Requirenautics Quarterly

**The Newsletter of the Requirements Engineering
Specialist Group of British Computer Society**

http://www.soi.city.ac.uk/homes/gespan/rq/rq.html

© 1999, BCS RESG Issue 17 (June 1999)

RE-Locations

RE-Soundings

Editorial

Despite the promise I gave to myself to deliver this issue before the end of April and the help of Ian Alexander to get it out on time, I did not manage to overcome the norm of the last few months and the 17th issue of RQ comes out a late again. I know there is no excuse this time. My only hope is that its contents will make you forget about the delay.

In this issue you can find an interesting account of the discussions during the "patterns day" which was organised by the RESG in the beginning of May. Geoff Mullery argues about the need for "strategic-issues-aware" tool support in software development in his regular column, and Douglas Kunda and Laurence Brooks share with us the findings of a case study they conducted on COTS selection. We also have a pre-publication review of the new requirements engineering book of Suzanne and James Robertson and the usual departments.

As you have probably notice in our title, the electronic RQ has moved back to Britain at: http://www.soi.city.ac.uk/homes/gespan/rq/rq.html. Many thanks to Steve Easterbrook for taking care of it over the last few years.

George Spanoudakis,

Department of Computing, City University

Chairman's Message

I generally try to attend most RE-related events, if I can find the money and the time, but my travel agent thought I had gone mad when I showed him the requirements for this summer's itinerary! A practical example of living with inconsistency if I ever saw one!

The requirements engineering community will be in hyper mode during the next few months, particularly in June. Two symposia - RE'99 (Limerick) and INCOSE '99 (Brighton) - clash in the week starting 6th June 1999; then, REFSQ'99 (Heidelberg) and a Dagstuhl workshop on Requirements Capture clash the following week.

If you decide to wait until September to 'do' some RE-related conferences, then you might enjoy a trip combining Florence and Toulouse, to catch REP'99 and ESEC/FSE/FM'99 on consecutive weeks.

If the thought of catching flight upon flight from our overcrowded airports fills you with dread, then why not keep your itinerary local to the UK. The RESG is organising two meetings for the summer: Requirements Engineering for E-commerce to be held in London on 14th July 99, and Managing Requirements Change to be held in Oxford on 31st August 99. As usual, details can be found inside this issue of RQ, and on our web page: http://www.cs.york.ac.uk/bcs/resg/. Have you got it bookmarked?

Do you want more meetings? Less? Different? Same? Drop us a line and let us know.

Finally, I'd like to bring to your attention two (additional) reasons for attending our 14th July meeting in London. The first is that we are holding our Annual General Meeting at 1pm that day - a chance for you to talk to the committee, and influence the group's future events and activities. If that sounds like too much hard work, then how about joining us for a drink and nibbles at the end of the meeting to celebrate the RESG's FIFTH anniversary. Yes, the group was approved by the BCS Technical Board as a BCS Specialist Group in the summer of 1994, and it held its inaugural meeting on 19th October 1994 on Requirements Traceability. Whether or not you intend to join our celebrations, we would really like to hear from you: How has our field changed in the last five years? Has the RESG kept up with the times? Is the UK (still?) in the lead in requirements engineering research and practice?

We would like to produce an account that tries to answer some of the questions above, and we'd very much prefer if the answers came from you rather than from us. So, please, spare us five minutes of your time and drop us a line with your views. Ian Alexander, RQ's Associate Editor, is coordinating our efforts, so you should contact him in the first instance - but, any member of the committee would be delighted to hear from you.

Bashar Nuseibeh,

Imperial College, London

RE-Treats

RESG Annual General Meeting

The next Annual General Meeting of the BCS Requirements Engineering Specialist Group will be held at 1pm on Wednesday 14th July 1999, in Room 418, Huxley Building, Department of Computing, Imperial College, London.

All members of the current committee are willing to serve for another term, and will be standing for re-election. If you are interested in contributing to the group's activities by serving on the executive committee, please contact Bashar Nuseibeh (ban@doc.ic.ac.uk). To all RESG members: please be there to give the committee your support!

Next event organised by the group.

Requirements for E-Commerce

Date: 14th July, 1999
Location: Room 418, Huxley Building, Imperial College, London.
Cost: £20 (including lunch and refreshments)

Format: What challenges does the development of systems for use in E-Commerce present for Requirements Engineering? What new approaches are available to address these challenges?
This meeting will address these and other important questions relating to the potential impact of e-commerce on requirements (and vice versa) through presentations by invited specialists and discussion with participants.
The meeting is being co-organised and co-chaired by:
Linda Macaulay, Department of Computation, UMIST
Sara Jones, Department of Computer Science, University of Hertfordshire
The RESG AGM (open to RESG members only) will be held during the lunch break, and a small celebration to mark the Group's 5th anniversary will be held after the meeting.

Contact: Sara Jones, Department of Computer Science, University of Hertfordshire, Hatfield AL10 9AB,Tel: 01707 284370, Fax: 01707 284303, Email: S.Jones@herts.ac.uk.

Other forthcoming events organised by the group.

