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About *FACS FACTS*

FACS FACTS [ISSN: 0950-1231] is the newsletter of the BCS Specialist Group on Formal Aspects of Computing Science (FACS). *FACS FACTS* is distributed in electronic form to all FACS members.

Submissions to FACS FACTS are always welcome. Please visit the newsletter area of the FACS website [http://www.bcs-facs.org/newsletter] for further details.

Back issues of *FACS FACTS* are available to download from:

http://www.bcs-facs.org/newsletter/facsfactsarchive.html

The *FACS FACTS* Team

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Editorial Team   Jonathan Bowen, Paul Boca

Contributors to this Issue

Paul Boca, Jonathan Bowen, Tim Denvir, Margaret West, Dimitris Dranidis, Ilias Sakellariou, Leo Freitas, Alexander Romanovsky, Rob Hierons, Alastair Donaldson and F.X. Reid (letters page).

If you have any questions about FACS, please send these to Paul Boca [Paul.Boca@virgin.net]

Editorial

Welcome to the first issue of 2008 – and my apologies for its lateness: this was caused by unexpected extra commitments. Our first contribution is a report from our Chair **Jonathan Bowen.** The **BCS-FACS AGM** was held on 4 June 2008 at the BCS London offices and as you will see from this report Jonathan is stepping down as Chair and being replaced by **Jawed Siddiqi,** our previous Treasurer. Jonathan will become out new Treasurer. Jonathan has been our Chair since February 2002 and thanks are due to him for his hard work in reviving FACS after a period of quiescence. Thanks are also due to Jawed who has ably performed his Treasurer role in the face of drastic changes in the financial rules for BCS Specialist Groups. Good wishes to Jonathan and Jawed in their new roles. The other Officers are unchanged – see below for a group photograph of Committee.

BCS-FACS committee members after the 2008 AGM in the BCS Offices.
Top row from left: Rob Hierons (Chair: Formal Methods and Testing sub-group),
John Fitzgerald (FME Liaison, SCSC Liaison), Roger Carsley (Minutes Secretary),
Margaret West (Newsletter Editor), John Cooke (Publications, FAC journal, BCS Rep.).
Bottom row from left: Jawed Siddiqi (new Chair), Jonathan Bowen (new Treasurer),
Paul Boca (Secretary).

First of all – you will notice the absence of the membership form for FACS. This is because of the new rules for BCS Specialist Groups introduced by the BCS which means that BCS members have free membership of selected Specialist Groups. The full implications of these new rules will be communicated to you when they are known to us. We are discussing with the journal publishers and with the BCS new arrangements for subscribing to the FACS journal.

We continued with our **FACS evening seminars** for the first half of this year and are currently taking a short break from them over the summer period. We will return in September and have already started putting together our seminar timetable for the 2008/9 season. A joint seminar with the London Mathematical Society will be given by John Tucker and this will take place on 11th November 2008 at De Morgan House, start time at 6pm. The Christmas Meeting will take place at the BCS London Office on 9th December 2008: *Formal Aspects of Safety Critical Systems.* This will also be a joint event – with the Safety Critical Systems Club and with Formal Methods Europe.

A major event being organized by BCS-FACS is the ABZ Conference on three major formal methods, ASM, B and Z, at the BCS offices on 16–18 September 2008. The chairs are Egon Börger (ASM), Michael Butler (B), Jonathan Bowen (Z), Paul Boca (finance) and Ian Oliver (industry). The conference is being supported by the ASM User Group, Association de Pilotage des Conférences B, British Computer Society, BCS-FACS Specialist Group, EPSRC VSR-net Network, London South Bank University and the Z User Group. A major focus of the conference will be a case study for a flash-based file system. An associated VSR-net Workshop is on 15 September immediately beforehand. For further information about ABZ 2008, see www.abz2008.org. Further information on both of these events is contained in this Newsletter.

The 2007 BCS FACS Christmas meeting was held at the BCS London office and the proceedings have recently been published in the eWiC series. Our evening seminar in December 2007 was held jointly with BCS-Women and a summary is contained in this Newsletter. Slides for the 2007/2008 series can be obtained via links on the FACS website.

A new feature for this issue is an occasional column by Tim Denvir. Tim is a founder member of FACS and will be letting us have his thoughts as and when he feels inspired. You will be relieved to hear we have heard from another of our FACS FACTS contributors – no less than *two* letters have been received from Professor F.X. Reid, from his current abode in Malta.

Many thanks to contributors to this issue: Dimitris Dranidis and Ilias Sakellariou have contributed a report on the 3rd South-East European Workshop on Formal Methods (SEEFM2007). Prizes for best paper and for best student paper were provided by FACS and pictures can be seen. A report on the Community Z tools (CZT) was contributed by Leo Freitas. DEPLOY is a project involving the industrial use of formal methods and this was contributed by Alexander Romanovsky. We also have a Ph.D. abstracts page, a books page and information about FACS events.

Most FACS events are held at the BCS offices since as a BCS Specialist Group, we can use these excellent facilities, including refreshments at no charge. Thanks are due to the British Computer Society for this wonderful facility. However, if FACS members wish to organize events elsewhere, please do feel free to contact Paul Boca or any member of the FACS Committee to discuss this at any time.

We hope you will enjoy this edition of the newsletter and will consider contributing articles to future issues. Without contributions, there is no newsletter! We hope to see you at one of the upcoming seminars too.

Margaret West, Jonathan Bowen, Paul Boca

Chair's Report
Jonathan Bowen

The series of evening seminars held at the BCS Covent Garden HQ have again gone very well. Many thanks are due to Paul Boca for their continued success. The FACS book based on the evening seminars is due to be published by Springer later in the year.

The Christmas workshop on Formal Methods in Industry was well attended and papers have again been published online in an eWiC (Electronic Workshops in Computing) that is freely available, this time under www.bcs.org/ewic/fmi2007. Thanks are again due to Paul Boca for making this such a success. The Software Engineering and Formal Methods conference was held at London South Bank University in September, with support from FACS (and Paul in particular).

Margaret West has taken over from Paul Boca as the FACS FACTS Newsletter editor. She has produced her first newsletter and another is in the pipeline. Do support her with material for the newsletter. Reports on conferences and meetings are especially welcome.

