

Reliability Society

NEWSLETTER

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President's Message



Dear Reliability Society Members,

This is my final correspondence with you as the president of our IEEE Reliability Society. In 2009, Alan Street will take over the leadership team and the day-to-day business of our Society. I thus bid farewell and I congratulate Alan and I wish him the best. Please support Alan during his term as you have supported me these past three years. I can be reached at [wtoniti@ieee.org](mailto:wtoniti@ieee.org) for any questions or comments you may have.

**ADCOM Elections:**

First and foremost I would like to share with you the results of the society ADCOM class of 2009-2011 elections. The winners are:

- Scott Abrams
- John Harauz
- Philip Laplante
- Alfred M. Stevens
- Alan Street
- Scott Tamashiro

**Congratulations to all!**

Rounding out, the officer slate for 2009 is:

**President:** Alan Street.

**Vice Presidents:** Louis Gullo – Publications, Dennis Hoffman – Membership, Alfred Stevens – Meetings, and Samuel Keene – Technical Activities.

**Junior Past and Senior Past Presidents:** William Tonti and Jeffrey Voas.

Alan has also made the following officer appointments for 2009:

**Treasurer:** Richard Kowalski

**Secretary:** Marsha Abramo

I would also like to once again thank those who are presently serving in the 2008 Vice President positions: Alan Street – Publications, Jeff Clark – Membership, Marsha Abramo – Meetings, Sam Keene – Technical Activities.

A special thanks goes out to Christian Hansen our secretary, Dick Doyle our treasurer, Lon Chase our newsletter editor, Way Kuo the editor-in-chief of IEEE Transactions on Reliability, Jason Rupe the managing editor of IEEE Transactions on Reliability, Scott Abrams the business manager of IEEE Transactions on Reliability, Tony Oates the editor-in-chief on Transactions on Device and Materials Reliability and Bret Michael our newly appointed co-editor of the now joint Computer and Reliability Society magazine IEEE Security and Privacy, Building Dependability, Reliability, and Trust. Finally, I wish to thank our past presidents Jeffrey Voas and Dennis Hoffman for all their advice, counsel, friendship, and their unending service to the Reliability Society during my tenure as president.

**New IEEE Senior members and IEEE Fellows:**

The following individuals have been elevated to IEEE senior member or IEEE Fellow. The Reliability Society wishes to extend its congratulations to all for the well deserved honors you have been awarded!

An IEEE Senior Member is the highest grade for which IEEE members can apply. To be eligible for application, candidates must:

- ◆ Be engineers, scientists, educators, technical executives, or originators in IEEE-designated fields;
- ◆ Have experience reflecting professional maturity;
- ◆ Have been in professional practice for at least ten years;
- ◆ Show "significant performance" over a period of at least five of their years in professional practice.

2008 Reliability Society Members Elevated to Senior Member;

Scott Abrams, Region 1, Long Island Section  
Earl Hill, Region 4, Central Indiana Section  
Steven Hunter, Region 6, Eastern Idaho Section  
Thomas Basso, Region 5, Denver Section  
Sridhar Canumalla, Region 5, Dallas Section  
Levent Sipahi, Region 5, Dallas Section  
Lina Margareta Bertling, Region 8, Sweden Section  
Kedar Patel, Region 6, Santa Clara Valley Section  
Bryan Root, Region 4, Twin Cities Section  
Raed Abdullah, Region 7, Ottawa Section  
David Verbitsky, Region 1, Princeton / Central Jersey Section

An IEEE Fellow is one of IEEE's most prestigious honors. The IEEE Grade of Fellow is conferred by the Board of Directors upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest. A brief citation is issued to new Fellows describing their accomplishments and the total number selected in any one year does not exceed one-tenth of one percent of the total voting Institute membership.

2008 Reliability Society Members Elevated to Fellows

Dr. William Tonti, cited for contributions to semiconductor memory reliability  
Dr. Jose Maiz, cited for contributions to reliability of high performance microprocessors

**IEEE Security and Privacy: Building Dependability, Reliability, and Trust**

All Reliability Society members should now be receiving an e-mail that directs them to the digital on-line subscription to the IEEE Security and Privacy magazine. This subscription is free for all Reliability Society members. If you are not receiving this e-mail, please send a note to our Publications VP, Alan Street so he can correct this ([astreet@qualcomm.com](mailto:astreet@qualcomm.com)). The content of this e-mail is at the end of this discussion.

The Reliability Society 2009-oriented content launch for our portion of this magazine is presently in process. Please submit your original contributions or suggestions for dependability, reliability, and trust to our Editor, Bret Michael ([bmichael@nps.edu](mailto:bmichael@nps.edu)), who is now working on the content rollout. This spans all hardware, software, skinware, transnational public as well as private policies and laws that form a trust equation.

This is the email content for the digital subscription:

*This note is your reminder that this month's issue of Security and Privacy is available to view or download. Click the link below to view in your browser:*

<http://www.qmags.com/2FE1161B16C067D81115DEB03131435912FF148A59.htm>

*Click the link below to Download Qmags PDF*

<http://www.qmags.com/2FE1171B16C067D81115DEB03131435912FF14FC81.htm>

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<http://www.qmags.com/2FE1151B16C067D81115DEB032FF14C80A.htm>

*We hope you find this month's issue useful and informative.*

**The Center for National Software Studies:**

After a decade of operation, first as the National Software Council (NSC) and then as the Center for National Software Studies (CNSS), the CNSS (<http://www.cnsoftware.org/>) believes that the time has come to cease operations as a separate organization and to align its interests with mainstream IT / Computer/ Software organizations addressing these interests in the software domain.

Accordingly, the CNSS will take the necessary steps to dissolve the CNSS with an orderly closeout of the organization's structure and its program.

Consistent with an orderly transition of the program and following discussions with Dr. Jeff Voas, the CNSS, after payment of all outstanding debts and liabilities, will offer the residual CNSS funds be donated to the IEEE Reliability Society intended to support the Reliability Society's involvement in Security and Privacy Magazine. This publication focuses on the broad systems issues associated with the term Trustworthy Systems, the mainstay issue of the CNSS. The Reliability Society thanks the CNSS for this generous donation and we welcome their future contributions to Security and Privacy.

**Distinguished Lecturers Program (DLP):**

The IEEE Reliability Society has had a Distinguished Lecturers (DL) Program for many years. It was informally administered, and funding for the program was often based on ad-hoc decisions. This year (2008), the Society AdCom made a decision to formalize the program by appointing an Ad Com member, Dr. Irving Engelson, as the DL Coordinator and to budget funds for the 2009 DL Program. A DL Program policy is being developed and will be presented for approval by Ad Com in early 2009. The proposed policy will define the qualifications to be a DL and the selection approval process. The primary function of the DL program will be to provide distinguished lecturers to Reliability Society (RS) Chapters and to university sponsored IEEE seminar events. Inquiries from RS Chapters on the DL program and from prospective DLs may be address to the DL Coordinator Dr. Irving Engelson at [i.engelson@ieee.org](mailto:i.engelson@ieee.org). Dr. Engelson will continue to broaden the DL speakers' list. If you have an interest in becoming a Reliability Society DL or you would like to review the DL list, please contact Dr. Engelson.

**Reliability Society Awards:**

The Reliability Society has two achievement-oriented IEEE awards that can be awarded annually. One is entitled the "Engineer of

the Year", which is intended to be awarded to an engineer who has made significant contributions in Reliability Engineering within the last three to five years. The second is entitled "Lifetime Achievement Award" and is intended to recognize an individual for sustained achievements in the discipline of Reliability Engineering throughout his or her career. For more information regarding the award requirements, please navigate to the RS home page or contact Dr. Jeff Voas directly ([j.voas@ieee.org](mailto:j.voas@ieee.org)). This year there is a recipient for each award. The Engineer of the Year Award will be awarded to Dr. William Tonti of IBM, and the Lifetime Achievement Award will be awarded to Dr. David Trindade of Sun Microsystems in January 2009. Congratulations to William and David!

#### **Reliability Society Chapter Awards:**

The 2007 IEEE Reliability Society Chapter Award results are as follows:

**First Place:** Boston

**Second Place:** Singapore

**Third Place:** Italy

**Fourth Places:** Baltimore, Cleveland, Denver, Japan, Ottawa, Taipei/Tainan, Twin Cities, UK/R I

Congratulations to all the Reliability Society Chapters that participated and thank you for all your hard work!

Our Society Chapters are your local branches to the Reliability Society and the Reliability Society's outreach to its members. The chapters are your local link to the valuable resources available from the IEEE. Chapters consist of members who share technical interests and geographical proximity. Chapters provide Society members with valuable opportunities to network at a local level enabling their personal and professional growth. Chapters have technical activities which provide learning and knowledge expansion to our members.

#### **Chapter Locations:**

This is a listing of our present Reliability Society Chapters. If you are in one of these areas, please support your local chapter and attend their technical meetings. Welcome to our newly formed chapters and thanks to the local members who proactively worked within their local communities to establish these new chapters.

- Baltimore
- Binghamton (Joint with AES and TM) **(NEW - 2008)**
- Central New England Council (Boston)
- Chicago
- Cleveland (Joint with IM, AES, IE, and EMB)
- Croatia **(NEW - 2008)**
- Dallas
- Denver/Pikes Peak (Joint Chapter)
- France
- Italy
- Japan Council
- Mohawk Valley (Joint with EMC) **(NEW - 2008)**
- Ottawa
- Philadelphia
- San Diego
- Santa Clara Valley
- Singapore (Joint with CPMT & ED)
- South Plains **(NEW - 2008)**
- Switzerland
- Taipei / Tinan (Taiwan) (Joint Chapter) **(NEW - Nov. 2007)**
- Toronto (Joint with TM, E, PC, and SIT) **(NEW - 2008)**
- Twin Cities
- UK & RI (Joint Chapter with CPMT)

The Reliability Society requests that the Chapters provide articles covering their local activities to Lon Chase, our RS Newsletter Editor ([l.chase@ieee.org](mailto:l.chase@ieee.org)). Lon also has a standing call for Chapters to place their upcoming agendas / activities in the RS Newsletter / RS home page.