Managing Requirements Change

Date: 31st August 1999
Location: London
Speakers: Jane Searle (ICL, UK), Richard Stevens (QSS, UK), Gregory Abowd, Colin Potts and Spencer Rugaber (Georgia Institute of Technology, USA), and Jun Han (Monash

University)
Contact: Bashar Nuseibeh, Imperial College (E-Mail: ban@doc.ic.ac.uk)

Requirements and COTS

Date: November 23, 1999
Location: York
Contact: Laurence Brooks, University of York (E-Mail: Laurence.Brooks@cs.york.ac.uk)

Dependable Distributed System Requirements

Date: February 2000
Location: London
Contact: Sara Jones, University of Hertfordshire (E-Mail: S.Jones@herts.ac.uk), Wolfgang Emmerich, University College, London (E-Mail: W.Emmerich@cs.ucl.ac.uk)

RE-News

Calendar

We have received the following notices of forthcoming events in which RQ readers may like to participate.

June 1999

- *Fourth IEEE International Symposium on Requirements Engineering, University of Limerick,* Limerick, Ireland, June 7-11, Theme: Requirements in a Changing World

  Overview: The Fourth IEEE International Symposium on Requirements Engineering (RE'99) provides a forum for researchers and practitioners to discuss requirements engineering, the branch of software engineering concerned with methods, techniques, and tools for eliciting, specifying, and analyzing software requirements. RE'99 features a substantial tutorial component to augment its traditionally strong technical program. Four half-day tutorials, two full-day tutorials, and the doctoral consortium occupy the first two days. The technical program begins on Wednesday. It features 19 research papers, 5 minitutorials, 2 panels, poster and tool demonstrations, and a doctoral consortium.

  http://www.ul.ie/~RE99/

- *INCOSE '99 - 9th Annual International Symposium of the International Council on Systems Engineering*, The Stakis Brighton Metropole Hotel, UK, June 6-11, 1999

  Overview: Tutorial and Panel Topics: Writing Good Requirements, Commercial Systems Engineering (SE), Processes for SE, Requirements-Based Product Engineering, Concept Analysis, System Validation and Verification, PM and SE, Integrated Process Improvement, Managing Risks, STEP, Case Studies, Trade-off Studies, Quality, SE Capability Model, Practical Systems Management, Tools, Status and Future of EIA 632, ISO 15288, EIA 731 and CMMI, and more.

  http://www.incose.org.uk/incose99/

- *ESI/EOQ/AEC Symposium on Business excellence for software organisations (within the 43rd European Quality Congress), Madrid, June 8th, 1999*
- *http://www.esi.es/Events/Year99/EOQ*

- *R E F S Q ' 99 - Fifth International Workshop on Requirements Engineering: Foundation for Software Quality*, Heidelberg, Germany, June 14-18 1999, (preceding the CAiSE*99 conference)
- *ECOOP'99 Workshop on Human Factors in Use Cases*, (In conjunction with the 13th European Conference on Object-Oriented Programming ECOOP'99), Lisbon, June 14-18, 1999 *http://www.crim.ca/~aseffah/ecoop*
- *SEKE'99-Tenth International Conference on Software Engineering and Knowledge Engineering, Dorint Hotel, Kaiserslautern, Germany, June 16-19, 1999 http://www.iese.fhg.de /seke99*
- *International Conference on Product Focused Software Process Improvement*, Oulu, Finland, June 22-24, 1999 (at Midsummer Night) *http://www.ele.vtt.fi/profes99*

July 99

- *AAAI-99 Workshop on Intelligent Software Engineering*, Orlando, Florida, USA, July 19, 1999 *http://www.aaai.org/Workshops/1999/ws99.html*
- *IWPSE99 - International Workshop on the Principles of Software Evolution,* Fukuoka, Japan, July 16-17, 1999 *http://dontaku.csce.kyushu-u.ac.jp/IWPSE99/*

RE-Calls

Recent Calls for Papers

ICSE 2000 - The New Millennium: 22nd International Conference on Software Engineering, Limerick, Ireland, June 4-11, 2000

http://www.ul.ie/~icse2000

Scope: The revolution in information technology has been the most striking development of the latter half of this century. The astonishing growth of this technology has brought with it major changes in the daily lives of much of the world's population - affecting how we work, learn, entertain, communicate, and interact in social groups at all levels, including within our families. The advent of the information society can be seen as reducing the impact of economic, cultural, social and physical differences. In doing so, it raises hopes of increased equality of opportunity. Appropriate software development can play a vital role in realising these hopes, by facilitating more universal access to information channels.

The focus of ICSE 2000 is on defining the research agenda for the new millennium. Research inevitably concentrates on providing new, advanced functions in a timely fashion. As this new technology is implemented, however, there is a growing need for its software components to be usable, dependable, adaptable and affordable. We must seek to facilitate the transition of technology from research into practical applications, while tightening up the feedback loop from practical experience into research. We also need to ensure continuous professional development for software engineers.

ICSE 2000 marks the starting point of a response to these challenges. In its aim to be the foundational conference on software engineering for the next millennium, ICSE 2000 will bring together researchers and professionals from across the globe in a diversity of forums. These include the main conference, tutorials and workshops. The main conference will feature refereed technical papers, invited industry presentations, panels and leading keynote speakers.

Important dates:

Deadline for workshop proposals: 1 October 1999

Deadline for papers: 11 November 1999

Notification to authors: 15 July 1999

Final version of accepted papers: 25 August 1999

ICRE 2000 - 4th IEEE International Conference on Requirements Engineering, Schaumburg, Illinois, USA, June 19-23, 2000

http://www.cse.msu.edu/ICRE2000

Scope:

ICRE 2000 is the fourth in a biennial series of conferences aimed at bringing together practitioners and researchers to discuss software requirements-engineering-related problems and results. As a technology transfer conference, ICRE2000 is designed to provide (1) practitioners with an evaluation of promising requirements research and practice and (2) researchers with an exposure to real-world requirements problems.