The FACS Testing subgroup led by Rob Hierons has produced a book on *Formal Methods and Testing* in the Springer *Lecture Notes in Computer Science* series (LNCS volume 4949). A survey paper has been accepted for publication and is due to appear in the ACM Computing Surveys journal. The FACS subgroup for Refinement led by John Derrick organized a Refinement Workshop during the year associated with the FM Conference, unfortunately without FACS financial support this time due to changes at the BCS, of which more later.

Forthcoming FACS events include the Christmas workshop (on Formal Methods in Safety-Critical Systems, jointly with the Safety-Critical Systems Club, through liaison with John Fitzgerald) and the ABZ 2008 conference in September, covering the formal methods ASM, B and Z, both to be held at the BCS London offices in Southampton Street. This is a wonderful venue for many of our meetings.

The major change facing FACS has been the ongoing introduction of new arrangements put in place by the BCS for Specialist Groups. These continue to be a focus for vigorous debate! Many thanks are due to John Cooke for liaising with the BCS on these matters and attending Specialist Group Assemblies. Paul Boca also has useful knowledge as a member of the Specialist Groups Executive Committee. Importantly, all finance for FACS is now centralised with annual budgets to be agreed in advance. May I commend to you the excellent thoughts of Jawed Siddiqi on the possible avenues for the future for BCS FACS? His conclusion is that we must follow the wishes of the BCS for the immediate future.

Jawed has taken over as Chair of FACS for the year and I am sure he will be an active and effective advocate for the sustenance of FACS in these changing times. I am now working fairly fulltime in industry for the moment, so have taken over Jawed's previous position as Treasurer. With the centralization of Specialist Group finances, this role should not be too onerous. Paul Boca continues in his important role as Secretary – and major lifeblood of FACS activities. Many thanks for everybody's help over the years, especially Paul and Jawed recently, in making FACS such a success. I intend to continue to play a role and look forward to renewed vigour with Jawed at the helm – and I hope Paul continuing his essential role in the engine room!

Prof. Jonathan Bowen
www.jpbowen.com

Tim Denvir's Column

FACS Members – Assert your Public Lending Rights!

BCS FACS includes many members who are authors of books. I therefore thought I would bring to your attention the possibility of receiving royalties on library loans via the PLR, Public Lending Rights.

If you register the books you have written with PLR, you will receive a royalty of 5.98 pence per loan. The PLR estimate the number of loans by a pretty good sampling technique, covering regions all over the UK. There is a lower limit of revenue they will pay you, but this has recently been reduced from £5 to £1 per year.

So, FACS members, assert your rights by registering your published books with the Public Lending Rights at www.plr.uk.com! The PLR year runs from 1 July to 30 June. If you register by 30th June, you will get paid for loans in the year 2007–8.

Hack(er): An Etymological Note

Today a Hacker is taken to mean someone who attempts with malicious intent through devious software to gain unauthorised access to a system, Hack being the verb. It was not always the case. The term has an inheritance from agriculture and pre-mechanised transport through literary occupations.

The Chambers' Twentieth century Dictionary, 1901 edition [1], gives this definition, complete with wry complaint:

> "**Hack**, *n.* a horse kept for hire, especially a poor one: any person overworked on hire: a literary drudge... **Hack-work**, literary drudgery for which a person is hired by a publisher, as making dictionaries, &c."

Hack was a contraction of "**Hackney**, *n.* a horse for general use, especially for hire; a person hired for any mean work...". More familiar are Hackney-carriage, Hackney-coach and "**Hackneyed**, devoted to common use, much used". The on-line Oxford English dictionary lists the same meanings but with less detail. In the fifties and sixties journalists who had to fill a precise number of words in time for a deadline were frequently called literary hacks. In the nineteen-sixties Hack was borrowed from journalism to describe programmers who generate a flow of unexceptional, poorly structured and inelegant code. The term was still used in this sense in the mid-seventies, as I remember a junior programmer saying to me, with charming but unwarranted self-denigration, "I'm just a hacker". She was claiming lack of expertise, not criminality.

I think the press heard the term and reinterpreted it with its current meaning in the mid eighties. After all, hacking as we know it only became possible when e-mail arrived. Before the advent of that technology, to alter software maliciously would require breaking and entering (although I remember one programmer complaining that people were coming into the office late at night and tinkering with his code, but I think his concern could be attributed to neurosis). So "Hack" has journeyed from horses through journalism through programming drudgery to malicious software.

[1] Chambers's Twentieth Century Dictionary, Original Edition, W. & R. Chambers Ltd., 1901.

Process Algebra for Collective Dynamics Professor Jane Hillston

Report by Margaret M West

The seminar was joint **with *BCSWomen* and** took place in the BCS London Offices on 10th December 2007. BCSWomen is a group which provides networking opportunities for all BCS professional women working in IT around the world. The Group's main objective is to provide support for female IT professionals, as well as mentoring and encouraging girls/women to enter IT as a career. The e-group format of BCS Women lends itself to international networking in a new and challenging way. Over one thousand women have already joined this lively group and it has featured in articles in leading computer publications.

Professor Jane Hillston has a personal chair in quantitative modelling at the University of Edinburgh. In 1995 she won one of the ***BCS/CPHC Distinguished Dissertation awards*** for her Ph. D. thesis – now published by Cambridge University Press. Since then she has had an accelerated career. In 2004, she won the ***BCS Roger Needham award***. This award, established in memory of the late Roger Needham, is for a distinguished research contribution in computer science.

The talk described the CODA project which involves a stochastic extension to Process Algebra: Performance Evaluation Process Algebra (PEPA). Process Algebras are formal languages used for the specification and design of concurrent systems. Systems are modelled as collections of *agents* (**P**) which engage in *actions* (α), hence:

$$\alpha \text{ .P}$$

These languages have been found to be particularly useful for modelling systems consisting of a large number of interacting components. In the PEPA extension a random variable **r** is associated with each action which then comprises **(α, r)** where r is the activity rate (the parameter of an exponential distribution). A PEPA entity is thus denoted

(α r).P

Process Algebras allow for composition of components and for qualitative analysis of the resulting system. This analysis consists of functional verification, reachability analysis and specification matching/ model checking. In common with classical process algebras PEPA uses structured operational semantics (SOS) to generate a labelled transition system. From this can be derived a Continuous Time Markov Chain (CTMC) for performance modelling. Each node of the graph corresponds to a state of the system and when the size of the state space is not too large linear algebra can be used for a numerical solution. However for complex systems state spaces can become intractable. In this case continuous state variables are used to approximate the discrete state space and ordinary differential equations (ODEs) represent the change in time of the variables. This form of modelling is particularly useful for analysing populations with complex interactions.

