

QRE CENTER NEWSLETTER

vol. 2, no. 2

Fall 1998

Quality & Reliability Engineering (QRE) Center

NSF/Industry/University Cooperative Center - Rutgers University & Arizona State University

New Quality & Reliability Books by QRE Faculty

Software Reliability by Dr. Hoang
Pham, Rutgers

The book, available through Springer-Verlag, provides a general introduction to software reliability engineering and presents detailed analytical models, state-of-the-art techniques and methodologies to assess the reliability of software systems. The book also provides a new research direction in which the field of software reliability engineering is headed, by including a new software reliability model with environmental factors.

**Applied Statistics and Probability
for Engineers** by Drs. Doug
Montgomery & George Runger,
Arizona State

From John Wiley & Sons, this is the 2nd edition of this comprehensive text used by many practicing engineers.

Engineering Statistics by Drs.
Doug Montgomery, George Runger
& Norma Hubele, Arizona State

Available from John Wiley & Sons, this is a more concise text focusing on key topics.

INFORMS forms Subdivision on Quality, Statistics & Reliability

The Institute for Operations Research and the Management Sciences (INFORMS, formerly ORSA/TIMS) has formed a new technical subdivision, the Quality, Statistics and Reliability Section. The goal is to provide a forum for discussion and interaction among individuals having an interest these fields.

Tracks sponsored by the Quality, Statistics and Reliability Section have been organized for the upcoming meeting in Seattle (Fall 1998) and future meetings in Cincinnati (Spring 1999) and Philadelphia (November 1999).

The new subdivision has a web page. Go to www.informs.org and look for subdivision/sections. If you would like to be kept informed on the activities of the section, please add your name to the list of potential members.

The Acting Chair of the Quality, Statistics and Reliability Section is Prof. Jan Shi from the University of Michigan. Prof. **Susan Albin** of Rutgers University is Acting Chair of the section's advisory board; Prof. **E. A. Elsayed** of Rutgers and Prof. **Doug Montgomery** of Arizona State University are members of the advisory board.

News from U. S. Army ARDEC, Picatinny Arsenal

ARDEC recently received the US Army's 1998 Large-Center R&D Excellence Award by measurably demonstrating outstanding achievement, vision, strategy, resource utilization, and continuous improvement. This recognition distinguishes ARDEC from its peers and enhances the reputation of its parent organization, the Tank-Automotive and Armament Command, throughout the entire DoD R&D community. As part of its quality culture, ARDEC is currently in the process of competing for the prestigious 1998 Quality NJ Award.

Plans for a Picatinny Quality Day '98 are getting underway. Replies are awaited from the two invited speakers, one a Q&RE expert, and the other a high-ranking DoD official. The tentative dates are November 10th or 12th. For details contact Sid Markowitz: sidm@pica.army.mil. All QRE Center members are entitled and invited to attend.

The first phase of the People Sensitive Processes project has begun. The project, underwritten by several ARDEC customers, including the Project Manager for Tank Main Armament Systems, was funded through the QRE center, with Professor Coit as the principal investigator. The output of Phase I will consist of an extensive literature survey on the subject of Human Error and the various Performance Shaping Parameters known to be operative in manufacturing environments. Phases II and III will respectively consist of identifying and implementing improvements deemed applicable to a particular tank ammunition facility.

Singpurwalla presents QRE Seminar on Burn-in

Dr. Nozar D. Singpurwalla of The George Washington University presented a QRE seminar at the Rutgers campus in Piscataway, NJ on September 11, 1998. The title of the seminar was "Burn-in and the Anatomy of Decreasing Failure Rates." Singpurwalla argued that the purpose of burn-in is largely psychological and not the physical improvement to a unit.

Next QRE Meeting - October 19-20, 1998

The third QRE meeting will be held on October 19-20, 1998. The meeting will be held at the Rutgers campus in Piscataway, NJ. On October 19, Drs. Chun K. Chan and Michael Tortorella of Lucent Technologies will present the short course, "Design for Reliability," to QRE Center member companies. Each company can send as many representatives as they wish to attend the course. The meeting will also feature status reports on the research projects.