Submissions:

PAPERS: Authors are invited to submit papers addressing theory and/or practice. (The web page contains details and suggested topics.) Full length papers are limited to 6000 words, typeset with enough room for comments by reviewers. They should include a short (150-word) abstract, a list of descriptive keywords, specification of the paper's category (experience / research), and complete contact information for the lead author.

PANELS: Proposals that focus on requirements engineering controversies are encouraged, especially those that highlight the gulf between requirements research and practice. Preference will be given to panels that present a diversity of views on the topic chosen. Proposals should include the panel's title, a brief description of issues to be debated, the names of prospective panel members, and a description of their roles.

TUTORIALS: Tutorial proposals should consist of at least the following information: title, instructors' names and affiliations, abstract (to be used for conference program should the tutorial be accepted), intended attendee, in particular industrial or academic or both, assumed background of attendee, what the attendee will learn, outline of topics covered, when and where was this course given last, if it is not new.

Important Dates:

Deadline for Papers: September 1, 1999

Deadline for Panel Proposals: September 1, 1999

Deadline for Tutorial Proposals: October 1, 1999

Author notification: November 30, 1999

Deadline for camera-ready papers: January 30, 1999

ACRE'99 - The Fourth Australian Conference on Requirements Engineering, Macquarie University, Sydney, Australia, September 29-30, 1999

http://www.jrcase.mq.edu.au/conference/acre99.html

Scope:

Over time, it has become clear to software developers and practitioners that one can achieve better quality in software development process and product if our methods and tools for gathering, modelling and analysing user requirements are more effective, robust and codified in practice. Therefore, Requirements Engineering (RE) in recent years has emerged as an important field of research and practice within software engineering and information systems. It also has widespread implications in other related fields such as systems engineering and human-computer interaction. Since the word "engineering" has been attached to "requirements", RE research efforts have endeavoured to incorporate an engineering approach to what was traditionally known as systems analysis.

The Fourth Australian Conference on Requirements Engineering is organised to bring together practitioners and researchers from academia and industry who work in the field of requirements engineering and to foster the development of an RE research community in Australia.

Important Dates:

Paper submissions by: June 28, 1999

Notification of acceptance: August 9, 1999

Final version for publication: September 6, 1999

Final day for registration: September 13, 1999

EMRPS '99 - 1st International Workshop on Enterprise Management and Resource Planning Systems: Methods, Tools and Architectures, Venice, November 25-26, 1999

Scope:

ERP (Enterprise Resource Planning) technology represents a major breakthrough for enterprises and their ways of doing business. It is important to note that the main innovation brought by ERP systems is not in the technological aspects, since they do not require the most recent technical solutions (although they can benefit from them), but on the way the enterprise is organised and operated. In fact, the main issues concern the full integration of the enterprise information asset and its alignment to the actual state of the business. This is achieved through an extensive, systematic, and integrated approach to business process modeling and automation, that potentially impacts on every aspect of enterprise activities and organisation.

To exploit the potential benefits of ERP systems to enterprises, new methods and tools are needed for: (i) requirement engineering: analysis, specification and management; (ii) enterprise modeling: notations, methods and tools; (iii) enterprise ontologies, knowledge-bases and knowledge management; (iv) innovative models of enterprise organisation and management; (v) business process and workflow modeling and re-engineering; (vi) quantitative methods for assessment and planning: metrics and tools; (vii) data warehousing and decision support systems; (viii) enterprise and business process simulation; (ix) component-based development for ERP technologies; (x) COTS, frameworks, customisable application platforms, product lines; (xi) legacy systems and ERP interoperability; (xii) impact analysis of business process change; (xiii) methods for middleware integration; (xiv) ERP technologies in small- and medium-sized firms; (xv) implementation methods for ERP technologies.

The objective of this workshop is to bring together scientists, experts and practitioners who are active in the above areas, either developing new solutions or experimenting with them in practice. Furthermore, given the wide scope and the number of issues on which ERPs impact, it is particularly useful to gather competencies and experiences from different sectors, with the intent to cross-fertilise ideas and experiences.

Submissions:

Submissions can be of two types: (a) regular papers (maximum 5,000 words), focusing on the state of the art or illustrating a position on a specific topic; and (b) short papers (max 2,000 words), presenting ongoing research or industrial experience. Submissions must be submitted in either electronic (RTF/PDF) or hardcopy (5 copies) form to the programme chair:

Dr Neil Maiden, Centre for HCI Design, City University, London, EC1V OHB, UK, Tel: +44-171-477-8412, E-mail: N.A.M.Maiden@city.ac.uk

Important Dates:

Submission deadline: July 15, 1999

Acceptance notification: September 9, 1999

Workshop: November 25-26, 1999

IEEE Software, Special Issue on Software Engineering in-the-Small, Call for papers

http://manta.cs.vt.edu/ase/vol10call.html

Scope:

The goal of the IEEE Software special issue is to raise awareness among groups of researchers, managers, and practitioners to the particular needs of small development groups working on complex projects. Issues of group size and development environment are known, but they have yet to be treated as the primary focus of a series of articles. Among the reasons for this lack, we feel, is that the proportion of small software development groups has not been generally noticed and that the scale and complexity of work that these groups perform has been underestimated. Even more significantly, the major body of software engineering literature addresses a software development methodology which small companies find sub-optimal in their environments.