Several case studies were presented during the talk. The first was ***Scalable Web Services*** where the system was modelled by 17 ODEs. This can be compared with an underlying CTMC of over 270 million states. The second case study involved the behaviour of *Internet worms*. The set of ODEs was used to obtain a plot of model behaviour against time (whereas the corresponding discrete model would have comprised $10^{10,000}$ states).

Ongoing and future work included:

- The development of Bio-PEPA, designed for modelling biochemical processes;
- HYPE: Designed for modelling hybrid systems combining discrete and continuous behaviour;
- $\mathcal{L}$: A logic which takes an alternative approach to modelling systems from the population perspective.

Further details of this most interesting talk can be obtained from slides of talk (in PDF format) – homepages.inf.ed.ac.uk/jeh/TALKS/bcs-facs.pdf – and further details of PEPA from the PEPA website: www.dcs.ed.ac.uk/home/stg/PEPA.

SEEFM 2007
Report: Dimitris Dranidis and Ilias Sakellariou

The 3rd South-East European Workshop on Formal Methods (SEEFM2007) took place in Thessaloniki on the 30th of November and 1st of December 2007. The workshop was organised by CITY College (Computer Science Dept) and the South-East European Research Centre (SEERC) and was a satellite event of the Informatics Education Europe II conference.

The theme of the workshop was twofold: a) Service-Oriented Computing and b) Teaching Formal methods. 17 high quality full papers have been accepted and presented during the two days of the event.

The workshop has attracted 35 participants, who came from several European countries: Greece, UK, Italy, Germany, Finland, Czech Republic, France, Portugal, Romania, FYROM, and Turkey. All participants expressed a high interest in the workshop themes and their satisfaction from the original contributions and the high quality presentations.

SEEFM was honoured to host two talks by distinguished keynote speakers. Prof. Marco Pistore from Trento, Italy presented about the research challenge of automated composition of distributed business processes. He emphasised the necessity of rigorous techniques and supporting tools. Prof. Martin Wirsing presented a novel comprehensive approach to the engineering of service-oriented systems, comprising model-based transformation techniques for the development of services and powerful verification techniques for guaranteeing quality of service.

The program committee has decided to present the best paper award to Dr Chrysafis Hartonas for the paper titled: *A Combined Open Petri Net and Process Algebraic approach to Message-Passing Services.*

The prize for best Doctoral Presentation was awarded to Annapaola Marconi for the presentation titled: "*An Iterative Approach for the Process-level Composition of Web Services*".

The program committee would like to congratulate both winners on their success. Both awards are sponsored by BCS-FACS and involved a one year subscription to the society.

Given this opportunity, we would like once more to thank everyone who has helped to make this workshop possible: our colleagues at SEERC and CITY College who contributed during the last year in the preparation of this event; all members of the Programme Committee and our sponsors: *SOSorNET* for its financial support, BCS-FACS for the best paper awards, and Macedonia Newspaper for supporting the dissemination of the event. Last but not least, we would like to express our warmest thanks to our keynote speakers for putting every effort to make this event unique and relevant to our intended objectives.

Dimitris Dranidis
Chair of the Programme Committee and Workshop Chair

Ilias Sakellariou
Chair of the Organising Committee

Community Z Tools
Leo Freitas

The **Community Z Tools** (CZT) initiative was proposed by Andrew Martin in 2001. It aims to provide open source **interoperable tool support for Standard Z and its extensions**. A series of proposals was made for tools and lines of research, which included not only basic support with parsers and typecheckers, but also more advanced tools like theorem provers, code generators, and refinement calculators. CZT have expanded to cover Z extensions drawing together people committed to its future development and use. It has a set of tools aimed at extensibility and interoperability.

Z being such a mature formal method, what makes new tools interesting? Practically, the number of requests in Z newsgroups and meetings for tool support has risen considerably. Also, it suits the objectives of a UK Grand Challenge in Computer Science Research in producing a set of tools aimed at formal specification and verification (vsr.sourceforge.net/gc6index.htm). Our main objective is threefold: a) provide extensive and reliable tool support for users of Z and its extensions; b) build an open source architecture that is extensible and modular for further tool builders; and c) allow room for extensions to be naturally added. Similarly direction, the RODIN platform (rodin.cs.ncl.ac.uk) is providing methodology, open source architecture, and extensible tool support for Even-B.

The major strengths of CZT are: a) tools interoperability with thorough Z standard conformance using XML; b) modular and extensible object oriented design in Java, with broad and careful use of design patterns and testing methodology to provide a reliable framework for tool builders; c) a wide range of projects (and openness for new projects) allowing a variety of people, from theoretical to practical backgrounds, to contribute and participate. We also focus on capturing the attention of quite important users: students! In this front, we have CZT embedded in favourite development editors, such as Eclipse and jEdit (www.jedit.org) where users can experience the available tools in friendly environments. This should also motivate industry users interested in formal modelling.

The CZT core is formed by an XML exchange format (named ZML) representing Z and its extensions. From XML-schema documents, we automatically generate a series of representation data types, such as Abstract Syntax Trees (AST), and XML-binding documents (JAXB). A thorough architecture of parsers and printers allowing interchange of various formats is available for ZML, *LaTeX*, or UNICODE, with the least effort possible, through automatic code generation and reuse. Apart from supporting Z, there are currently four extensions available that are fairly stable: an object oriented version of Z (**Object-Z**); **Circus**, a concurrent process algebra combining Z, CSP, and the refinement calculus with Hoare and He's Unifying Theories of Programming (UTP) as the semantics background; timed communicating object

Z (**TCOZ**), an integration of object Z and timed CSP also using the UTP; and finally, a pattern language enabling the description of a system of inference rules for Z and its extensions, which is useful in implementing animators and theorem provers. Moreover, section management allowing modular specification for Z and its extensions are also available. Apart from the CZT core, there are several subprojects under development. Among those there are: the interface projects as plug-ins for Eclipse and jEdit; XML readers and writers for interchange with other tools not in Java; a system of natural deduction inference rules allowing Z schema unfolding, and trivial term rewriting as the basis of a Z theorem prover; an animator for a finite subset of Z (called ZLive), which uses the natural deduction rules; a simple Java-beans interface code generator (called Gaffe), which enables visual animation of Z specifications using ZLive; a model-based testing tool, which allows one to write models for testing purposes, and how to use model-based testing to generate test suites; Z browsing allowing type inspection and cross-reference of well-formed formulae; interfacing with the Z/Eves theorem prover using the Z/Eves XML API; a series of prototype translators between Z and B, standard Z and Spivey's (Z/Eves) Z, ZML and HTML; and so on.

