011; other members of the ISG have been PC chairs for a number of smaller conferences; Vovk and Gammerman were co-chairs for the 1st and 2nd Conformal Prediction and its Applications Workshops; Vovk was PC co-chair for ALT 2010; Fiadeiro was PC co-chair of FASE'2008, SEFM'2010, SBLP'11 and FACS'2013.

Steering committees: Zhaouhui Luo is a member of the SC of the TYPES conference series (2013-2016); Gutin has been a member of the IPEC SC; Fiadeiro has been a member of the SC of CALCO (founder), ETAPS, FASE, FACS, WADT and WS-FM; Chockler is a founder and has been a SC member of the ACM SIGACT/SIGOPS Workshop on Large-Scale Distributed Systems and Middleware (LADIS).

Local hosting of conferences: Pairing 2008, CARDIS 2008, SCC 2010, WISTP 2012, InTrust 2012, IDMAN 2013 and ESORICS 2013.

Other esteem indicators: Chockler was a member of the EU RISEPTIS WG1: Security and Dependability in the Future Internet (2008 – 2009), and a visiting scholar at EPFL (Switzerland) in 2008 and KTA (Sweden) in 2012. **Fiadeiro** is a member of IFIP WG1.3 (chair 2004–2009) and the Scientific Advisory Board of INESC-TEC, Portugal. He has also served in the Research Project Assessment Panel in Computer Science, Portuguese Ministry for Science, since 2006 (chair in 2009); the Research Project Assessment Panel in Mathematics and Computer Science, National Research Council of Romania, since 2012; the Belgium Quality Agency for Higher Education (co-chair of the 2010-11 Informatics panel); and the French Research Assessment Agency in 2013 for the evaluation of INRIA. He was also a visiting scholar at UPC (Catalonia) in 2012 and NASA AMES (USA) in 2013. **Gammerman** was Honorary Professor, University College London, from 2006-2010; Visiting Professor, University of Paris 9 (Dauphine), 2008-2009 and Distinguished Professor (Profesor visitante distinguido) of Complutense University de Madrid, Spain, 2010. **Johnstone** was a panel member for the joint NSF/EPSRC panel on eScience software sustainability. **Zhaohui Luo** was an invited visitor of Institute for Advanced Study at Princeton (2012) and a member of Faculty Evaluation Committee for the CS State Key Lab of the Chinese Academy of Sciences (2013). **Paterson** received a distinguished paper award at NDSS 2012, served as an INRIA theme evaluator in 2011 and was an invited speaker at the RSA conference in 2009. **Stathis** is a member of EU Technical Group 8 on Virtual Organisations for GRID Computing, FP6 Programme on Software Systems and leader of the EU Technical Group 8.4 on Service Level Agreements and Contracts for Virtual Organisations. **Watkins** is an official nominator for the Japan Prize. **Gutin** has received a five year Royal Society Wolfson Merit Award.