Small groups, especially those developing mass-market and Internet software products rarely work according to the published formal contract models. Although they are intensely interested in best practices, software engineers in small organizations find it difficult to separate the reported methods useful to them from the methods used principally to coordinate multiple large groups. By focusing on small-scale software engineering and by comparing it with large-scale methods, we expect that the importance of this area will be highlighted and spur new research.

We seek original articles on specific issues related to software engineering in-the-small that might be addressed include (but are not limited to): (i) software development and management processes for small organizations; (ii) life cycle issues, (iii) adapted methods and techniques for small groups; (iv) development issues for mass-market/Internet software; (v) coping with limited resources; (vi) education; (vii) modeling and documentation in the small, (iix) planning and estimation; (ix) the roles and application of new technology in the small.

Guest editors:

Mauri Laitinen, Laitinen Consulting,

E-mail: mdl@sierra.net

Dr. Mohamed Fayad, Computer Science and Engineering, University of Nebraska,

E-mail: fayad@cse.unl.edu

Roberd Ward, Qoukka Sports,

E-mail: robert.ward@quokka.com

Australian Journal of Information Systems, Special Issue on Requirements Engineering, Call for papers

http://www.uow.edu.au/ajis/ajis.html

Scope:

The Australian Journal of Information Systems seeks articles for a special issue on Requirements Engineering to appear in November 1999. Requirements engineering (RE), a critical first step in the software development process, involves the generation of a description of the goals of the envisioned system, leading to a description of the artifacts that must be built to achieve such goals. Given that requirements engineering is a critical determinant of the quality of the final system, and given the size and complexity of the current generation of software development projects, the area has attracted increasing research attention. This special issue invites high-quality submissions on all aspects of requirements engineering, including, but not limited to:

- Theories and models of RE, with special emphasis on how these might lead to the development of better RE tools.
- Requirements elicitation and evolution techniques.
- The interaction between system requirements and business processes and its impact on business process reengineering.
- Conceptual modeling and requirements definition techniques and their role in analysis and validation.
- Non-functional requirements and design rationale.
- The impact of software architecture on RE.
- Cultural, political and organizational issues that impact requirements engineering practice.
- Insights into requirements engineering practice drawn from industrial-scale RE exercises.

Submission:

Five (5) copies of completed manuscripts must be submitted to the Editor-in-Chief by July 30, 1999. Documents in Microsoft Word format are preferred. Submitted papers must not have been previously published or be currently under consideration for publication elsewhere.

Correspondence should be directed to: Editor AJIS, Department of Business Systems, University of Wollongong, Northfields Avenue, Wollongong, Australia 2522. E-mail: robert_macgregor@uow.edu.au

Important Dates:

Papers due: July 30, 1999

Author notification: September 6, 1999

Revised paper due: October 4, 1999

Tentative publication date: November, 1999

RE-Sources

For a full listing of books, mailing lists, web pages and tools that have appeared in this section in previous newsletters, see the RQ archive: http://research.ivv.nasa.gov/~steve/resg/*http://www.soi.city.ac.uk/homes/gespan/rq/rq.html*

Web Pages

Please note that the web address of the RESG is now: http://www.cs.york.ac.uk/bcs/resg/

Requirements Engineering, Student Newsletter:

http://www.cc.gatech.edu/computing/SW_Eng/resnews.html

IFIP Working Group 2.9 (Software Requirements Engineering):

http://www.cis.gsu.edu/~wrobinso/ifip2_9/

Mailing lists

The SRE list - The SRE mailing list aims to act as a forum for exchange of ideas among the requirements engineering researchers and practitioners. To subscribe to SRE mailing list, send e-mail to listproc@jrcase.mq.edu.au with the following line as the first and only line in the body of the message:

subscribe SRE your-first-name your-second-name.

RE-Actors

The committee of RESG

Chair: Dr. Bashar Nuseibeh, Department of Computing, Imperial College, 180 Queen's Gate, London SW7 2BZ, UK. E-Mail: ban@doc.ic.ac.uk, Tel: 0171-594-8286, Fax: 0171-581-8024

Treasurer: Dr. Neil Maiden, Centre for HCI Design, City University, Northampton Square, London EC1V OHB, UK. E-Mail: N.A.M.Maiden@city.ac.uk, Tel: 0171-477-8412, Fax: 0171-477-8859

Secretary: Dr. Wolfgang Emmerich, University College London, Department of Computer Science, Gower Street, London WC1E 6BT, UK. E-Mail: W.Emmerich@cs.ucl.ac.uk, Tel: +44 171 504 4413, Fax: +44 171 387 1397

Membership Secretary: Dr. Sara Jones, Department of Computer Science, University of Hertfordshire, Hatfield, AL10 9AB, UK. E-Mail: S.Jones@herts.ac.uk, Tel: 01707 284370, Fax: 01707 284303

Newsletter Editor: Dr George Spanoudakis, City University, Department of Computing, Northampton Square, London EC1V OHB. E-Mail: gespan@soi.city.ac.uk, Tel: 0171 477 8413, Fax: 0171 477 8587.