In the IMS in India, there are works in translating Simulink diagrams into **Object-Z**. At the University of York (UK), they are translating Simulink to *Circus*. The National University in Singapore does **TCOZ** related work. In UFPE Brazil, a refinement calculator for *Circus* is being developed using CZT. In York UK, a translator from Circus to Java was built, and a model checker with theorem proving capabilities for *Circus* is under development. In Queensland Australia and Sheffield UK, work in translating Z to PVS-SAL for model checking purposes is under way. This synergy shows the diversity of activity, and the broadness of choice within our community. Yet, there are plenty of open proposals still to be filled and new ideas waiting to be discussed! For instance, foreseeable projects includes: a Z to JML translator to allow verification of Java code; interfacing to existing theorem provers, such as ProofPowerZ; further Eclipse plug-ins; formalisation of our architectures; extension of the natural deduction system to include proof tactics; and so forth.

So, why not join in? There are mailing lists for people interested in proposing new projects, taking on going projects, participating in discussions, or just quietly following what is happening until you find something suitable to your interests. For more information, please visit vsr.sourceforge.net, where you can freely register on the czt-users and/or czt-devel mailing lists. Alternatively, you could contact us directly via the information below with your thoughts and ideas for contributing to CZT.

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DEPLOY
Alexander Romanovsky

DEPLOY: Industrial deployment of advanced system engineering methods for high productivity and dependability

Alexander Romanovsky

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The overall aim of the DEPLOY Integrated Project is to make major advances in engineering methods for dependable systems through the deployment of formal engineering methods. The work is driven by the tasks of achieving and evaluating the industrial take-up of the DEPLOY methods and tools, initially in the five sectors which are key to European industry and society.

DEPLOY

Formal engineering methods enable greater mastery of complexity than do traditional software engineering processes. It is the central role played by mechanically-analysed formal models throughout system development that enables mastery of complexity. As well as leading to big improvements in system dependability, greater mastery of complexity leads to greater productivity by reducing the expensive test-debug-rework cycle and by facilitating increased reuse of software.

The successful three-year FP6 STREP RODIN project on Rigorous Open Development Environment for Complex Systems (2004-2007, http://rodin.cs.ncl.ac.uk/) researched and developed industrial strength methods and tools paving the way for the technology to be deployed. In particular, RODIN delivered an extensible open source platform, based on Eclipse, for refinement-based formal methods along with a body of work on formal methods for dependable systems. DEPLOY exploits and builds on these results.

In DEPLOY five leading European companies, representing five major sectors: transportation (Siemens), automotive (Bosch), space (Space Systems), telecommunication (Nokia) and business information (SAP), will deploy advanced engineering approaches to further strengthen their development processes in order to improve competitiveness

Objectives

The overall aim of DEPLOY will be achieved with a coherent integration of scientific research, technology development and industrial deployment of the technology. The complementary expertise and technological base of the

industrial deployment partners and the technology provider partners will be combined to achieve a set of challenging scientific and technological objectives.

Consortium

DEPLOY offers a balanced interplay between industrial deployment, scientific research and tool development, where companies in five sectors join their forces with eight technology providers to meet the goal.

The industrial sectors, transportation (Siemens), automotive (Bosch), space (Space Systems), telecommunication (Nokia) and business information (SAP), comprise a palette of important European base industries of today. The companies possess different maturity levels when it comes to deploying formal approaches. The five academic partners are world leaders in formal methods research, that have considerable experience in developing and applying resilience methods as well as a wide range of formal approaches.

The tool vendors, Systerel and ClearSy, have long-standing experience in developing tool support for formal engineering methods. CETIC has considerable experience in industrial quality measurement and will be in charge of the assessment activities.

The project is coordinated by Newcastle University with a dedicated Project Office set at the School of Computing Science.

Methodology

Strategies for deployment

The key to achieving successful and cost-effective deployment of advanced engineering technology will be the construction of *strategies for deployment*. DEPLOY will develop this concept taking into account the specific characteristics of ways in which rigorous engineering technologies are applied in each industrial sector.

Results

DEPLOY will deliver methods and tools that (i) support the rigorous engineering of complex resilient systems from high level requirements down to software implementations via specification, architecture and detailed designs; (ii) support the systematic reuse and adaptation of models and software thus addressing industry's requirement for high productivity and requirements evolution; (iii) have been field-tested in and adapted for a range of industrial engineering processes; (iv) are accompanied by deployment strategies for a range of industrial sectors; and (v) are based on an open platform (Eclipse) and will themselves be open.

Measurable outcomes

By the end of DEPLOY each industrial partner will achieve real deployment of formal engineering methods and tools in development of products and become self sufficient in the use of formal engineering methods. The deployments will enable us to provide scientifically valuable artefacts including formally

developed dependable systems and results of systems analysis including a rich repository of models, proofs and other analysis results.

By extending the mathematical foundations of formal methods the project will deliver research advances in complex systems engineering methods that enable high degrees of reuse and dependability, and effective systems evolution that maintains dependability. DEPLOY will deliver a professional open development platform based on Eclipse that provides powerful modelling and analysis capabilities, is highly usable by practising engineers and is tailored to sector-specific engineering needs. Through the experience and insights gained in the industrial deployments DEPLOY will deliver strategies that enable the integration of formal methods and tools with existing sector-specific development processes.

DEPLOY will put in place an organisation which will be the home of the open platform, set up a body made of industrial users and technology providers whose role will be to coordinate technical decisions on the open platform and deliver training material covering general and sector-specific formal engineering methods.

Project:

The work of the project is driven by the tasks of achieving and evaluating industrial take-up, initially by DEPLOY industrial partners, of DEPLOY methods and tools, together with the necessary further research on methods and tools

Project coordinator

Prof Alexander Romanovsky, Newcastle University (UK).