QRE Center Activities

- Dr. **Douglass Montgomery** of Arizona State was the keynote speaker for the Business and Industry Section at the Royal Statistical Society meeting in Glasgow, Scotland on September 7-11, 1998. He presented a paper titled, "Experimental Design for Product and Process Design and Development." Copies of the paper are available from Dr. Montgomery at doug.montgomery@asu.edu.
- Dr. **Mohsen Jafari** of Rutgers is the General Chair of the 1998 IEEE International Conference on Systems, Man and Cybernetics being held October 10-14, 1998 in San Diego, CA. There is a track dedicated to quality and reliability with three sessions. Invited papers will be given at the conference by Drs. **Tayfur Altioik**, **Mohsen Jafari** and **Elsayed A. Elsayed** from Rutgers.
- Drs. **James Luxhoj** and **David Coit** of Rutgers presented papers at the Probabilistic Safety Assessment & Management (PSAM 4) conference in New York, NY on September 14-18, 1998. Dr. Luxhoj's paper was titled "Risk-Based Decision-making for Aviation Safety Using Bayesian Belief Networks." Dr. Coit's paper was titled "Reliability Optimization Considering User Risk & Reliability Estimation Uncertainty."
- Dr. **Hoang Pham** of Rutgers was the General Chair for the Fourth ISSAT International Conference on Reliability and Quality in Design held in Seattle, WA on August 12-14, 1998.
- Dr. **David Coit** of Rutgers and Dr. **John English** of the University of Arkansas will present a tutorial at the 1999 RAMS conference in Washington DC on January 18-21, 1998. The tutorial is titled "Intelligent Use of Regression Analysis."

Call for Papers

ISSAT International Conference on Reliability and Quality in Design

August 11-13, 1999, Las Vegas, Nevada

The Fifth ISSAT International Conference on Reliability and Quality in Design is an international forum for presentation of new results, research development, and applications in reliability and quality in design. Papers may address any aspect of reliability and quality in design. Papers dealing with case studies, experimental results, or applications of new or well-known theory to the solution of actual reliability and quality problems in engineering design are of particular interest.

Topics of interest include:

- reliability
- modeling analysis and simulation
- fault tolerance
- quality assurance
- optimization
- software reliability and testing
- quality cost
- maintainability and availability
- data collection and analysis
- human factors and reliability
- concurrent engineering and design
- performance analysis

Three copies of the papers (maximum 15 double sided pages) should be submitted by February 15, 1999, to Program Chair:

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Phone: (248) 576-0167

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Rutgers and U. of Arkansas Receive Grant from Army Research Office to Study Quality

A recent grant titled "Statistical Process Control of Processes Generating Time Dependent Data" was awarded to Rutgers and the University of Arkansas. The grant was from the U.S. Army Research Office for \$330,942. The principal investigators are Drs. John English and Terry Martin from Arkansas and Dr. Elsayed A. Elsayed from Rutgers.

Rutgers IE Department Working Paper Series

The Rutgers University Industrial Engineering Department maintains an active working paper series of technical reports authored by their faculty. Recent quality & reliability papers are as follows.

- 98-101 Gamma Distribution Parameter Estimation for Field Reliability Data with Missing Failure Times, D. Coit/T. Jin
- 98-102 A Data Depth Monitoring Scheme for Aviation Safety Data, A. Cheng/R. Liu/J. Luxhoj
- 98-104 An Applied Cognitive Task Analysis of Aviation Safety Inspectors, D. Horowitz/J. Luxhoj
- 98-105 Applying Available Computer Tools to Maintenance Diagnostics of Mechanical Handling Systems: A European Technology Finding Its Way to the U.S., J. Luxhoj
- 98-107 Cold-Standby Redundancy Optimization for Nonrepairable Systems, D. Coit
- 98-108 An Intelligent Computer-based Tool for Evaluating Aircraft Accident Causation J. Luxhoj/ D. Arendt/T. Horton
- 98-110 Neural Network Modeling of Aviation Safety Field Studies, J. Luxhoj/J. Cheng
- 98-113 Accelerated Life Testing Using Proportional Hazards Model and Its Extensions, E. Elsayed
- 98-115 A Software Risk-Cost Model, H. Pham/X. Zhang
- 98-116 A Multivariate Control Charting Scheme for Aviation Safety Data, A. Cheng/R. Liu/J. Luxhoj
- 98-117 Forecasting of Safety Trends for Aircraft Operators, J. Luxhoj
- 98-120 Control Policies for Material Flow in Bulk-Port Marine Terminals, S. Dipsar/T. Altiok
- 98-122 Neural Network Forecasting of Service Problems for Aircraft Structural Component Groupings, L. Nordmann/J. Luxhoj
- 98-123 Optimizing Multiresponse Experiments Using the Accuracy of Prediction as an Optimization Criterion, F. Fogliatto/S. Albin
- 98-126 An Accelerated Degradation Hazards Model, G. Eghbali/E. Elsayed
- 98-127 Linear Trend Detection Using X bar Trend and Cross-Correlation Control Charts, M. Gultekin/J. English/E. Elsayed
- 98-129 Maximization of System Reliability with a Choice of Redundancy Strategies, D. Coit
- 98-130 A Bayes Predictive Analysis for Describing Software Failures, L. Pham/H. Pham