Associate Newsletter Editor: Ian Alexander, 17A Rothschild Road, Chiswick, London W4 5HS. E-Mail: iany@easynet.co.uk, Tel: 0181-995 3057

Publicity Officer: Carol Britton, Department of Computer Science, University of Hertfordshire, College Lane, Hatfield, UK. AL10 9AB, E-Mail: c.britton@herts.ac.uk, Tel: 01707 284354, Fax: 01707 284303

Associate Publicity Officer: Dr. Vito Veneziano, Department of Computer Science, University of Hertfordshire, College Lane, Hatfield, AL10 9AB, UK. E-Mail: v.veneziano@herts.ac.uk, Tel: 01707 286196.

Web-Master: Dr. Laurence Brooks, Department of Computer Science, University of York, York, YO10 5DD. E-Mail: Laurence.Brooks@cs.york.ac.uk, Tel: 01904 433242.

Industrial Liaison Officer: Dr. Barbara Farbey, Department of Computer Science, University College London, Gower Street, London WC1E 6BT, UK. E-Mail: B.Farbey@cs.ucl.ac.uk, Tel: +44 171 419 3672, Fax: +44 171 387 1397.

Emeritus Newsletter Editor: Dr. Steve Easterbrook, Department of Computer Science, University of Toronto, 6 King's College Rd, Toronto, Ontario, M5S 3H5, Canada. E-Mail: sme@cs.toronto.edu.