Partners from:

Newcastle University (UK), Aabo Akademi University (Finland), Bosch (Germany), CETIC (Belgium), ClearSy (France), ETHZ (Switzerland), Heinrich-Heine Universität Düsseldorf (Germany), Nokia Research Center (Finland), SAP AG (Germany), Siemens Transportation Systems (France), Space Systems (Finland), Systerel (France), University of Southampton (UK)

Subcontractors: **Martyn Thomas (UK) and RATP (France)**

Duration: 4 years   **Programme**: Framework 7

Further information:

Strategic Objective IST-2007.1.2 Services and Software Architectures, Infrastructures and Engineering

Project start: February 1, 2008

Project web site: http://deploy-project.eu

Books Page

Springer has recently published a book on Formal Methods and Testing as part of its Lecture Notes in Computer Science series:

> Robert M. Hierons, Jonathan P. Bowen and Mark Harman (eds*), Formal Methods and Testing: An Outcome of the FORTEST Network, Revised Selected Papers, Lecture Notes in Computer Science Volume 4949, 2008. ISBN: 978-3-540-78916-1.*

This book was an outcome of the EPSRC funded FORTEST network and contains twelve chapters written by many of the leading researchers in the field. The chapters are:

- *Model Based Testing with Labelled Transition Systems,* Jan Tretmans

- *Model-Based Testing of Object-Oriented Reactive Systems with Spec Explorer,* Colin Campbell, Wolfgang Grieskamp, Lev Nachmanson, Wolfram Schulte, Nikolai Tillmann, Margus Veanes

- *Testing Real-Time systems using UPPAAL*, Anders Hessel, Kim G. Larsen, Marius Mikucionis, Brian Nielsen, Paul Pettersson, and Arne Skou

- *Testing State Based Specifications,* Jeff Offutt, George Mason University, USA Paul Ammann, George Mason University, USA Wuzhi Xu, George Mason University, USA

- *Testing in the Distributed Test Architecture,* Jessica Chen, Robert M. Hierons, and Hasan Ural

- *Testing from X-machine specifications*, Kirill Bogdanov

- *Testing Data Types Implementations from Algebraic Specifications,* Marie-Claude Gaudel and Pascale Le Gall

- *From MC/DC to RC/DC: Formalization and Analysis of Control-Flow Testing Criteria*, Sergiy A. Vilkomir and Jonathan P. Bowen

- *Comparing the Effectiveness of Testing Techniques,* Elaine J. Weyuker *TTCN-3: Systematic Testing for Reactive Systems,* Jens Grabowski, Ina Schieferdecker, and Theofanis Vassiliou-Gioles

- *Testability Transformation,* M. Harman, Andrea Baresel, David Binkley, Bogdan Korel, Robert M. Hierons, Lin Hu, Phil McMinn, Marc Roper *Modelling the effects of combining diverse software fault removal techniques,* B Littlewood, P Popov, L Strigini, N Shryane

For more details, see Springer's website.   *Contributor: Rob Hierons*

PhD abstracts

"Automatic Techniques for Detecting and Exploiting Symmetry in Model Checking"
Alastair F. Donaldson (supervised by Alice Miller), University of Glasgow, June 2007

Model checking is an increasingly popular technique for the formal verification of concurrent systems. The application of model checking is limited due to the state-space explosion problem – as the number of components represented by a model increases, the worst case size of the associated state-space grows exponentially. As such, models of realistic systems are often too large to feasibly check. Over the last 15 years, symmetry reduction techniques for model checking have been developed and, in a restricted setting, have been shown to be effective in reducing the state-space explosion problem. Current techniques can handle limited kinds of symmetry, e.g., full symmetry between identical components in a concurrent system. They avoid the problem of automatic symmetry detection by requiring the user to specify the presence of symmetry in a model (explicitly, or by annotating the associated specification using additional language keywords), or by restricting the input language of a model checker so that only symmetric systems can be specified. Additionally, computing unique representatives for each symmetric equivalence class is easy for these limited kinds of symmetry.

We present a theoretical framework for symmetry reduction which can be applied to explicit state model checking. The framework includes techniques for automatic symmetry detection using computational group theory, which can be applied with no additional user input. These techniques detect structural symmetries induced by the topology of a concurrent system, so our framework includes exact and approximate techniques to efficiently exploit arbitrary symmetry groups which may arise in this way. These techniques are also based on computational group theoretic methods.

We prove that our framework is logically sound, and demonstrate its general applicability to explicit state model checking. By providing a new symmetry reduction package for the SPIN model checker, we show that our framework can be feasibly implemented as part of a system which is widely used in both industry and academia. Through a study of SPIN users, we assess the usability of our automatic symmetry detection techniques in practice.

ABZ 2008 Conference

BCS London Offices, Covent Garden, London
16–18 September, 2008

Abstract State Machines (ASM), B and Z stand for three rigorous methods that share a common conceptual foundation and are widely used in both academia and industry for the design and analysis of hardware and software systems. This conference is dedicated to the cross-fertilization of these three related state-based and machine-based formal methods. The program spans from theoretical and methodological foundations to practical applications, emphasizing system engineering methods and tools that are distinguished by mathematical rigor and have proved to be industrially viable. A main goal of the conference is to contribute to the integration of accurate state- and machine based system development methods, clarifying their commonalities and differences to better understand how to combine related approaches for accomplishing the various tasks in modelling, experimental validation, and mathematical verification of reliable high-quality hardware/software systems.

The conference includes a one-day common program of invited lectures and two days of contributed papers. Although organized logistically as an integral event, editorial control of the joint conference remains vested in three separate programme committees, which respectively determine its ASM, B and Z content, presented in parallel conference tracks with a schedule to allow the participants to switch between the sessions. The conference simultaneously incorporates the 15th International ASM Workshop, the 17th International Conference of Z Users and the 8th International Conference on the B Method. It is preceded by a tutorial day and Verified Software Repository Network (VSR-net – www.fmnet.info/vsr-net) workshop on Monday, September 15.

A case study for design and verification of a flash-based file system has been suggested to the participants. Leo Freitas and Jim Woodcock are available to help enhance the collaborative aspect of the work. For details, see: www.cs.york.ac.uk/circus/mc/abz.

The papers are published in a volume of Springer's LNCS series (5238). Contributions cover all aspects of the theory and applications of ASMs, B, Z and related approaches in software/hardware engineering, including the development of tools and industrial applications.