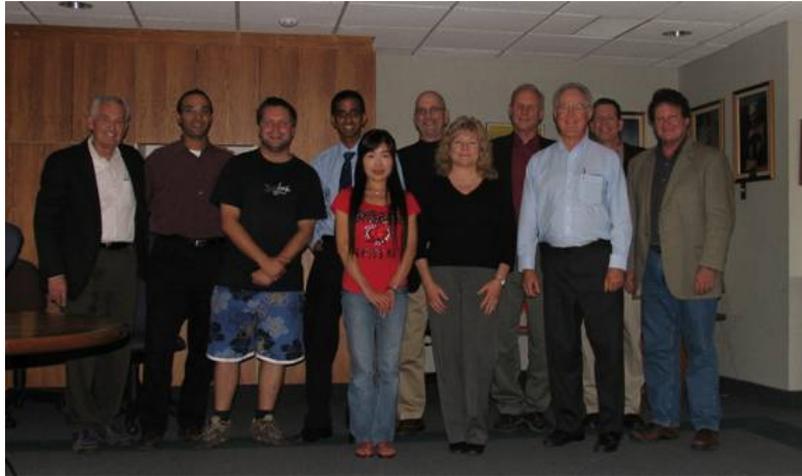
#### **Graduates of the Last Decade (GOLD):**

The Reliability Society continues to support GOLD through university scholarships, best student paper awards, and Society student outreach university seminars.

The Reliability Society sponsored three Student Outreach Symposia in 2008. The first was held at the University of Arizona on Thursday, April 24, and featured Dr. William Tonti with a presentation on the engineering behind obtaining a U.S. patent. On May 29-30, the Reliability Society held a joint symposium at the University of Padua, Italy. The event was entitled: "System and Device Reliability in Nanoelectronics Reliability" and featured presentations from both RS members and local subject matter experts. This was sponsored with the department of Information Engineering at the University of Padua. The symposium was very successful with over 150 of their best and brightest students in attendance. On September 25, the Reliability Society collaborated with the IEEE Ottawa Section to cosponsor an event at the University of Ottawa and also at Carlton University entitled "Systems Reliability in the Nanoelectronics Era". The invited symposia speakers and their presentation titles at this last symposia were:

- Dr. Samuel Keene, "Developing world class products with Design for Six Sigma Tools"
- Dr. William Tonti "The Electronic Fuse"
- Mr. Alfred Stevens, "Safety and Reliability on the NASA Space Shuttle"
- Ms. Marsha Abramo, "Focused Ion Beam Technology and Applications to Microelectronics"
- Mr. Alan Street, "Early Problems with Lead-Free Solders in Cell Phones"

Shown below are some of the students and society presenters who stayed through the entire day of presentations.



If you have an interest in a Reliability Society sponsored student seminar at your institution, please contact Alfred Stevens at [astevens@ieee.org](mailto:astevens@ieee.org).

The Reliability Society promoted two GOLD awards at conferences this year:

The International Reliability Physics Symposium awarded the best GOLD student platform paper to **Jason Campbell** of Penn State University. His paper was entitled "Density of States and Structure of NBTI-Induced Defects in Plasma-Nitrided PMOSFETS," The Co-authors include Prof. P.M. Lenahan of Penn State University, and A. Krishnan and S. Krishnan of Texas Instruments".

In addition to the best student paper award IRPS awards the overall best paper and poster awards. This years award recipients are:

The IRPS Best Paper Award is "Quantum Mechanical Treatment of Si-O Bond Breakage in Silica Under Time Dependent Dielectric Breakdown Testing," by **Joseph McPherson** of Texas Instruments.

The IRPS best poster award was presented to **A. Ditali, H. Le, D. Butler, M. Ingram and M. Ma** of Micron Technology for their paper, "Correlating Wafer-Level TDDB Lifetime Projections to HTOL Gate Oxide Failures."

The first annual International Conference on Prognostics and Health Management sponsored a technical competition with a Challenge to estimate the remaining life of an unspecified component using data-driven techniques. The Challenge data set consisted of multiple multivariate time series. Each time series was from a different instance of the same complex engineered system (referred to as a "unit"). Each unit started with different degrees of initial wear and manufacturing variation which were unknown to the user. This wear and variation were considered normal, i.e., it was not considered a fault condition. There were three operational settings that had a substantial effect on unit performance. These settings were also included in the data. The data was also contaminated with sensor noise. The objective of the competition was to predict the number of remaining operational cycles before failure, i.e., the number of operational cycles after the last cycle that the unit would continue to operate. The competition awarded the best GOLD entry solution to Leto Peel, which focused on "Data Driven Prognostics using a Kalman Filter Ensemble of Neural Network Models".

#### **RS Student Scholarships:**

The IEEE Reliability Society Scholarship Program provides up to five scholarships each year to qualified and deserving students. Selection is based on:

1. Involvement in IEEE activities.
2. Academic achievement with a preference to those who have demonstrated excellence in reliability.
3. Extracurricular activities related to academic / professional interests
4. Letter of evaluation by at least one of the instructors in a course with reliability content.

All five 2008 scholarships have been awarded. Congratulations are in order to:

- Vijay Venu Vadlamudi, a student at the Indian Institute of Technology in Bombay,
- Shravan Gaonkar, a student at the University of Illinois Urbana-Champaign
- Nagarajan Raghavan, a student at the National University of Singapore
- Amanda J. Taylor, a student at Christian Brothers University
- Narasimha Raju Nagaiah, a student at the University of Central Florida

Details regarding scholarship submissions, deadlines, and requirements can be found on the Reliability Society home page.

#### **Conferences:**

The following conferences sponsored by the Reliability Society are up and coming, or have just taken place:

**ESREF** September 29- October 2, 2008, Maastricht - The Netherlands  
*"European Symposium on Reliability of Electron Devices, Failure Physics and Analysis"*

**PHM'08** October 6-9, 2008, Denver, CO, *"IEEE International Conference on Prognostics and Health Management"*

**IIRW** October 12-16, 2008, Stanford Sierra camp, Fallen Leaf Lake, Lake Tahoe, CA "*IEEE International Integrated Reliability Workshop*"

**ISSRE** November 11-14, 2008, Seattle / Redmond, WA, "*IEEE International Symposium on Software Reliability*"

**HASE** December 3-5, 2008, Nanjing, P.R.China, "*The High Assurance Systems Engineering Conference*"

**RAMS** January 26-29, 2009, Fort Worth, Texas, "*Reliability and Maintainability Symposium*"

**ISQED** March 23-25, 2009, San Jose, CA, "*The International Society for Quality Electronic Design*"

**IRPS** April 26-30, 2009, Montreal, Canada, "*IEEE International Reliability Physics Symposium*"

**RSP** June 23-26, 2009, Paris, France, "*IEEE International Symposium on Rapid System Prototyping*"

#### **Reliability Engineering Projects:**

Below is a snapshot of the ongoing projects that are in progress. I encourage you to contact the project leaders to become directly involved.

#### **IEEE Reliability Society Certification Project:**

The IEEE Reliability Society attempted to partnership with the ASQ to update, refine, and jointly administer the CRE exam (Certified Reliability Engineer Exam). RS members responded to this call and twenty SMEs were ready to lend a hand! Unfortunately, the ASQ management decided against this partnership. As a result the IEEE Reliability Society has decided to pursue certification within IEEE. This project is now contained within IEEE and it first will require IEEE approval. Assuming this results in the affirmative the plans for this two to three year project are as follows.

The RS certification project will be divided into 3 or more groups each with a defined task leader and this is an invitation for you to become involved. It will be one of the largest projects that the Reliability Society has ever undertaken. We intend to model this after the software certification program developed by the IEEE computer society. They first developed a very large guide entitled "SWEBOOK" (Software Engineering Body of Knowledge) and they pattern certification around the information contained in the SWEBOOK. We will first develop a Reliability Body of Knowledge Book and then a certification process. This process may involve technical tutorials, exams and a formal procedure to administer the IEEE Reliability Certification. Our goal is to have this as an ISO Certification.

Several Body of Knowledge sections will have to be developed as Reliability is a very broad field that touches every aspect of IEEE. For example these sections may include the mathematical area of a Reliability Engineering BOK, Maintainability Engineering BOK, Software Reliability Engineering BOK, Medical Reliability Engineering BOK, Safety and Trust Engineering BOK, Electron Device BOK etc. The fields of registration will first have to be determined. We need your input and we are asking for you to contact our two team leaders: Jim McLinn <Jmrel2@aol.com>, and Alfred Stevens <astevens@ieee.org>, or the Reliability Society Project Manager, Dick Doyle [r.doyle@ieee.org](mailto:r.doyle@ieee.org). We will need more participants and team leaders as we intend to subdivide the BOK's into sections and then chapters where individual teams will work concurrently. Please express your willingness to participate as soon as possible. This is an exciting endeavor, and I hope that you agree.

#### **Standards:**

Our Standards Committee Chair, Lou Gullo ([Louis\\_J\\_Gullo@raytheon.com](mailto:Louis_J_Gullo@raytheon.com)), is presently working on 5 standards with Joe Childs, Scott Tamashiro, and the Standards Working Groups. If any RS members would like to be involved with the publication of these and other standards yet to be developed, please touch base with Lou.