post□PÉë-
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
EÇ¹□PÉëL³□§€´ãõ‰á?àLntry(è~ÍÛEÍ~žõëaj□û×~qÀ□+ZMõ□³l□w¦□I+¬url 1http://www.soi.city.ac.uk/~gespan/rq/Image37.gifbsrl/http://www.soi.city.ac.uk/~gespan/rq/rq17.htmlmime image/gifhntt□"5a927-47ff-37497756"hvrs□□dataGIF87aÂ□3□÷ÿÿÿ!ù□‚Â□3□@ÿ□H° Áƒ□*ˋÈ°¡Ã‡□#JœH±¢Å<□3jÜÈ±£Ç□ CŠ)□€É"(□□P¹□å@ — '□ÆŒP²Íˎ8sêUÉófÊ™-□²4□"hÑ¡*□Òl©4eÎ§P£J□J•äØ€Uƒ□tÉˮkÖˆ ÄŠ□qiY¬BÑ¢MÈ□äU®fÉÊˆ□K·®Ï𝜇[a&%j¶-V¼/gÂ□ÜÐkÂÂv□+ˆÌØ¡W§Lóþ̟L{Ð°cˆ—e"nÌ¹³gÆ™ 5{}8îCÓÝS«^¬o[¿¥7§…ÙîÛ'·YëPÍÛˮẽ£{𝜇RŽ□»taˆ"%'¿[ûmîÞÐ£‡Ì¼"v`ëB□kwl·óœ®eÇ̨ÿ&-½¼ùãÁÇ×nî
òUâ□!#l□õûìoøÏëw<¿¿ÿÿ□(à€□□hà□□v□vû5Èßs□É□_SGU&Xu¶𝜇g□^,‰□a†ëEX_W®ˮáuË9¨"n□æÅž}□V¯"!!¢ˆÞV□□'Ü†ïÑt¢o?Z¸□y+šG
'l!ˮT□,–x□qÙÝöÛJR„ZT□>ùâ•EÒU`d□-8ˮFˎBÙ£ZNuØWQ:.õÚˮ¬YÆˮ™]>•†oÌxšˮ□âH"ŒQZ‡USÁ¹7"hSêEeWÀ½é!š□¦†¤□tÒÙäcƒfúd□ªõ5èvj"□
jdžž‰'œUb¨ekzjôZˮ□–ÿ–¦£Ûí¸è¡l¥°¤□c©ª%¡î9%zNþ‰Ô˜öä□RÿV©bóá¹j¡y,ú×.æGb}lÆ°+}<†vêˋà□ËkMÁÖ(Ù„"žÆ#ˮ□-¢#𝜇ÈV»¥'(¦ÓZÝ□{îž¶(ì…'®&Þ}
rJ–¡z%□o¾5ŽÛ.g§ wç—þ*©q¹<Ô šÝöë„□?>ïYˮñê□¹äQJJÍ[OÑÜÔ7uMzÉšÒä®$¹Š"miÍS_êX‡□À ŠM¿#›¶u³4eîg ›O¥zö8³mÈ~□¬úPW=²*~'K[ˆÒGCý% h1ò¸ÿ¾
□□œyOy€□%‰□-–A□:lwOÌP²□çA¦Üäz@* □Œ¦)óyÑ†äùV□erÄÇA,WìòX□K×Cònþm¤Ûÿ çÈ?ì…mŠ□Ô"□9E9□ö'L8ôc•¯ïE®xêÂ□ ûT(cÑ□Œéy
‰ó²W<□˜ž%xÏ#—ãˮÉj□°‰ƒ;ÒåÅ"¬*w¦LÜ(/å©Zåaeldöœ"<5 ñ}©´áV□¸□□ë□□¤Ný·Yˮ«™ Htûãí,»J?.ñgV4i8WBï"Q<¬#ào4f□□\T¬Ý.ã¤Ì= Ë"‰*'xô□
—£𝜇ïj,Tç†,□Blbjxu¬àl6©K□Ê□ˎKÿdÖ%Ñ‰&vŠÌ>óƒ'…(Ù6□õ□¡íóÓ □Y>0N "Äˮå]Yœ0ˎG¡,2ˋ6 <□J□32□¢æÿ□g@õ„Q'0%å=áWLÅ%ŽÝ□,Ú Å53A□
t□ÄÛ□¬:□Âct□÷□□ˮz M¥áðŽÍ¡\□"z@7Ò±eáÉÈRƒhI®A2p«Îev□□P"¦Hj©<åôÎ□,•,>r›\□©C¤b𝜇Y4TÓW□zI•>ˋ$j-¢0Ùz6□~¤©3Ò"I¤&U
□:u®Qìc𝐹□4¼€z4'ëCcW‰õEG□4‰fB D ›Â+êÔˋÛÛ[LÅI7ªŠÕh^□%□]¦GUjR□¿□'½□Øü©°i𝜇Eçe□𝜇@WÆudA«à¸øÍF□r$·}cJ□□□CP□ó<®}□