Conference Chair
 Egon Börger, University of Pisa, Italy

Program Chairs
 Egon Börger, University of Pisa, Italy (ASM)
 Michael Butler, University of Southampton, UK (B)
 Jonathan Bowen, London South Bank University, UK (Z)

Local Chair and Financial Chair
 Paul Boca, London South Bank University, UK

Chair of the VSR day
 Jim Woodcock, The University of York, UK

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 Mark Utting, University of Waikato, New Zealand
 Sergiy Vilkomir, The University of Tennessee, USA
 Jim Woodcock, The University of York, UK

Venue
The conference takes place at the BCS London Offices, Davidson Building, 5 Southampton Street, Covent Garden, London, UK. The support of the British Computer Society, through the BCS Formal Aspects of Computing Science Specialist Group, in providing the venue and refreshments, is gratefully acknowledged.

Important dates:

 September 15, 2008:
  VSR-net workshop.
 September 16–18, 2008:
  Main ABZ 2008 conference.

The conference programme and other information are available on the ABZ 2008 conference website under www.abz2008.org.

Supported by:
 ASM User Group
 Association de Pilotage des Conférences B
 British Computer Society
 BCS-FACS Specialist Group
 EPSRC VSR-net Network
 London South Bank University
 Nokia
 Z User Group

For questions concerning ABZ 2008, contact:
Prof. Egon Börger boerger@di.unipi.it

The Conference is preceded by
Workshop on the Verified Software Repository 2008 (WVSR)
(see next page)

Workshop on the Verified Software Repository 2008 (WVSR)

15 September 2008, BCS London Offices

In 2004, the UK Computing Research Committee initiated a number of "Grand Challenges" aimed at stimulating long term research in key areas of computing science.

One of the challenges (GC6) focuses on Dependable Systems Evolution. GC6 has two central principles: theory should be embodied in tools, and tools should be tested against real systems. The goal is to produce a Verifying Compiler (a suite of integrated tools) and a repository of verified software. The results of the first VSR pilot project, conducted in 2006, on verifying the Mondex system, using different formalisms and tools, are the first artefacts to be deposited in the repository. A number of other pilot studies are underway in various parts of Europe, USA, Canada and China. This is a truly international initiative, and the UK is a major contributor.

In 2005, Joshi and Holzman from the Jet Propulsion Laboratory at CalTech suggested the specification and verification of a POSIX-compliant filestore interface to flash memory. The filestore has strict fault-tolerance requirements that make it suitable for use by forthcoming NASA missions. This was suggested to the ASM, B and Z communities as an interesting challenge to work on, and some rose to this challenge by submitting papers to the upcoming ABZ 2008 conference, held immediately after the VSR-net workshop.

The purpose of this VSR-net workshop is to bring together researchers and practitioners interested in the current challenges, and wishing to contribute to future challenges. Cliff Jones, University of Newcastle, is the keynote speaker at the workshop. In addition, there are talks from the follow among others:

- **Jim Woodcock, University of York – Pilot projects for the VSR**

- **Richard Banach, University of Manchester – Mondex**

- **Michael Butler, University of Southampton – Verified filestore**

Call for Papers
7th International Conference in Integrated Formal Methods
Düsseldorf, Germany, 16–19 February, 2009

Objectives and scope:
Applying formal methods may involve the modelling of different aspects of a system that are expressed through different paradigms. Applying formal methods may also involve the application of different analysis techniques as to treat differently modelled system views, or simply as to cope with the sheer complexity of the system. The iFM conference series seeks to further research into the combination of different formal methods, both for modelling and analysis, covering all aspects from language design over verification techniques to tools and their integration into software engineering practice.

Areas of interest include but are not limited to:
Formal and semiformal modelling notations · Semantics · Verification · Model checking · Static analysis · Theorem proving · Integration of formal methods into software engineering practice · Refinement · Model transformations · Type systems · Logics · Tools · Experience reports · Case studies

Invited speakers:
David Basin · Michael Butler · Byron Cook

Conference location:
Ten years after the first iFM conference in York, the 2009 edition will take place in Düsseldorf, Germany, alongside the river Rhine. Hosted by the University of Düsseldorf the conference will be jointly organized by the software engineering group of Düsseldorf University and the formal methods group of the University of Paderborn.

PC chairs:
Michael Leuschel (U. of Düsseldorf, D)
Heike Wehrheim (U. of Paderborn, D)

Important dates:
Abstracts   5 September 2008
Full papers   12 September 2008
Notification   1 November 2008
Final version   1 December 2008
Conference   16–19 February 2009

Program committee:
Eerke Boiten (U. of Kent, UK)
Einar Broch Johnsen (U. of Oslo, N)
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Frédéric Dadeau (U. of Besançon, F)
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Marina Waldén (Åbo Akademie U., FI)
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See also: www.formal-methods.de/ifm2009

Letters to the Editor

Palazzo Magnifico,
Triq E. W. Dijkstra,
Sant Pawl Il- Bahhar,
MALTA.
April 2008

Dear Editor,

Further to the obituary, *soi disant*, that appeared some months ago in your newsletter under the by-line 'Victor Zemantics'. After somewhat lengthy enquiries, which, fortunately, I was able to delegate to a disciple who had wasted the requisite quantity of time in learning to use 'search engines' (dreadful neologism), it became clear that the *soubriquet* of the obituarist refers to a technique in the operation semantics of asynchronous systems based on sets of indexed families of sequences. As I cannot imagine M. Nivat – who adopted such an approach in work published in the late 1970s – or M. Broy – who adopted a similar approach in a model for software components in the early 2000's – involving themselves in such frivolities, I can only conclude that the miscreant is a certain obscure English informatician whose main claim to the attention of the community is the ability to consume enormous quantities of cheap alcohol. It is presumably after such debauches that he *commits* his 'papers', no other explanation being plausible.

As rumour has the tendency to follow me like crows, I can only resign myself to put up with the conjectures that must certainly now arise touching my absence. Let me state, therefore at the outset, that I have not absented myself to spend more time with my family, as I am fortunate enough to lack such encumbrances. Nor have I been closeted in a clinic dealing with venereal disease, drug addiction or anti-aging treatment. I have not to my knowledge inadvertently ingested Polonium 210. Neither a first novel nor a slender volume of verse is about to appear under my name and I coached not a single team in the late World cup.

So what *have* I been doing, given that I have not been spending my time expiring? The phrase 'Mind you own damned business' *does* float towards the forefront of my mind, but let us be charitable.