This year, the IEEE Standards Board approved 2 new standards for the Reliability Society. These standards are IEEE 1633 and IEEE 1624. IEEE 1633 is the Standard on Software Reliability. IEEE 1624 is the Standard for Organizational Reliability Capability. IEEE 1633 was published in August 2008. IEEE 1624 is going through final editorial review and should be published in early 2009. Besides the development of these 2 new standards, the IEEE RS Standards Committee (IEEE-RS-SC) is also busy revising 3 existing standards, which are IEEE 1332, IEEE 1413, and IEEE 1413.1. Along with standards development, the IEEE-RS-SC has updated its Policy and Procedures to better formalize its processes for operation of the committee and its working groups. Also, this year, Lou Gullo, the IEEE-RS-SC Standards Chair has accepted a position on the Executive Committee for the IEEE Computer Society's S2ESC Standards Committee to enable co-development of standards between the Computer Society and the Reliability Society. The IEEE-RS-SC is contributing to the development of MIL-HDBK-217 which is sponsored by the Defense Standardization Program Office (DSPO) and Naval Surface Warfare Center (NSWC) Crane Division. The IEEE-RS-SC through Lou Gullo is providing IEEE data sharing capability to the 217 working group (217WG) by using the IEEE On-Line Community to host data repository services. Lou established a special on-line community for this 217 working group similar to the one which he set up for the ADCOM. Lou is also pushing to get the IEEE 1413 standard cited in the new version of MIL-HDBK-217 and increase the scope of reliability predictions in this handbook to become holistic in its approach and include all causes of system / product failures besides just part / component and interconnect failures. A detailed discussion on MIL-HDBK-217 is included in this newsletter. Please take a look at this.

#### **Technical Activities:**

The Reliability Society Annual Technology Report, a compilation of the technical updates in reliability is currently under development. Selected articles will be published in the IEEE Transactions on Reliability during the first half of 2009. Please consider submitting your work for the upcoming Reliability Society Annual Technology Report to any of the following folks: (In general if you have a doubt where to submit, send your inputs to Sam Keene and he will work directly with you)

Sam Keene, VP Technical Activities - [s.keene@ieee.org](mailto:s.keene@ieee.org)

Dennis Hoffman, Deputy Technical Activities - [dennis.r.hoffman@lmco.com](mailto:dennis.r.hoffman@lmco.com)

Japan: Shuichi Fukuda - [shufukuda@gmail.com](mailto:shufukuda@gmail.com)

Taiwan: Shiuhyng Shieh - [ssp@cs.nctu.edu.tw](mailto:ssp@cs.nctu.edu.tw):

Europe: Enrico Zio - [enrico.zio@polimi.it](mailto:enrico.zio@polimi.it)

Singapore: Sam Keene (acting)

Software Development: Robert Stoddard - [rws@sei.cmu.edu](mailto:rws@sei.cmu.edu)

System / Subsystem Development: Lou Gullo - [Louis\\_J\\_Gullo@raytheon.com](mailto:Louis_J_Gullo@raytheon.com)

System Foundation (Devices) - Aaron Dermarderosian - [AaronDermarderosianJr@raytheon.com](mailto:AaronDermarderosianJr@raytheon.com)

Also Technical Activities is looking ahead to providing reliability tools, standards, and guides for our members. We welcome your contribution to this effort also. These aids will be available via our web site and located in a members only data portal. Any artifacts you could provide or suggestions you would care to make will be most welcomed. Thanks for your help in this area.

**RS Yahoo Forum:**

This forum / discussion group remains quite active and is a current successful product. Please log onto the Society website and get involved!

**RS Video Tutorials:**

The Reliability Society has digitized its VHS technical tutorial library. If you are interested in learning more about these inexpensive learning tools, please contact Dr. Christian Hansen. ([c.k.hansen@ieee.org](mailto:c.k.hansen@ieee.org)). Presently the tutorial of highest interest is Accelerated Testing.

**EXPERT Now Modules:**

The RS continues to add new content into this IEEE educational venue. The newest module "Concepts and Models for Repairable Systems Reliability" is completed. If you have technical modules that you are interested in publishing to the IEEE community, please contact Alan Street ([astreet@qualcomm.com](mailto:astreet@qualcomm.com))

**Reliability in the real world:**

Last week, I had the opportunity to investigate a semiconductor reliability failure first hand. In the matter of a few seconds my rear projection TV which I normally watch went from just perfect to awful. After some investigation I determined that the horizontal and vertical convergence circuits (ie two amplifiers) were the failure points. It is worthwhile to point out the POH which the set had prior to failure. The set is 3 years old, and pessimistically it is used 2 hours a day. Thus early amplifier failures occurred at 2190 POH. The next step was to investigate a possible warranty repair. Both the store where this set was purchased and the manufacturer said sorry, the set was 1 year out of warranty. I then called a few authorized repair centers. The estimated repair bill was \$600.00 (US). Considering the original price for this set was \$1200.00, the repair cost did not appear worthwhile. I decided to debug the failure and repair this myself. It turned out google provided a wealth of information regarding these amplifiers. Almost all manufacturers use the identical amplifiers, and almost all fail within 4 years of operation. The chips are readily available and retail for approximately \$10.00 which includes shipping and handling. Considering the MTTF of these (Fig 1), I decided to mount them on a zero insertion force socket. Unfortunately I could not find an 18 pin socket (2x20 pins were readily available) and I thus mounted the larger sockets on elevated standoffs as shown in Fig. 2. The original chips are metal backed, and they are secured by two mounting screws to their respective heatsinks. Google indicated the OEM build of these typically neglected the use of thermal grease to assist in the heat transfer. This was in fact correct regarding Figure 1, ie thermal grease was not applied. My educated guess considering the heat sinks, high temperature operation and the failure mode, good one second, and bad the next is the failure mechanism is electromigration related. In the repair depicted in Figure 2 thermal grease is applied and the amplifiers retention screws were re-tapped into the heatsink. The thermal grease is evidenced by the white line on the back chip of Figure 2. This is the thermal grease residue that naturally oozes between the chip and the heatsink when properly applied. There is no such evidence in Figure 1. The end result: The new amplifiers work perfectly, the TV picture is as good as new! The total repair cost was approximately \$40.00 which includes the sockets, thermal grease, and the sockets. I also purchased a second set of amplifiers for three years down the road. I would hope the next repair will take 10 minutes versus the 5 hours to desolder and re-engineer the present configuration.

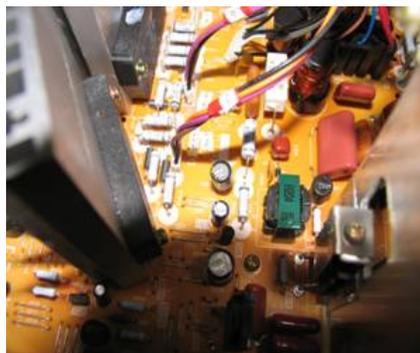


Figure 1: Original Convergence Amps soldered to the PCB.



Figure 2: New Convergence Amps connected to a zero insertion force socket that is elevated on standoffs.

If you have a personal reliability engineering story you would like to share with fellow members please send it to the newsletter editor, Lon Chase at: [Lchase@ieee.org](mailto:Lchase@ieee.org)

Regards,

Bill Tonti  
IEEE Reliability Society President  
<mailto:wtonti@US.IBM.COM>

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## From the Editor

Welcome to the IEEE Reliability Society e-Newsletter. An issue will be published quarterly and published to the Reliability Society website.

We welcome your articles, comments or questions. All RS Newsletter inputs should be sent electronically to [l.chase@ieee.org](mailto:l.chase@ieee.org).

<b>March</b>	<b>Inputs due February</b>
<b>June</b>	<b>Inputs due May</b>
<b>September</b>	<b>Inputs due August</b>
<b>December</b>	<b>Inputs due November</b>

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## Society Awards

### New Reliability Society Fellows

Two of our RS members received the coveted Fellow Award. They are:

**Dr. William Tonti**, our president, for contributions to semiconductor memory reliability, and

**Dr. Jose Maiz** who was cited for contributions to Reliability of high performance microprocessors.

Congratulations to our new Fellows on this important achievement!

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### Lifetime Achievement and Engineer of the Year Award

We had four nominations for Lifetime Achievement, and three for Engineer of the Year. The winners are:

**Lifetime Achievement** – David Trindade (nominated by Judy Koslov)

**Engineer of the Year** – Bill Tonti (nominated by Sam Keene)

Thank all of you that nominated for these two awards.

Those nominations that did not result in winners will be held for consideration for next year, however re-nomination is needed by the nominator.

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### Latest RS Scholarship Awards

The IEEE Reliability Society is pleased to announce the awarding of its 4th and 5th scholarships for 2008. Narasimha Raju Nagaiah, a PhD candidate at the University of Central Florida, is in his second year of his doctoral program. Raju has tentatively titled his dissertation, Study of Correlation among Design Parameters/Variables to Determine the Reliability using Probabilistic Techniques. Raju hopes to work for NASA following the completion of his studies. The final 2008 scholarship went to Amanda Taylor, a senior at Christian Brothers University in Memphis, TN. Amanda is our first undergraduate winner of a Reliability Society scholarship. In addition to her studies Amanda is the vice-president of the local Tau Beta Pi chapter and was instrumental in starting an "Engineers without Borders" chapter at CBU. Congratulations to both Raju and Amanda.

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### Chapter Awards (2007)

The results of Chapter Awards based on activities in 2007 are as follows:

1. Boston - 84.4 points ( \$ 800.00 )
2. Singapore - 71.0 points( \$ 600.00 )
3. Italy - 69.0 points( \$ 400.00 )
4. Baltimore, Cleveland, Denver, Japan, Ottawa, Taipei/Tainan, Twin Cities, UK/R I (\$ 200.00 each Chapter)

The awards will be issued as specified in the details provided on your Chapter's submission forms. Congratulations to all the Reliability Society Chapters that participated and thank you for all your hard work!