G𝜇»](Mˮ—□Îa"çÿ]Zv—£¢ÂlpÙ¶ˋ†"yïÝÕW7ùÞóe×RE□šXþùÛu^7□Õî'®® DîÄ¢æ:xh1¶ ß,–¢ƒmïq□s̟ÇbÎPŒáÍ□†□Ì¬□k□6þQ;Cüà□õ÷2Ì€—
õ®ÊÀˋŽ"#JÝ□PyÝ¾}Ò□cC□jˆû*a¡ÙXRjÙ□F/LdïÚ-Æ8Ž)jAÌdÛ□×Š*®Ž# S'"ô¥þ•l□" _)–kÈn£(ÉZXìU□¶»OŽ+‡ƒgF9¤e°2_•¨²³èç™ (")ž3□`$#óˮÐ;–„ÑZZ
—š—¶ÑLïœô¼Í*□7¡□Üòô̟H□lø¡□ˮ£□ƒˮ'{ M,sºOnFäˋ9îP'Z•Î□¾"õ×Ûç'™□œ~Ö4ü ªá□¯Äïœ̈_ÿ:áxÿÊ¬Â;Äˋuu=A_ÚØID¶-•]ƒWMÊÒ̟šÝß‰□k°Î «Å□°□
Œ_Ý\□m"°käKÓþ;¬ÕŠ¥μÛ(7nÏˮ¯V□□AÖÖ—ÌˋÃ'ÿø§®;·5š+C5𝜇Î¡,□×ƒˋ–Ó¥ù/ˋÂ$e̟Ô𝜇"o'7p«š□¨º□eaÆÉ□¡2Pˋ7~u)□□d?5»Ìï𝔬¬Ý:m6W5¶ˮ□¹m7!/½ûä¡
!ˋ—‡s□«<çåÚ ›Ìcg¦UÏ8È¹êØ□□sã□ß°ë÷ózÈÝgå£m̂#Zö¹"·;)ÿ-±Å„ÒQò%‰Çâ □¬öÙ[ªWÿ.p~wÀE}H´Ã̟𝜇ÿž□¿2›ÙEìˋ;Ýâr□{[žÖH#îÃa§åØˋÎ\ö-½
¥¡v6•aÛpÁK^¨"b¯™ Y*ó¼Óz¹»<·î6Ûy¦Zå6³#áç7²"wì‰o?³ÙÛîY óT)Þ³ügCúñ□□9Ê𝜇/wÚ□NÀ[□U6□ZÓ O_§·'÷™ g>^¥_5Ú{‰{°□p•%ï□}êSÑ□"£ïzž¾
¨ØÐiø¼HoXÔwÑtóÔ½záW¨VùÛ̟ÿþÝþ;þ÷Ì□#…Õúý□€□H□□□Eyã{□Ch□,€xˋÕ}□V1,Ô€□X□×G1sF~□,□□ˮ'XˋU^wk¸ÿÍÇ□&Ø
qU7„s8kJ7XI¢ƒ)v,2øs□5,NåVæ□z3¸ƒø…\±çip%w#ÈƒD¯~~Ãdn–„"aeë…E;%zE¸ƒY—AÈ□0Ï'h□Åh=Gg□‡ZÿQø…æÄL 66_ÖXüRˋç÷ƒ^□;ˋˆ□ž÷†Ù¦
{P(vÜÖ†¬W†Ð3x®3bWw[Bu"ŠÆFˋ¥>Uáz"§□vÈeNõJÄWI%□ƒÈ—\¼—#□(jÉ□□îb~¡Tyˮ‰¨j□5q±öf¶□†~□9ë·R×ôc4"eSD□ˮ6□V‡Æ□j§¦[B~7"^ÿö□
zE„¯…ÆåBĬ5q›£€¯gŠGˮu"□Yu"O‡¶P²X^¸8cˮø2êö□»‡†m×n¿Å}ºsB"°6□rD°,Γ□□•Å_[¨¨ Ãjm„wô□<#7□G□(é¤f·ÇW]DHÒ□□"ÇŒÑ!!ûØbj£s1–
‡ÿÕ—Œp¢ipH†ß•EZ#Pd"~□ækv1g;7dNÈ„Lr_□7lR□Z]§□-r>□□□æ—p¾³z□G0š‡-8†Q̂‰Ïás□ôg¡Öy□rKÕd□¿□,u·†8 \6□o□^®e"ëØ1 ³‡ eVWD:ù-¡□
□v×ˮq¶Yó5t{6„eBgÈ†9™ ±GuÔR□*¦R€:³ZÐÄ]+ç¨ì□w¡È¨□ùw¸ç•ˮTŽ*h{,((ç‰þ„—Q">Z9□—w<Ú¶[7æM□eoˮE} æŽyÆ6)ÅJLùGk□ON)¸é(o□
EÃˮ‰Qå□‰ObD™ èw<¢äb□Fˮç□›ÿc¹"ƒ7Iÿ'bÚæˮCƒ2º9—©Åuº„[â¥"—‡Æb`æ9ƒÉe□ÉXxij«HJ÷"lÖ¶•0£;PÅˆ„„q□IGÆi€0$fØøvVÉYBùaÿUX\ïV$Tm□¶RÖ
‰o//–'/□,]†G□Æ‰øvƒ'9□qè…öH\ˋÙ¨□Ù"#¹□=¹l𝜇¤FŽõ€'ÿò*.G^³H•éU□û l<§—Ó×Ÿûô@ÁÈg9ˋˆ<åŠê!sõq[□–¡Ù-%Ø~Ã—IÉ)ž•Vd5¶„)ì‰Åâ^□