As is well known, I have semi-retired to a modest (modesty being my middle name) apartment in a small coastal town in Malta. There I had planned to spend my declining years keeping bees – Malta being celebrated for its honey, as its name under the Roman empire, *Melita*, suggests – rereading Proust and writing the occasional advanced text on selected mathematical subjects,. No sooner had I arranged my library in alphabetical order, however,

than I received a visit from two gentlemen in light grey suits – this, in the heat of June, testifying in no small way to their fortitude – who announced themselves as representatives of the Order of the Knights of St. John.

Even I am not unaware of the furore surrounding Mr. Brown's novel, 'The Da Vinci Code'. Indeed, at the time of the release of the film of the book, the correspondence column of the Times of Malta was full of indignant letters from Roman Catholics worried that other people's faith (never their own) might be endangered by exposure to it. I was therefore somewhat wary. Did the Knights possess some secret and dangerous item of knowledge, such as the location of the Holy Grail or the zeros of the Riemann zeta function? Or had they come to invite me to take over as Grand Master of the Order? After all, I may not be as noble, courageous or devout as Jean Parisot de la Vallette, but I surely I know more Category Theory than he did!

Reasonable though it was, my conjecture turned out to be false. The Order already possessed a Grand master, resident in Rome somewhere near the Spanish steps; my visitors had other ideas.

The Order, it appeared, had decided, as they put it, to *engage* with the new Millennium and required the services of a World Class (their words) information technologist to bring this about.

As we all know, requirements capture is tricky at the best of times, and was not made easier in this case by the fact that the conversation was entirely in Latin, a language in which I am not quite fluent. At one stage, indeed, I thought I was being asked to use an Access database with a Visual Basic GUI, but perhaps that was my uncharitable side coming to the fore. I also think that they asked me about Fibonacci numbers, but I feigned incomprehension.

At any rate, after much persistence on all our parts, their requirements were established. As any reasonably intelligent schoolboy knows (I nearly added 'both of them') the Knights started as hospitlers, healers (The St. John's Ambulance is an offshoot of the order) who's job was to care for pilgrims visiting *Outremer* in the 11th and 12th centuries. My visitors wanted me to design a system with functionality similar to that proposed for the NHS in the UK, the difference being, of course, that it would work properly.

At any rate, I agreed to take on the commission. They in turn presented me with a plane ticket (they had confidently anticipated my reaction, a fact which slightly irritated me), together with an address in Rome to which they required me to report myself.

I dutifully turned up at Luqa airport at the specified time and went through the usual tedious business of checking in and going through security and customs, after which I installed myself in the small bar, plugging my ears to drown out the TV. Through the fog of boredom, I was still able to make out a pasty faced monk who seemed to wince every time he took a step. I sympathised with him; I have never managed to walk comfortably in flip-flops myself. He had pink eyes and a look of exasperation as though he had been spending the preceding five hours working with Microsoft Word.

I will not dwell further on the journey. The aircraft was full of vociferous Italian infants clambering over the seats and picking the airhostesses' pockets. I put a tape of Alec Guinness reading *The Wasteland* into my Walkman and preoccupied myself with the draft of my paper on the P versus NP problem. Errant *bambini* soon learned the meaning of the phrase 'a box on the ears'.

I was met at Rome airport by two gentlemen in dark suits and even darker glasses who silently escorted me to a black stretch limousine. They signalled me to get in, which I did, and while one drove, the other gently took my briefcase out of my hand and started to examine its contents. At first, I was inclined to protest, but reflected that an Italian *minder*, if such he was, would be unlikely to understand the finer points of Complexity Theory, and, indeed, although he did spot the typographical errors on page 17, he missed those on pages 13 and 16.

We eventually came to rest in the shady courtyard of a *palazzo* where, my briefcase once more in my possession, I was escorted into the building, where I was met by a grave man in black who I took to be the butler and who then escorted me to what was obviously the library.

By this time, I was beginning to have doubts. Why was I here, when the requirements capture had been completed to my satisfaction, that is to say, impeccably? Why would the Knights require such a system at all? And, above all, whose was the corpse that I suddenly espied in the corner?

He was lying beneath a reproduction of what I recognised as Caravaggio's The Beheading of John the Baptist, the original of which I have seen many times in the co-cathedral of St. John in Valletta. In his right hand, I saw clenched a sheet of paper upon which was written a sequence of natural numbers. I noted these down:

17 11 67 13 83 59 11 23 7.

a list of prime numbers.

The body appeared to be that of a man in late middle age, dressed in a somewhat archaic garb; that of a Knight of some order, certainly, but not of that of St. John, with whose regalia I was familiar. Could he be a Templar? As any *aficionado* of conspiracy theories knows, the Templars were slaughtered on the order of the French king Philippe the Fair (an ironic name that), who was anxious to get his hands of their loot. Such *aficionados* are also usually convinced that the Order was not truly destroyed and is now secretly ruling the World, establishing colonies on Mars, telepathically controlling George W. Bush and Vladimir Putin, *und so weiter*.

Was I about to discover that I was descended from Christ through a liaison with Mary Magdalen? If so, much would be explained – but at this point my speculations were disturbed by the sound of a male voice, unmistakably that

of a person in authority, in the anteroom. The conversation was in Italian; I translate.

'You say that there's a dead body in the library. How original!'
'The killer may still be there.' The voice was that of the butler.
'Unlikely, but I will certainly need to examine the body and send for our cryptographic experts.'

My course was clear. I am far better at *Sudoku* that *Ju jitzu*, and within a second I had passed through an open pair of French window into a small courtyard which, happily, led to an exit from the grounds. On a corner, I noticed the albino priest, his eyes following my progress and occasionally screwing up with pain.

I am now back home writing this account. I have no doubt, however, that *they*, whoever they are, are on my tracks. Perhaps I may be able to write to you again, perhaps not. As they say, watch this space!

Reid

Flat 3, Ackfa Court,
Triq San' Aristaku,
San Pawl il-Baħar
MALTA.
May 2008

Dear Editor,

I am writing to reassure my friends, colleagues and disciple that, contrary to rumour, I have not been 'done in' by an albino monk with a limp or a man called 'Teabag', or some such. I evaded the sinister machinations of the Knights Hospitalers and managed to penetrate to the heart of the mystery thanks to my successfully decoding Carravaggio's painting of the beheading of John the Baptist which hangs in the co-cathedral of St. John in Valletta.