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## Society News

### Annual Technology Report in Transaction on Reliability

Dear colleagues,

I am pleased to announce the RS Annual Technology Report is featured in the the September issue of our transactions. We received diverse input from the Technology Management Council, Dept of HS, Europe, Asia and US, as well as base RS contributors. Thanks to all that made this happen, and especially for the Transactions managing editor, Jason Rupe's support and efforts.

Samuel Keene, PhD, FIEEE VP, Technical Activities IEEE Reliability Society

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### ADCOM Election Results

ADCOM class of 2009-2011 elections resulted in the winners:

Scott Abrams  
John Harauz  
Philip Laplante  
Alfred M. Stevens  
Alan Street  
Scott Tamashiro

Congratulations to all!

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### Successful PHM Conference with a PHM Challenge IEEE GOLD Winner

The first annual IEEE Reliability Society sponsored International Conference on Prognostics and Health Management (PHM08) was held from October 6 – 9, 2008 in Denver, Colorado. The conference was well attended and was well received by the attendees – it was a very successful conference.

The PHM Conference included a competition, The PHM Data Challenge, which was open to conference attendees. The goal of the Challenge was to estimate the remaining life of an unspecified component using data-driven techniques. One winner from each of following three categories was determined on the basis of the Challenge score. The categories were:

- Professional: open to anyone, (including mixed teams).
- Student: open to any individual or team (with all members) enrolled as full time students during the spring 2008 semester.
- IEEE GOLD (Graduates of the Last Decade): open to any individual or team comprised solely of IEEE members who received their first professional degree after March 1998. See <http://www.ieee.org/web/membership/gold/index.html> for more information on the IEEE GOLD program.

The PHM Conference Challenge winners were:

**Student Category and Overall Winner: Tianyi Wang;** A Similarity-Based Prognostics Approach for Remaining Useful Life Estimation of Engineered Systems

**Professional Category Winner: Felix Heimes;** Recurrent Neural Networks for Remaining Useful Life Estimation

**IEEE GOLD Category Winner: Leto Peel;** Data Driven Prognostics using a Kalman Filter Ensemble of Neural Network Models

Congratulations to the PHM Challenge Winners!!

See [here](#) for more information on the challenge.

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### DoD Endorsement of Reliability

The US Department of Defense has made the strongest endorsement for Reliability that I have seen in many years. This endorsement is based on the report entitled: Report of the Defense Science Board Task Force on Developmental Test & Evaluation, dated May 2008. The Defense Science Board (DSB) Task Force on Developmental Test and Evaluation (DT&E) was convened in the summer of 2007 to investigate the causal factors for the high percentage of programs entering Initial Operational Test and Evaluation (IOT&E) in recent years which have been evaluated as both not operationally effective and not operationally suitable.

On 6 June 2008, John Young, Under Secretary of Defense for Acquisition, Technology and Logistics, stated in his memorandum releasing the DSB Task Force findings report "to ensure programs are formulated and funded to execute a viable systems engineering strategy that includes a robust reliability growth plan from inception." The endorsement letter, highlights and a weblink to the report available [here](#).

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### RSConstitution Revision Approved By IEEE Headquarters

This is a notification to let you know that the Reliability Society Constitution was revised to incorporate the IEEE TAB defined "Must Haves". These "Must Haves" were applicable for incorporation by all IEEE Societies, not just the Reliability Society. The "Must Haves" mainly focused on quorum voting requirements and Nomination and Appointments Committee requirements. The "Must Haves" were incorporated and the revised RS Constitution was approved by IEEE Headquarters as being fully compliant. The newly released RS Constitution (release date November 6, 2008) will replace the current release version posted on the RS web site, if you would like to review.

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## Society Solicitations

### Reliability Society Scholarships

Up to five \$2000 scholarships will be awarded each year to students who have demonstrated achievement in their studies and have taken at least one course with reliability content. We encourage all interested students to apply.

"We are extremely pleased with this outreach effort, and hope that these scholarships encourage students to take an interest in Reliability Engineering and to understand that reliability is an overarching factor in whatever they may be studying and what they will do in their career. If you are a student, and have taken a course with reliability content which sparked an interest in reliability, I encourage you to apply for this scholarship" said Bill Tonti, the President of the IEEE Reliability Society.

Detailed requirements and applications for the scholarship are available [here](#) and on the Reliability Society website (<http://www.ieee.org/portal/site/relsoc/>) and through school financial aid offices.

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### Call for Fellow Nominations

Nominations are being accepted for the IEEE Fellows class of 2010. The rank of IEEE Fellow is the institute's highest member grade, bestowed on an IEEE Senior Member who has had an extraordinary record of accomplishments in any of the IEEE fields of interest. The deadline for nominations is 1 March 2009.

Senior Members can be nominated in one of four categories: application engineer/practitioner, research engineer/scientist, educator, or technical leader.

More information on how to become a fellow is available in this [link](#) and the Fellows Web pages which has information regarding the history of the IEEE Fellows program, the nomination process, access to the Fellows Nomination Kit, lists of Fellows who are eligible to be references and more about the Fellow program. Please visit the Fellows website at <http://www.ieee.org/fellows>.

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## Chapter Activities

The most recent chapter activity reports are linked below:

[Dallas](#)

- [University of Texas at Dallas Software Colloquium](#) - [Brochure](#)

[Denver](#)

[Singapore](#)

[Twin Cities](#)

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## Technical Activities

### Technical Committee Reports

The 2008 Annual Technology Report has been released and was published in the September issue of the IEEE Reliability Society Transactions. This is the first time that the annual report has been published in our transactions but it is planned for annual inclusion.

#### **Your inputs requested for the 2008 Annual Technical Report (ATR)**

Articles are solicited on recent innovations / advancements, new technologies / methodologies, insights / "hot topics", and lessons learned on reliability and related assurance topics. These will be published into our ATR on the IEEE Reliability Society web site. A sub-set of these articles will be abstracted to form the formal ATR report and published in the Reliability Society transactions (as a ref, see the special section of the September 2008 Transactions, pp. 398-425). There is no limit on the size of articles published in the full ATR on the web site. They can beneficially be one paragraph or range to several pages. The following are examples of topical areas with reliability implications:

- Power and translation; Negative Bias instability
- Soft errors; Six Sigma for Software; Software Assurance Program; System Security
- Batteries, Photovoltaic and Renewable Energy, Green Technology
- Malicious Code Detection
- Designed-in-Reliability; Cost Effective Problem Resolutions
- Lead free electronics; SAC alloy performance; Tin whisker risk assessment mitigation

- MIL HDBK 217; prediction technology
- Cloud computing; Service Oriented Architecture; Mashups
- Counterfeit parts, COTS; COTS Integration
- System Prognostics and Health Management; Testability; Maintainability
- Applications: military, health, financial, space, ...

Please submit your articles to Lon Chase: [l.chase@ieee.org](mailto:l.chase@ieee.org) and cc Sam Keene: [s.keene@ieee.org](mailto:s.keene@ieee.org), not later than 1 December 2008.

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### Society Technical Activity Organization

"Technical operations" is now called "technical activities" to align with the naming used by the IEEE technical advisory board. "Technical activities" is obviously the technical arm of the IEEE Reliability Society. Its charge is to:

- Help incubate new conferences
- Foster ways to get more technical information to our members through:
  - Annual Technical Report that comes out each January
  - Enable a content rich web site that will provide IEEE RS organizational data, technical reports and data, and tools (These capabilities are under development)
  - Publicize state of the art work in the IEEE Transactions, Spectrum magazine, our web site, and discussion groups
  - Enhance the RS promotional flyer with technical activities content
  - Build templates, guides and resources to guide and mentor new members of the society and profession
  - Interface with other technical societies and collaborate on joint ventures to gain synergy
  - Deliver technical information through: classes, tutorials, DVD's, and online collaboration (meetings)

Technical Activities organization:

Sam Keene    VP Technical Activities

Tech Ops Deputy	Dennis Hoffman
Tech Ops Japan	Shuichi Fukuda
Tech Ops Europe	Enrico Zio
Tech Ops Taiwan	Shiuhpyng Shieh
Tech Ops Communications	Lon Chase

### Technical Pillar leads:

Jim McLinn	System of Systems Development and Performance
Robert Stoddard	Software Development and Performance
Lou Gullo	System/Subsystem Development and Performance
Aaron Dermarderosian	System Foundation Development and Performance

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### Announcements

[2009 Reliability & Maintainability \(RAMS\) Symposium -- Program](#)

[2009 IEEE International Reliability Physics Symposium \(IRPS\)](#)

[Call for papers - Security & Privacy \(S&P\) Magazine](#)

[Call for papers - System Journal, Special Issue on Biometrics Systems](#)

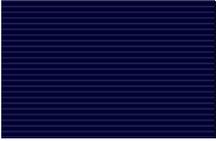
[Call for papers - Transactions on Instrumentation and Measurement](#)

[2009 International Symposium on Quality Electronic Design \(ISQED\) March 23-25, 2009](#)

[Call for papers - Computer-Aided Validation and Verification of Architectures for Complex Systems](#)

[Reliability Outreach/Workshop 2009 at Greenwich University, England](#)

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Send questions or comments to [Webmaster](#), IEEE Reliability Society.  
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## IEEE RS Newsletter Article

### Environmental Stresses of HALT - HALT (Part 3)

Lou Gullo

This article is part 3 of a 4 part series of articles on Highly Accelerated Life Testing (HALT) published in 4 consecutive IEEE Reliability Society (IEEE-RS) newsletters. An introduction to HALT was published in the March 2008 newsletter. This first part of the 4 part series on HALT included a comparison to traditional reliability tests. As described in the March newsletter, HALT is a method used to rapidly accelerate failure mechanisms, which may be latent manufacturing defects or design weaknesses. The failure acceleration occurs through the application of a combination of environmental and electrical stress conditions. HALT uses accelerated stresses that are applied non-uniformly in varying stress combinations. Part 2 of the HALT series which was published in the June IEEE-RS newsletter detailed a description of HALT by providing 2 bulletized lists, stating “what HALT is” and “what HALT is not”. Also included in HALT part 2 was a discussion on HALT time compression and test coverage. This HALT part 3 article explores the concepts of selecting HALT step stresses and load cases for various environmental stress conditions.