These reports are available to the public by contacting Ms. Cindy Ielmini at (732) 445-3654 or by email at ielmini@rci.rutgers.edu

Calendar of Events

INFORMS National Meeting
October 25-28, 1998
Seattle, WA
Contact: INFORMS Seattle, 2 Charles St., Ste.
300, Providence RI, 02904
Phone: (800) 343-0062
EMail: meetings@informs.org

Annual Reliability and Maintainability Symposium
(RAMS)
Jan 18, 1999 - Jan 21, 1999
Washington, DC
Contact: Dr. H.N. Hartt, Tracor Systems
Engineering, 400 Virginia Avenue, Suite 825,
Washington, DC, 20024
FAX: (202) 646-6398
EMail: hhartt@vitro.hq.nasa.gov

1999 International Reliability Physics Symposium
(IRPS)
Mar 22, 1999 - Mar 25, 1999
San Diego, CA
Contact: Allen G. Street, 1999 IRPS, Integrated
Reliability, 10225 Barnes Canyon Road, Suite A-
100, San Diego, CA, 92121
Phone: (619) 658-9770
FAX: (619) 550-9445
EMail: alan@irsi.com
Link: <http://www.irps.org>

Third International Congress in Quality and
Reliability
Mar 25, 1999 - Mar 26, 1999
Paris, France,
Contact: ENSAM Paris/Laboratoire CPN, Conges
Qualite et Surete de Fo, 151 Boulevard de
l'Hopital, 75013 Paris, France,
EMail: refereq@paris.ensam.fr

Contributions to Newsletter

For contributions to the newsletter and information,
please contact:

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Rutgers University
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FAX: (732) 445-5467
Email: coit@rci.rutgers.edu

53rd Meeting of the Society for Machinery Failure
Prevention Technology
Apr 19, 1999 - Apr 22, 1999
Virginia Beach, VA
Contact: Henry Pusey, MFPT Headquarters, 4193
Sudley Road, Haymarket, VA, 20169
Phone: (703) 754-2234
EMail: hcpusey@ix.netcom.com
Link: <http://www.mfpt.org>

INFORMS National Meeting
May 2-5, 1999
Cincinnati, OH
Contact: David F. Rogers, U. of Cincinnati, P.O.
Box 210130, Cincinnati, OH 45221-0130
Phone: (800) 343-0062
EMail: meetings@informs.org

Industrial Engineering Research Conference
(IERC)
May 23-26, 1999
Phoenix, AZ
Contact: Don Taylor, IERC8 Program Co-Chair,
4207 Bell Engineering Center, University of
Arkansas, Fayetteville, AR 72701
EMail: gdt-ierc99@engr.uark.edu
FAX: 501-575-8431

QRE Projects

- System Reliability Models With Uncertain Component Reliability Estimates - Project Director: Dr. David W. Coit, Rutgers
- Multivariate Process Monitoring and Control - Project Director: Dr. Douglas C. Montgomery, Arizona State University
- Statistical Methodology for New Product and Process Development - Project Director: Dr. Douglas C. Montgomery, Arizona State
- A General Reliability Model for Accelerated Life Testing - Project Director: Dr. Elsayed A. Elsayed, Rutgers University
- Multivariate Control of Batch Processes: Initial Stage - Project Director: Dr. Susan L. Albin, Rutgers University
- Electronic Manufacturing Processes and Reliability - Project Director: Dr. J. Bert Keats, Arizona State University
- Software Reliability and Development Models - Project Director: Dr. Hoang Pham, Rutgers University