I was only mildly surprised to discover my true ancestry, that I was linearly descended from Mary Magdalen. Indeed it explained much, my brilliant insight that led to the discovery of the Redundant Sock Thorem or the Wash-Rinse Cycle.

At any rate, I am back here in San Pawl il-Baħar. *Kollox sew*, as they say here.

No, the reason for my long silence is simple to explain. As I fled through Europe with a beautiful French cryptographer, my mind drifted, as one might expect, to Complexity Theory, and as we hurtled through Zurich, I had a sudden inspiration concerning the P=NP question. Of course, I was not in a position to write anything down at that point as we were locked in the back of a van, where I was explaining Fibonacci numbers to my charming companion

As soon as I could, I jotted down what I could remember on the back of a guide to Rosslyn Chapel, and on my return home, after further strenuous adventures with the beautiful French cryptographer, I began to draft a paper on the subject.

As soon as I had jotted down the last reference, in my elegant calligraphy – and could I say that the quality of post-graduate handwriting is nothing short of deplorable – I opened a bottle of *Mouton Cadet* and prepared to celebrate my great achievement.

It was at this point that disaster struck. My silver-grey Persian kitten, Babbage, leapt suddenly onto my desk and knocked the bottle over, soaking my trousers and the manuscript.

Something similar happened to Isaac Newton once, I believe, yet one more of the many things we have in common. At any rate, the draft was now illegible.

Of course, I was extremely annoyed by the thought of having to write the paper all over again. After changing my trousers and admonishing Babbage, I poured myself what was left of the *Mouton Cadet* and sat at my desk, pen in hand, to begin my labours anew.

And do you know? I couldn't remember a thing. I had no recollection of the direction of my argument. I couldn't even remember whether P=NP or not. Imagine how I felt; I had solved the P=NP problem, but I has no evidence of the fact.

This was ridiculous. I opened another bottle of *Mouton Cadet* and tried to think as I sipped the wine. Nothing came. I poured another glass and drank it. Babbage rubbed himself against my leg and purred. Still nothing. I considered braining the animal with the empty bottle, the one that he had knocked over. I poured another glass.

At this point the door buzzer sounded. It was the *seftura*, come to clean the flat. I knew that as long as she remained, I would never be able to get any work done. I polished off the *Mouton Cadet*, let her in and headed off to the bar of the Gillieru restaurant, notebook in hand.

It was all in vain. Even after five or six glasses of red wine, I had no clear memory of my discovery. Nor had Nino, the barman, my only friend, as I told him repeatedly. Eventually, I gave trying and drank another glass of wine to console myself.

I have no idea how long it was before the *pulizija* arrived. They told me that I was *fis-sakra* and escorted me from the bar to their waiting *karozza* and it was at that point that my memory suddenly returned; my proof was clear in my head. But I had left my notebook in the bar! I begged the officer for some paper, but he merely answered '*le*'.

That was that. They kept me in the cells until I was coherent, but by then I had forgotten everything again.

I have since tried many times to recreate the events of that evening in the hope that my memory might return – and have consequently been banned from every bar in San Pawl il-Baħar – but in vain. The sacrifices one makes for Mathematics! Now I'll have to walk all the way to Qowra.

Thanks to the kitten, I have suspended all my other work: a critical examination of the Hacking-an-Apple proof of the four colour conjecture, the application of Hoare Logic to the complete Windows software, a Mathematical formulation of A. J. Toynbee's Universal History, a translation of *Finnegans Wake* into Maltese and a great deal more, alas.

At any rate, I felt compelled to let you know what has been happening to me. In the meantime, I remain

Yours sincerely

F. X. Reid

P.S. Excuse the shaky handwriting

FACS FACTS Issues in 2008–2009

Call for Submissions

We welcome contributions for the next issue of *FACS FACTS*, in particular:

- Letters to the Editor
- Conference reports
- Reports on funded projects and initiatives
- Calls for papers
- Workshop announcements
- Seminar announcements
- Formal methods websites of interest
- Abstracts of PhD theses in the formal methods area
- Formal methods anecdotes
- Formal methods activities around the world
- Formal methods success stories
- News from formal methods-related organizations
- Experiences of using formal methods tools
- Novel applications of formal methods
- Technical articles
- Tutorials
- Book announcements
- Book reviews
- Adverts for upcoming conferences
- Job adverts
- Puzzles and light-hearted items

Please send your submissions (in Microsoft Word, LaTeX or plain text) to Margaret West [editor@facsfacts.info], the Newsletter Editor.

If you would like to be an official *FACS FACTS* reporter or a guest columnist, please contact the Editor.

Forthcoming Events

BCS FACS Seminars

Unless stated otherwise, these take place at:
BCS London Offices
First Floor, The Davidson Building
5 Southampton Street
London WC2E 7HA

September 2008

ABZ 2008
Formal Methods In Industry
16–18 September 2008 www.abz2008.org

November 2008

Joint Meeting with LMS
John Tucker
Note: venue is De Morgan House
11 November 2008

December 2008

Christmas Workshop: Joint with SCSC and FME
Formal Aspects of Safety Critical Systems
9 December 2008

For further conference announcements, please visit the **Formal Methods Europe** (FME) website [http://www.fmeurope.org], the **EATCS** website [http://www.eatcs.org] and the **Virtual Library Formal Methods** website [http://vl.fmnet.info/meetings].

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FACS is always interested to hear from its members and keen to recruit additional helpers. Presently we have vacancies for officers to help with fund raising, to liaise with other specialist groups such as the Requirements Engineering group and the European Association for Theoretical Computer Science (EATCS), and to maintain the FACS website. If you are able to help, please contact the FACS Chair, Professor Jawed Siddiqi at the contact points below:

BCS FACS
c/o Professor Jawed Siddiqi (Chair)
Sheffield Hallam University
E   info@bcs-facs.org.uk
W   www.bcs-facs.org

You can also contact the other Committee members via this email address.

Please feel free to discuss any ideas you have for FACS or voice any opinions openly on the FACS mailing list [FACS@jiscmail.ac.uk]. You can also use this list to pose questions and to make contact with other members working in your area. Note: only FACS members can post to the list; archives are accessible to everyone at http://www.jiscmail.ac.uk/lists/facs.html.

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Conference reports

Details of upcoming FACS Evening Seminars

And More…