#### Load Cases and Step Stresses

Typical stress conditions in HALT are separated as Load Cases. Within each load case are step stresses. Stresses may be applied individually or in various types of combinations, such as a combined temperature cycling with voltage cycling and vibration cycling. A typical HALT Plan may have 6 types of test profiles (Load Cases) with various Step Stresses (SS). These typical load cases and step stress conditions are:

1. High Temperature Step Stress (HTSS)
2. Low Temperature Step Stress (LTSS)
3. Temperature Cycling SS or Thermal Shock Transitions (Figure 1)
4. Random Vibration SS
5. Combined Environment Temperature Cycling and Random Vibration
6. Slow Ramp Detection Screen

Any of these load case profiles could be executed with combined electrical operation conditions, power cycling and input voltage cycling or voltage variation to further strengthen the test capability. Voltage cycling or voltage variation may include:

- Input AC or DC voltage static (i.e., margins)
- Input AC or DC voltage dynamics (i.e., dips, interruptions, and variations)
- Frequency margins (applicable mostly for transformer-coupled, linear regulated converters)

An example of a temperature cycle load case with 3 step stresses is shown in Figure 1.

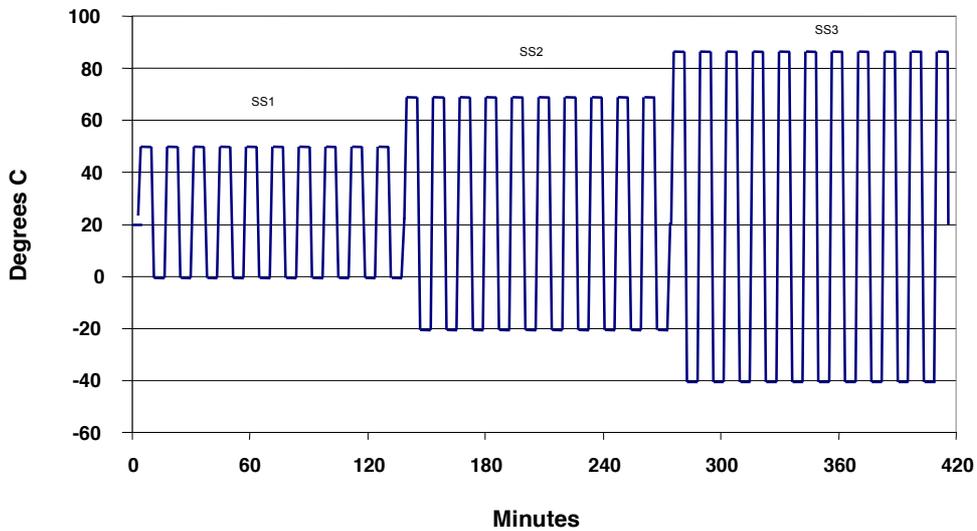


Figure 1 – Temperature Cycle SS Load Case

#### Sensitivity to Stresses

A key advantage of HALT is the ability to determine product sensitivity to stress conditions. For any type of load case involving step stress conditions, the HALT engineer should decide how many steps and how large the incremental steps should be. Step stresses may start as large or small steps, depending on how important it is to determine the operating limit versus the destruct limit. The operating limit is the point in the HALT where intermittent operation occurs, but the product recovers at ambient test conditions. The destruct limit occurs at the stress level where the product could not recover from a failure mode when operated at ambient levels.

For the example in Figure 1, you will notice that there are 3 steps between the temperature ranges 0 to 50 deg C and -40 to 90 deg C. Each temperature cycle step stress increase is 40 deg C. The step increases could have been 10 deg C or 20 deg C if the goal of the HALT test was to identify sensitivity of various failure modes to stresses at various stress levels on the way to the -40 to 90 deg C range limit. There is nothing scientific in the selection of this step increment other than the speed it will take to reach the operating limit or destruct limit. The duration of each step is based on science, however. The step duration is the time it takes to fully exercise or test the function which may be sensitive to the stress. If the test takes 5 minutes to run at each step versus 1 hour at each step, this difference in test time at each dwell period could contribute to the decision to apply larger step increases instead of smaller steps during the load case. The test may be synchronized so that the electrical test profile is out of phase with the temperature cycles so that a certain electrical test step occurs at a different place in the thermal profile.

The HALT analyst determines the sensitivity to stresses by exercising the equipment in small steps in the stress area where operation becomes intermittent. As the test stress is increased in large steps with continuous test stimuli and detection, and the test records degraded performance, the analyst should bring the equipment back to a stress level where reliable operation is restored, and then start the step process again. This time, as the step approaches in the step stress sequence, where intermittent operation occurred initially, the stress should be increased in smaller steps, continuously monitoring the performance and determine if the equipment repeats the intermittent operation at the same stress area as previously recorded. This stress area is the condition in the HALT where the product potentially has no design margin. If the failure is still intermittent (e.g. soft failure) at the same stress area, the operating limit is verified, and the test stress steps continue beyond this limit to the point where intermittent operation occurs more frequently and then leads to a hard failure condition in which equipment operation does not recover when the stress is reduced to specification levels or lower stress levels under nominal conditions. The destruct limit is the stress level where a hard failure occurs, repeatedly, and may be considered a design weakness which limits product robustness. There should be 2 or 3 product samples available for the HALT test to prove the case for a known destruct limit. At this destruct limit, the fundamental limit of the technology is reached. If only one sample fails and another sample passes at the stress level, which was predicted to be the potential destruct limit, this may demonstrate the case for variability of the supplied parts or components manufacturing quality or processes, or a potential design weakness.

Test stimulus may be applied several ways. The test stimulus may be electrical or mechanical measurements, that are recorded based on known test inputs or test signals. Test signals may be injected at specific nodes on the circuit continuously stressing the circuit. Test meters are used to monitor the circuit outputs and detect failure conditions. Software test routines may be injected into the circuit interface and looped repeatedly to accelerate and precipitate the detection of latent faults. These latent faults may be caused by probabilistic failure mechanisms. Looping test routines constantly stressing the circuit functionality within a few hours accelerates the latent faults that would otherwise surface after many months or years of operation by the customer. The failure mechanisms may initially appear as intermittent probabilistic failures, but will increase in frequency of occurrence and become more repeatable with further accelerated testing over time until they become deterministic hard failures.

Time compression or failure mode acceleration is accomplished through exercising a single stress condition or combinations of stress conditions. These stress conditions result in an acceleration of failure modes, typically, with combinations of environmental and electrical step stresses integrated in a single load case test profile, which may include temperature extremes (hot and cold step stresses), temperature cycling (or thermal shock), random vibration (typically, 3 axis simultaneous, 6 degrees of freedom, repetitive shock random vibration), mechanical shock (such as drop testing), humidity, power, operating profiles, voltage, current, duty cycle, and frequency.

The next IEEE RS newsletter will contain part 4 of HALT, focusing on the final key points of HALT and conclude this 4 part series.

*This is the third article of a 4 part series on HALT for the IEEE-RS newsletter.*

*Lou Gullo  
Raytheon*

## **The Revitalization of MIL-HDBK-217**

By Lou Gullo

### **Introduction to MIL-HDBK-217**

MIL-HDBK-217 is the military handbook for the reliability prediction of electronic equipment. This handbook was developed in 1961. The purpose of MIL-HDBK-217 is to establish and maintain consistent and uniform methods for estimating the inherent reliability (i.e., the reliability of a mature design) of military electronic equipment and systems. It provides a common basis for reliability predictions during acquisition programs for military electronic systems and equipment. It also establishes a common basis for comparing and evaluating reliability predictions of related or competitive designs. The handbook is intended to be used as a tool to increase the reliability of the equipment being designed. This handbook has not been modified since 1995.

This handbook contains two methods of reliability prediction ♦ Parts Stress and Parts Count. These methods vary by degree of information required as inputs to component failure rate models. The Parts Stress Method requires the greatest degree of detailed information. Parts Stress Method is applied in the later phases of design when actual hardware and circuits are being designed. The Parts Stress Method requires actual and rated parametric values for assessing the stresses and stress percentages of components within an application.

### **Initiation of the Revision Project**

Defense Standardization Program Office (DSPO), OUSD (AT&L), under Mr Greg Saunders created ASSIST Project # SESS-2008-001, to initiate the effort to revise MIL-HDBK-217. ASSIST is the Acquisition Streamlining and Standardization Information System which is a web-based online database. More than 100 government activities may prepare and submit documents to the ASSIST database using the electronic document submission tool.

DSPO is funding Naval Surface Warfare Center (NSWC) Crane Division to release MIL-HDBK-217 Rev G by the end of 2009. DSPO is driving the revision of MIL-HDBK-217 based on the results of a survey conducted throughout government and industry. This survey was initiated in 2004. It was conducted by NSWC Crane and completed in 2007. The purpose of this survey was to determine what tools are being used by industry to generate MTBF data. NSWC Crane determined from the survey results that although this handbook has not been updated in over a decade, it remains the most widely used reliability prediction method for electronic equipment. Under the leadership of NSWC Crane, a working group of individuals representing the government, DoD, and industry has been established to conduct this revision. The members of this working group, the MIL-HDBK-217 Revision Working Group (217WG), responded to the NSWC Crane call for volunteers and were down selected from the overwhelming list of respondents.