□§°□œc†£ïUÙÂûÑ;n+ÕÒ¬Pj¬†jê£yìÚöaÈR'¯v-xÿ6êGâ–9\\E—□aÛNmÚ>Ìþ«û¼Ä□•÷…Þ¢ÚmI~Óë°FQa%□ZöœEÎW5©□ã
□ yLhÃÂbÄþŸx'ãÿ™ Îú±hç®®÷¯íûÑHuÍ□Ô□l□úí^ÖÉ²®îŽ#Ñ'(mõîî□›ÈÍç§Ý.□Á'ðÊn³.o³6êŸ6¡lM.æ9□□Jîô1/öf önoÝ□c7–^"ÃòmŠMîY)+÷š[ë&/i□æ²)Ë
□'çëô□oÖ□ïG…#0¡/ÿöFÿB¥öR]ìýû□.ï6žåPª□&kóŽ+□ 0§B06F õY©_ÒïNÒè¥2Uö&î□G«´ÿzp□□$ÎÒjø,$€Ùa—,¯□3e Ep¦¶ð□‡,÷Žcß□ðú□
ßu€–¢Èxå.ß°.ïÎ êê,□□qð¢j Û ä6]□fÕ□ë+ÈíŽÉ^a¬â□Ç¢Û□±þU/Ó□mßÂï Fñ ¾¦ÀR1\êïõ'³fñW~_□F]fQñ /¯□□□□ì<âZÀr"z‰°□ß–£qÂÈ§â.ñ□
–/êMÏhAlì>0xJ°?®$«oÐ□ò□<&æçì§'¾ ¨Úá¢}ë□Ê°Óæ^·□*□qo»ãó³!/£Ý~²…%–□ÚèSžr ÒŠîÔ&Â²FÅŽ?]¬□Çè+Cg,□ï7v†õÿÂ¬¼áôQF,&êk□¿'0ÃÛ§m
□$_Ê o "Ï)2«X\ñΟ□î□[rÏhhrM□Nq¹Åðâ"¨□□¢□ã'fvîÍAâØ,³Øj9ûk□ÆðUJòd□ñÚí£:ï¥ÈRM:¿o®¯mî®*þ□ëÞ/é'-Ýâò6®¦ib±F>e"@³X□XŽ^¯BZI□®ã□
¯ìá®……êãï□k]~Rg^n%□□ó î°□ò K>o>¡4PBt†©fMJÕ#¦«(á*…^²e2uÝªg\ ¥³n-O3%□çf´vóèž.7U¯□ßâ(ê² ›2†ž°= ð!‹âŸUµGmPÆ±1õ'´¯7C}±]+ò□Ñœ□□
ÌQ□_"àÅþõe~□5#¢2ÿ´ x³ÓéÌxãϵ4ùòs÷ž¡Í!□ã□¯ž□°ëñõÿ,´RÙ»Îÿ¥\ÃåNså-¶=□)f Ýv2¯Z-N÷h¯Ø□æ~0P·6,#ßh‡Õ>gú¢v□ÛŸRÃÇ"□¦6Sp)µgë5Èîtn‹.Ð[®Å
□]□-.^¯²b²sî:©f÷æ¶ò□¥u›iÜ [U¸Â¬^— .qè□;¢»Æ´)½·9ÛârgrG□)t[ÝêöOV†wq"fp_w[+l%ëqHGi}—2TOð!Êï[C¡bß†\[3ª3ÜE®€□¸k÷ñl□1[w8';sOÃ#
‰âÐIç□ªa8cMjjZÒjSêâ□ò bWÚ7r7/§PÌ□B«[£xkBö]ÈÔ□{a,O"lÓx□□ùYoï"'ÿvbßö~ÙT -mÛ¶W"ÿvÓ†°/□¹v□swÁpy;·NÒèü¼.□«__Yðog8'w9—³¹–Ç3□Î³Ü
□thÒb÷□5=ZwLf□vp□·7&□:œÛvµIi"ßìUk z3°¿¡·ç□5x¿xX□ù0ÿï—¯2íxÛX+qÃU ŒÆirW±p□°Ÿ¥#u©óïäÅxF~□wÉy®´z□¡«›Ò©x°x°¯+åÐ™ l^Îy"□ö§
□¢q+ú□»±qzûñ:#ªŽž•ó,□(□RY?°Vïö~›ž²wÓÑÅ®CÚ¹□¿ªÒ:ð´?ºµ—{ Šw=²å°fùÙrúk[™ □¾¯l Wð¬›ÿûÆ³oû®µ¦□ÚÍYZ¢S¨")Dââ¯æ_Ö{´ã;§‡zŽj¢†Šß³U
,OÒd#Üh□-6Üs/À3l□›ª¿»9□□□ÏQ‰JÙˆ ygÔ□Ñà¸zûsªÐ6¨ŒîÂgd¾1@ªn□QPßµBêYk¨úª²,»úºµñ¶ÂÍ<lŸãú…-ç□äŽx½□X□± +'0¯û¼*Sû
□!nK{<³h´µ¯Í¿ÈÓ—¬ö'¨³ä°»šE□"Ø□$5µ¹ŸÌÙ+h¦§=®pø±µLæhfïÿ‰™ □¼"<Å□w□?ÇP†8Ì·å'Cdßkùv¿1;Ý¬œê$A Vµãaº3ã"W□Ü³VlÙû¹¬6ÕÈé¼ÛKê□□Ú
ÿ¸½¹ÇÈ&Ž»/æÒ}•öÜã8KÕ•¶¾ú"Ÿ¹¯÷aÒ¯}™ ÛØ¥□Q}ÝÿÔ¹□a66ó‡6YU□uª□=0mþ1#□G□áçz□Ú¾a½kîß>E¿&ÿ[¾-M ü
ÿµ£ZÂâqÌxø¯™ žù{dÛ€□É'¦…Ë2@0□€@,□□□(hP!Åf□□Ft¯□"Å… +fÕ,'cG□A†□ÙQbÄ'&G~œ¸QbÊ†□Q¦DØÒ#Ðš5®dùR'K›1A—□*²dÂ‹□'&}it¢Ð›
‡"':•jU—ECFµÊ□êÌž$□2<ùó«F¬Yµš}ZsJ¡WÃ2\y□£R°ÿGã–å°•o¸Vé²õê7°O¯z3Æ•ê5ocÇ□!GNë¶pP"1ï¾Ý[÷ Å¼□A‡□MU¸ØÒ}□{ölÚôð¶<%Ç—=;îTÍ–/
–ë°œæÝ»aß=œxq¢□SSvÝyµÌÊÇfÉ¶[ep·Óá ïš{®XÅœ}3=›Ûxyó,¸1□$Ý"uE□ËÝŸ…Þ61Üöñ©ã¨ï□ûX§ÊÙ/'Ý€*□À·à;OÁ□ý3□<µØÃ-¾□k
□+?°.Ä□>÷úëªCÜ□Ð>‹Â□ê?Ú–bPÅ□¯Kq3´□»oÂ e□O»×6T-Gá³¯FŒö□ìÆúLÃ,ÀçhãïA□™ <□¦ž□ÿ3ï«ä~,□Ð□ÑÊ□¿¹âR¡□Õ□
SÈånÔî¿1%SªÉ5YÌ□3□{sm& ã‚ë9"‡ÓKÆÈ ãóG¯RJAWKêÌ aD´®□Ùl44□mêì½8A¯□-□äÊ>s—â1¹mªÐ~f□÷±ªÕ¨é™ õ;šéî□þþÛhE{úº
□›Ãúç□OnÕPléLs¶OÙí°¶»nv4Ê¯ÚS□b¸¿47e$!Õé¡□í3ïÿŠ<Òì6□[4ÚÇý6□I:1Ç°q□#d×sjf□4o·ç\□/õ□üXPP□t0–]5²é¸?°=ÔÐWúÛ8%uÝÿRÕW□œõÀaºTsß
□÷qî¯□ÆyrtuG□Áâ‡□x'c•lb[¯7öp□Ã□¿à›?□Ûâ3¿>v¼l_Z},öšãZÅ÷øáòIïöè ÀßÍÅ¦×ö=¢Ö¬À ª□î°¡?Y□□jÿcP±□G¹õ!F]Ý□ÛäÊ³Ã?QÑ□□þ3ºh>□
MGpÇ³"òÄ¥¨S□+a+,L□=□¥)e*,,kºÖÉˆ·□ Np,,#+ß□-6žÑñ0noÊž»jÈ¤Ô□sG´Ð½d□-—=ñ‰SkÚúZ‡>□z‡9;LâzÎÖ¾4ÿÎ¢þ«Ò□UV¹êÉj‹Õcc□Ñ□®□åP{k¦ì'Ö
□ÃÝ«n´é3Šö Œ□Ç□õëuZ4¤Îú‡Ç¿éÑjb□^ûZ×E8 □CY²#□{‡FEòp"VËÜ#%□Ê"Rr□#ò□ñ□ÙÄ□ªŠlR¡úÊeº6Óoq□«$%tèØ·KÊE'¶Tc'-÷Ê$□È□¶râ□
o%ž¸J²‹ÌTe2f%Â V:ð€IÉ^¬l Mü¬¯□}$#Y´9¨•U3œ‹¹]9IÈMprï¬"¼ã4□6DtrkžBÃ¦Ýš–ÍrÊ□zü¬ç?□¬™ °□ ˆÛJšPÈÑMÝ EÏ□gçP‰ª¨Š□]Ñª.hQ□n"£□fGA□
RRÂS¤·;post□
qÀ□+XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
è~ÍÛqÀ□+á÷³o'Ö´âôŒI+Gÿ€jcat `EÇ¹□PÉëL³□§€´ãô‰á?àLè~ÍÛqÀ□+á÷³o'Ö´âôŒI+Gÿ€□ÿÿþaux 6SURL.http://www.soi.city.ac.uk/~gespan/rq/rq17.html