### **Other Related Activity**

Besides this 217WG, DSPO has sponsored aerospace industry collaborative research through the Aerospace Vehicle Systems Institute (AVSI). ♦ AVSI is working to develop new reliability prediction models for new component technologies that are not covered in MIL-HDBK-217. AVSI is focused on commercializing Physics of Failure (PoF) models considering semiconductor wearout, and developing a new software tool for reliability predictions. Several members of the 217WG and AVSI

are also members of VMEbus International Trade Association (VITA). VITA's mission includes not only promoting VMEbus, but promoting open technology as embodied in the many standards currently under development within the VITA Standards Organization (VSO). VSO is accredited as an American National Standards developer and a submitter of Industry Trade Agreements to the IEC. VITA formed a Community of Practice for reliability engineering professionals called VITA51, which is focused on providing practitioners of MIL-HDBK-217F with an industry consensus-based approach to MTBF calculation. The efforts of AVSI and VITA51 should have a benefit and direct effect on MIL-HDBK-217 revisions in the future.

IEEE Reliability Society (IEEE-RS) assisted the 217WG with a virtual private on-line community. The purpose of this on-line community is to provide a repository to upload and download files to share information between the members of the 217WG. A few members of 217WG, AVSI and VITA51 are also members of the IEEE 1413 working group, revising the IEEE standard for reliability predictions.

### **217WG Kick-Off Meeting**

On May 8, 2008, the initial 217WG face-to-face meeting was held in Indianapolis, IN, sponsored by the NSWC Crane Division. ♦ Jeff Harms, NSWC Crane and Chairman of the 217WG, presented a meeting agenda, which outlined the topics and schedule for the meeting. The meeting was productive, with a considerable amount of discussion on various subject areas. During this meeting, it was decided that the project would be split into 2 phases.

Phase 1 is the release of MIL-HDBK-217 Rev G by December 2009. Phase 1 includes modification to existing models and adopting models that are used by other entities or standards, such as 217Plus, PRISM, AVSI and VITA51. Phase 2 is the reinvention of the handbook to be a more holistic approach and include all causes of system and product failures. Phase 2 includes analysis of raw test and field data to derive new failure rate models. Also, the working group is considering a proposal from Lou Gullo to reference IEEE 1413 and IEEE 1413.1 standards in the new revision of the 217 handbook to provide alternative options for performing reliability predictions using holistic approaches.

### **Most Recent 217WG Meeting**

The last working group meeting was held between November 13-14, 2008. 17 of the 25 working group members attended. A complete list of the 217WG members who attended this meeting is shown in Table 1.

	<b>Name</b>	<b>Company</b>
<b>1</b>	Lori Bechtold	Boeing
<b>2</b>	Jim Garten	SDA
<b>3</b>	Louis Gullo	Raytheon
<b>4</b>	Jeffrey Harms	NSWC Crane
<b>5</b>	David H Johnson	AFRL/RXSA
<b>6</b>	Douglas Loescher	Sandia National Lab
		
<b>7</b>	Jim McLeish	DfR Solutions
		
<b>8</b>	Larry Mosher	Eaton Areospace
		
<b>9</b>	David Nicholls	RiAC
<b>10</b>	Dan Quearry	NSWC Crane
<b>11</b>	Joe Rodenbeck	DLA
<b>12</b>	Gerry Thomas	NSWC Crane
<b>13</b>	Jack Thompson	WPAFB
<b>14</b>	Bahig Tawfellos	Honeywell Aerospace
<b>15</b>	Bill Allen	LMSI
<b>16</b>	Dan Jacob	RELEX
<b>17</b>	Bob Ricco	Northrop Grumman

Table 1,  Meeting Attendees

Dave Johnson stated new microcircuit (commercial) types with life limited/wear-out data needs to be added. The group discussed the current wear-out model usage and methodology. It was stated that Jim McLeish would address wear-out issue in the Phase 2 and Phase 3 proposals. Mention was made of making the handbook a dynamic/web-based tool. This suggestion is not possible given the scope of the current MIL-HDBK-217 Phase 1 requirements. Change control could be an issue. NSWC Crane took an action to discuss possibilities with DSPO for future phases.

Discussion became rather lengthy on the verification and source of component data. Concerns were expressed by several members on the source sensitivity. For Phase I of the MIL-HDBK-217 update, the RiAC is handling all submitted data using the structure and taxonomy of the existing RiAC databases. RiAC is responsible to ensure data is sanitized and that there is no data pedigree retained in the data warehouse and outputs from this data warehouse. Dave Nicholls reminded the 217WG that RiAC will accept individual company Non-Disclosure Agreements (NDAs).

Engineering Judgment vs. Component Data became a source of debate at the meeting. First priority for section updates is to utilize data. Guidance was provided that stated, when necessary, each section

lead can use engineering judgment as their section revision basis and would document engineering judgment rationale and submit to WG for review and approval. Section leads could decide when to stop collecting data and use engineering judgment for section updates in lieu of data. NSWC Crane to indoctrinate guidelines for documenting engineering judgment. A suggestion was made to add working group review and feedback loop to 217 Revision Process flow chart.

Doug Loescher had conducted a comparison of inductor models between Telecordia, 217 and RiAC prediction models. He found 3 orders of magnitude difference, and expressed concern with reflecting this in the Rev. G update.

Lou Gullo discussed his interaction with NSWC Corona to gain access to the Navy's Material Readiness Database (MRDB) to leverage fleet performance historical data for component model refresh and handbook updates. Lou provided his NSWC Corona points of contact (POCs) to NSWC Crane. Lou also discussed gaining access to the Navy's Open Architectural Retrieval System (OARS) database. OARS is another repository for the Navy's fleet performance data, known as 3M data. Dave Nichols, RiAC, was helpful in providing website link and Navy POCs for OARS access.

The list below shows persons who volunteered to lead most of the sections. Since there are several sections that do not have leads assigned, a discussion occurred on how to best handle unassigned sections. There was also discussion on new part sections, currently not covered in 217.

**MIL-HDBK-217 Sections and Leads**

- nSections 1-4 NSWC Crane
- nSection 5 (Microcircuits) Tyrone Jackson
- nSection 6 (Discretes) Chandru Michandani
- nSection 9 (Resistors) Jim Garten
- nSection 10 (Capacitors) Bahig Tawfellos
- nSection 11 (Inductors) Doug Loescher
- nSection 13 (Relays) Rich Yannitti
- nSection 14 (Switches) Rich Yannitti
- nSection 15 (Connectors) Bill Allen
- nSection 16  
Larry Mosher  
(Interconnection Assemblies)
- nSection 17 (Connections) Larry Mosher
- nSection 21 (Filters) Jack Thompson
- nAppendix  
B Jim McLeish

**MIL-HDBK-217 Sections that do not have a Lead**

- nSection 7 (Tubes)
- nSection 8 (Lasers)
- nSection 12 (Rotating Devices)
- nSection 18 (Meters)
- nSection 19 (Quartz Crystals)
- nSection 20 (Lamps)
- nSection 22 (Fuses)
- nSection 23 (Misc. Parts)

A new Fiber Optics/Photonic section was planned to be added to the handbook. Preliminary data for this new section was received and placed in the IEEE on-line community 217WG share area.

Interconnection Assemblies & Connections model updates was discussed by Larry Mosher. He has over 1 million hours of data with failure analysis of solder joints performed. Disclosure of this data to the 217WG is pending legal approval. He will most likely update pi-factors. There was discussion of leveraging the Engelmeier models. There was also discussion about the prediction methodology from Boeing on lead free solders.

### **Phases II & III Review**

Jeff Harms began the sessions with a review of the Phase II and III objectives, which included investigating current reliability approaches. This was followed by three presentations (see IEEE 217WG website for presentation material):

217Plus Bill Denson

Review of the reliability prediction methodology utilized in 217Plus from a component and system-level perspective.

AVSI Lori Bechtold

Provided an update on the work being performed in current AVSI reliability initiatives. One objective of these initiatives is to provide findings to the 217 Working Group.

Reliability Assessment Jim McLeish

Provided a detailed presentation of the Physics of Failure approach to design reliability practices.

### **Next Meeting Discussion**

The next meeting dates are tentatively scheduled for 18,19 FEB 2009. NSWC Crane to determine next meeting location. Jeff Harms to check on potential for meeting in Dallas, TX site.

### **Further Information**

Details of the project can be found at the NSWC Crane website: [www.crane.navy.mil](http://www.crane.navy.mil)

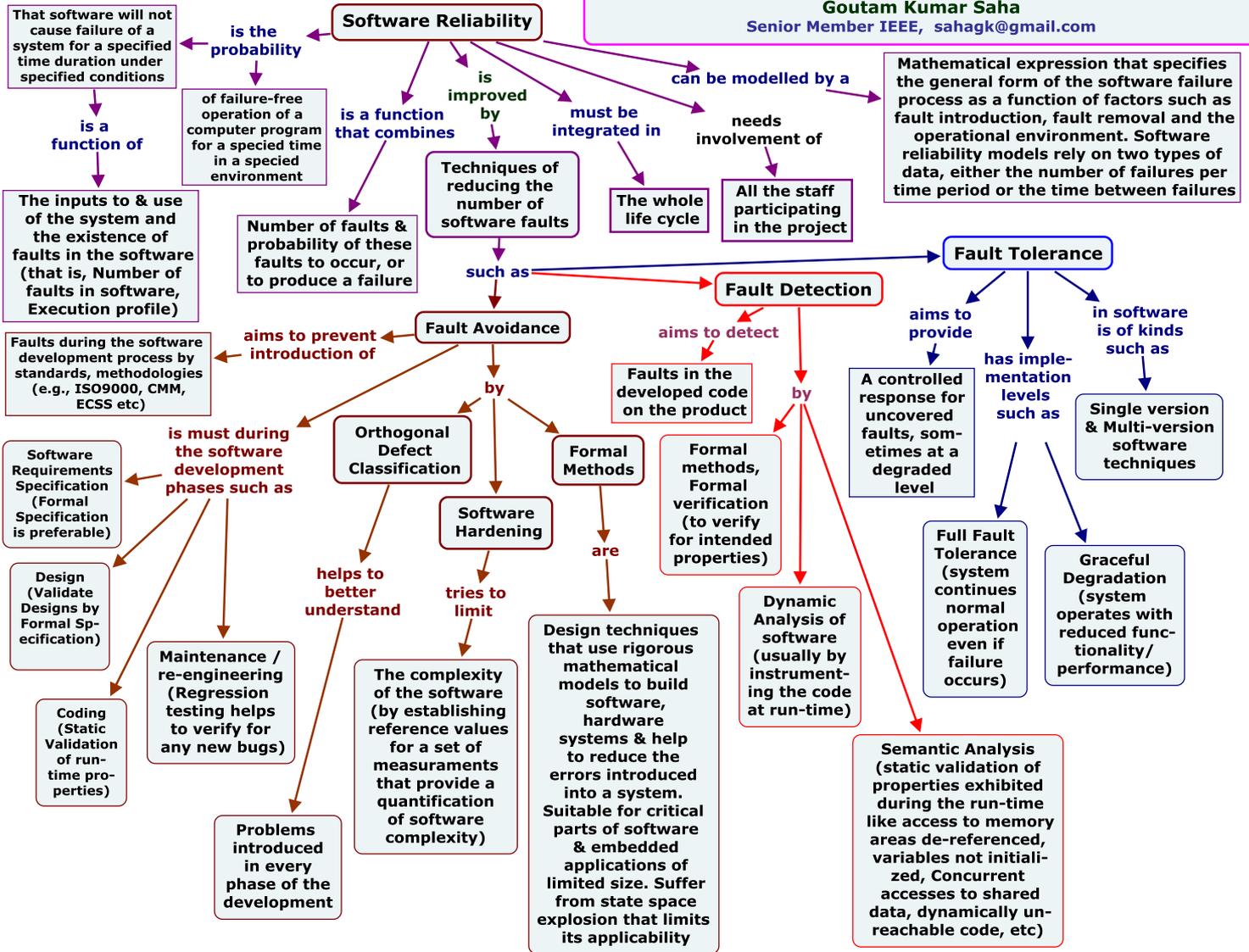
Besides details about the 217WG, there is also other pertinent information on reliability such as SD18 for parts derating, which can be found at this website. A questionnaire survey to the

electronics industry is also available on this website.

# Understanding Software Reliability Concepts

Goutam Kumar Saha

Senior Member IEEE, sahgk@gmail.com



**Further Reading:**

- [1] Goutam Kumar Saha, "Software based Fault Tolerance: a Survey," ACM Ubiquity, Vol.7, No. 25, pp. 1-15, July 2006, ACM Press, USA.
- [2] E. Valido-Cabrera, "Software Reliability Methods," Technical Report, Technical University of Madrid, 2006.
- [3] Goutam Kumar Saha, "Understanding Software Fault Tolerance Using a Concept Map," IEEE Reliability Society Newsletter, Vol. 54, No. 2, June 2008, IEEE Press, USA.

**The Dallas Chapter held the following meetings this fall:**

**Title: "Reliability Test Challenges and Solutions"**

Date: Thursday, September 18, 2008

Speaker: Mike Jackson, Micromanipulator Company

**Program Summary:**

The ITRS foreshadows challenges in device reliability testing for semiconductor manufacturers. Those challenges in turn test the ability of equipment suppliers to develop and support the electrical and physical equipment and methodologies to conduct measurements to achieve the required data. These challenges will be summarized and reviewed for understanding and consideration based on current industry trends.

**Speaker:**

Mike Jackson obtained his BS degree in Technical Management (Electronics) from Regis College in Denver Colorado. After 15 years in the Liquid Crystal Display industry in positions including Reliability test, Applications Engineering and Production Management. Mr. Jackson joined Micromanipulator in 1988 where he currently holds the position of Vice President of Product Marketing and Applications.

\*\*\*\*\*

**Title: "Qualifying devices for Aerospace Applications"**

Date: Tuesday, Oct 21, 2008

Speaker: Keith Forbes, Freescale Semiconductor

**Program Summary:**

The aerospace industry is incorporating more commercial off-the-shelf (COTS) devices in their systems to reduce costs and increase performance. However the aerospace applications often include temperature extremes and lifetime requirements that are not qualified for COTS devices. The problem becomes how to characterize COTS devices in aerospace applications without incurring additional costs and screens.

Techniques used to provide reliability data and engineering analyses will be presented. This includes the lifetime for intrinsic reliability, radiation effects, and defectivity. Keith will discuss the general models and acceleration factors used and Freescale's coordination with aerospace companies through GEIA and APMC to develop process and requirements for a Aerospace Qualified electronic Components (AQEC) standard.

**Speaker:**

Keith Forbes is the manager for Strategic Reliability in Freescale Quality. His team is responsible for ensuring the reliability and quality of the advanced process technologies that drive the performance of

new Freescale products. This includes completing early reliability assessments of new technologies, measuring intrinsic soft error rates for memories and logic, and providing analyses and tools for predictive reliability and defect reduction.

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**Please see the report on University of Texas Dallas (UTD) Computer Science Colloquiums included with the Dallas Chapter information.**

## **Computer Science Colloquium at the University of Texas at Dallas (UTD)**

**Professor Thomas Otani from the Department of Computer Science at the Naval Postgraduate School gave a talk on "Validating UML Statechart-Based Assertions Libraries for Improved Reliability and Assurance" on August 29.**

It was based on a paper that received the best paper award at the Second IEEE International Conference on Secure System Integration and Reliability Improvement SSIRI 2008) sponsored by the Reliability Society. Other co-authors include Doron Drusinsky, James Bret Michael (a member of RS AdCom), and, Man-Tak Shing. More than 70 attendees including faculty, graduate students, and engineers from the North Texas Net-Centric Software Consortium attended Professor Otani's talk.

Additional note:

The colloquium was very successful with more than 70 attendees. For details please refer to the attached flyer that was sent to all the faculty and students in Computer Science and Electrical Engineering at UTD. It was also sent to selected faculty at UTA (University of Texas at Arlington), SMU (Southern Methodist University), UNT (University of North Texas), and some researchers at Raytheon, Lockheed Martin Aeronautics, Texas Instruments, and EDS.

**Dr. Phil Laplante, IEEE Fellow, Member of IEEE AdCom, and Professor of Software Engineering at the Penn State Great Valley campus, was the speaker for the Computer Science Colloquium at the University of Texas at Dallas on September 19.** The title of his talk is "Testing Without Requirements."

# COMPUTER SCIENCE COLLOQUIUM

“Validating UML Statechart-Based Assertions Libraries for Improved Reliability and Assurance”

**Dr. Thomas Otani**

Department of Computer Science  
The Naval Postgraduate School (NPS), Monterey, California

## Abstract

In this talk, we will present a new approach for developing libraries of temporal formal specifications. Our approach is novel in its use of UML statechart-based assertions for formal specifications and the inclusion of validation test scenarios as an integral part of a formal specification library. Validation test scenarios are needed to ensure a robust validation process and to improve the reliability and assurance of the resulting software. We will also demonstrate the use of the actual software tool during the talk. This talk is an extension of a paper which recently received the Best Paper Award at the 2nd International IEEE Secure System Integration and Reliability Improvement Conference (SSIRI 2008).

## Biography

Dr. Thomas Otani is an Associate Professor of Computer Science at the Naval Postgraduate School (NPS) in Monterey, California. He is currently the department's Associate Chairman for Academic Affairs. He received his M.S. and Ph.D. from the University of California, San Diego. At present, he is heavily involved in a software project funded by the NASA IV&V center with other software engineering professors at NPS. His research interests include data modeling, visual language, software verification and validation, and computer science education. He is an author of many conference and journal articles and has published three computer programming textbooks.

**The colloquium is open to the general public**

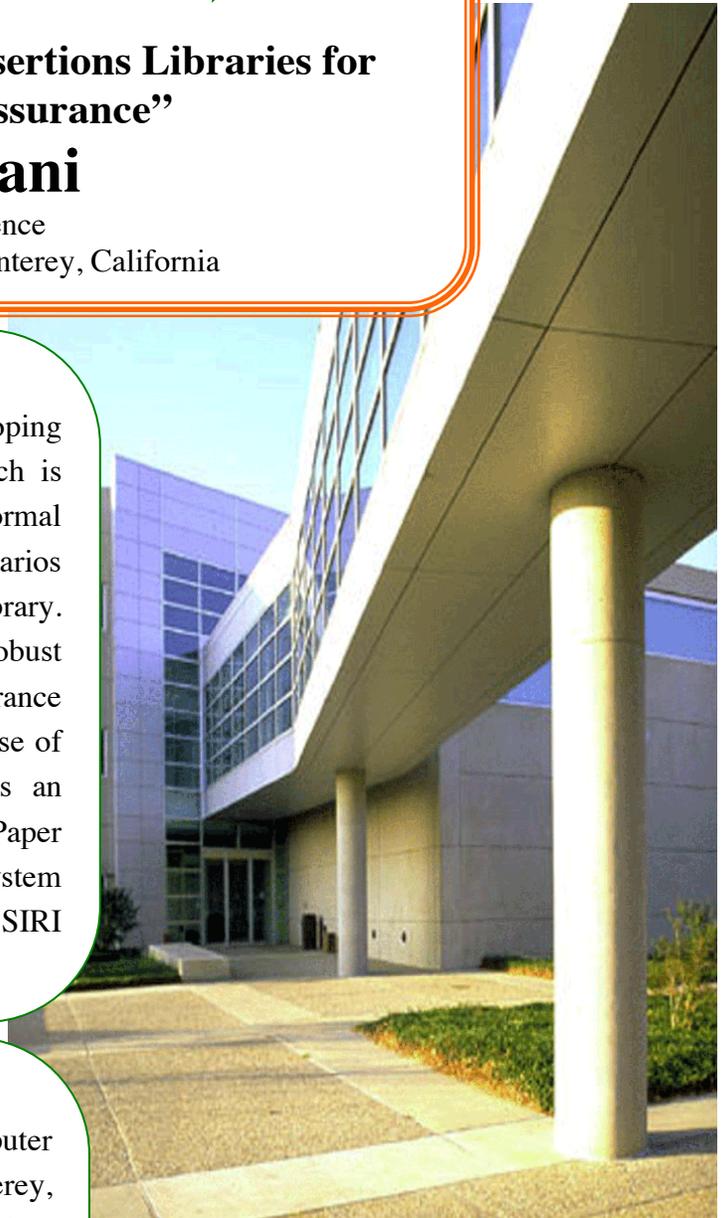
**Date: Friday, August 29<sup>th</sup>, 2008**

**Time: 11:00am – 12:00pm**

**Location: Room: ECSS 2.410**

**(Refreshments will be served at 10:45am)**

**The University of Texas at Dallas**  
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## September 2nd meeting in Colorado

Software Reliability: INSIDE-OUT by Bruce Webster

Organizations too often treat software reliability as an 'after the fact' consideration, performing testing as a last step and then constraining it due to schedule and financial pressures. I'll present a simple "inside-out" software lifecycle model where all software development activities (not just coding) take place within a framework covering a broad spectrum of quality-related activities.

Webster is Principal and Founder at [Bruce F. Webster & Associates LLC](#). He works with organizations to help them evaluate troubled or failed information technology (IT) projects, or to assess IT systems and products for possible investment/acquisition. He has also worked in several dozen legal cases as a consultant and as a testifying expert, both in the United States and Japan.

A tour of the HALT/HASS facility at Advanced Energy Industries, Inc. (AE) in Fort Collins and a presentation by Mr. Harry McLean, a Member of Technical Staff of AE and a guru of HALT/HASS testing. This event was a joint activity of IEEE Reliability Society Denver Chapter and ASQ Section 1309.

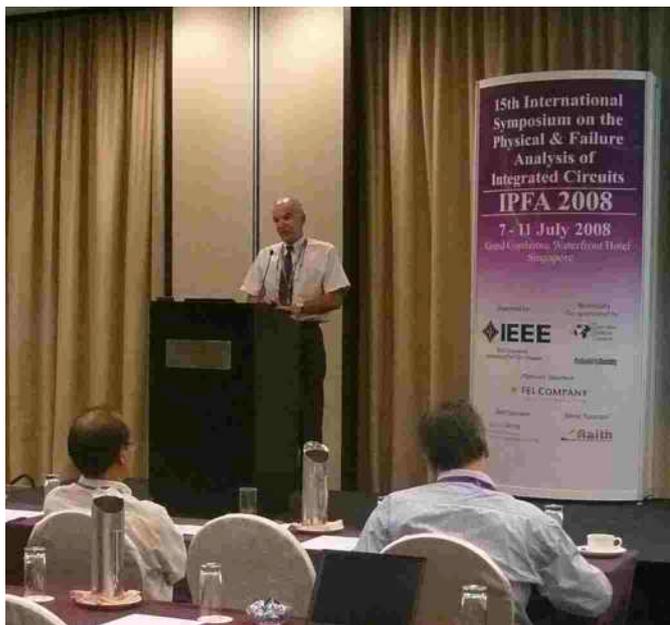
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Six Sigma MBB  
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303-709-4262 mobile

## [Contribution to IEEE Reliability Society Newsletter by Singapore REL/CPMT/ED Chapter September 2008](#)

Our main recent activity was the 2008 IEEE 15th International Symposium on the Physical And Failure Analysis of Integrated Circuits (IPFA 2008) from 7 – 11 July. The week began with six half-day tutorials on reliability and failure analysis spread over two days. The symposium itself began on the Wednesday with two high profile keynote papers. In the first, Professor Dimitri Antoniadis from MIT looked into the future of high performance CMOS while in the second, Dr. Raj Master, from AMD explained the challenges of packaging and cooling advanced digital devices such as microprocessors. During the symposium over 50 papers were presented orally together with almost 18 poster presentations. There were 7 invited papers and the best papers from ISTFA and ESREF were presented. An equipment exhibition with 37 exhibitors was held in parallel with the symposium and this year IPFA was generously supported by three industry sponsors, FEI Company, Phoenix X-Ray and Raith. For the first time IPFA organised a competition, the Art of Failure Analysis, in which FA practitioners submitted artistic, unusual and imaginative pictures with some equally imaginative titles.

Two best papers, one in failure analysis and one in reliability, were selected for presentation at ISTFA (USA) and ESREF (Europe) conferences respectively. This year they were both won by authors from Singapore. For Failure Analysis the winning paper was “Effect of refractive solid immersion lens parameters on the enhancement of laser induced fault localization techniques” by S H Goh et al from National University of Singapore SEMICAPS and while the best paper in reliability was “Effect of Pulsed Current on Electromigration Lifetime” by M.K. Lim et al from Nanyang Technological University and Chartered Semiconductor Manufacturing, Singapore.



**Professor Dimitri Antoniadis presenting the first keynote paper**

Apart from IPFA, the summer has been busy with one seminar, one DL talk and one technical talk. Eight talks focusing on the front-end reliability research from NTU and

IIT were presented in a half day seminar on “Reliability Study of Logic and Flash Memory Devices” held at Nanyang Technological University (NTU) on 14 July. This was co-organized by NTU, the Indian Institute of Technology, Bombay (IIT) and Singapore Rel/CPMT/ED Chapter.

On 24 July, Professor Souvik Mahapatra from IIT Bombay, India gave a DL talk on Nonvolatile Flash Memory and on 30 July 2008 Dr Frank L. Wei from Philips Lumileds Lighting Co. gave a presentation on Observations of Electromigration-Induced Extrusion Failures in Cu/low-k Interconnects”

**Planning is well underway for Chapter’s other flagship conference EPTC 2008** which will be held in Singapore from 9 to 12 December 2008. 352 abstracts were received in response to the call for papers, a record for EPTC. There will be keynotes Speeches by Dr. G.Q. (Kouchi) Zhang, from NXP, Prof. Michael Pecht from University of Maryland and Prof. CP Wong from Georgia Tech. This will be the 10th Anniversary of EPTC so there will be special celebrations, social events and networking activities. Registration is now open and full details of EPTC can be found at the website: <http://www.eptc-ieee.net>

**Minnesota Reliability Consortium** ♦ composed of the Twin Cities Reliability Society, IEST and the Reliability Division of ASQ

MRC Report for Summer 2008 ♦

During the summer 2008 year the Twin Cities chapter of IEE RS held one planning meeting and two regular meetings June and September. This continued the increase in attendance at meeting over the last several years. During this past year a SRE chapter formed in the Twin Cities. We will be co-operating with this group as well in the future.

In June, 2008, elections were held at this meeting and new officers elected for the coming year. Larry Akre was elected Chair, Frank Costabilo, Vice Chair and Jim McLinn Treasurer of the Twin Cities RS chapter. They continued in office for another year. Three people were also selected for a steering committee. The June meeting itself was held at Sauer-Danfoss with Mark Galley of ThinkReliability! speaking on Error Cause Mapping. This was an excellent topic by a dynamic speaker.

The Twin Cities RS chapter board met on August 14 to plan out a new fall program. At this meeting we decided, since this was the year of change, we would off all meetings free in 2008/09 year. The format of the meetings was also changed in order to facilitate attendance. Meeting topics for September, October and November were created and speakers obtained.

The September 16 th meeting was attended by 37 people. Sarath Jayatilleka of Eaton Corporation spoke on his experiences with implementing Accelerated Life Testing in a commercial company.

The October 21 meeting will be a Panel discussion of Best Practices for Reliability. One speaker will address software practices best practices and the other will discuss hardware best practices.

The November and January meetings have not yet been finalized.

Contact James McLinn at 763 498-8814 or [JMReL2@Aol.com](mailto:JMReL2@Aol.com) for more details of Chapter activities.

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The Annual Reliability & Maintainability Symposium  
The Worthington, A Renaissance Hotel  
Fort Worth, Texas USA  
January 26-29, 2009

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If this email does not display in HTML format, look here:  
<http://www.rams.org/newsletter/>

Mark your calendars for RAMS 2009:

RAMS will mark its 55th year in Fort Worth, Texas on 26-29 January 2009 with RAMS 2009. Regardless of the products, systems, and processes that create your reliability universe, there is a great deal more to learn than can be obtained in any classroom, library and literature search. Please plan to join us in Fort Worth for a rich human-based experience where we can learn from each other.

Read more in RAMS General Chair's Message:  
<http://www.rams.org/chair/>

Registration:

Registration for RAMS 2009 is open! ♦ Sign up and pay by credit card now to receive our advance registration discount. ♦ The Symposium Hotel, the Renaissance Worthington, is also accepting reservations at a special discounted rate but rooms will be in short supply so register for the Symposium and make your hotel reservation now.

READ more at RAMS:  
<http://www.rams.org/registration/>

ASQ Certified Reliability Engineer, Six Sigma Black Belt and Six Sigma Green Belt Exams will be offered at RAMS 2009:  
Special arrangements have been made with the American Society for Quality (ASQ) to offer the ASQ Certified Reliability Engineer (CRE), Six Sigma Black Belt (SSBB) and Six Sigma Green Belt (SSGB) examinations at the 2009 RAMS Symposium. These 4 hour examinations will be held on Thursday morning, January 29.

Read more at RAMS:  
<http://www.rams.org/cre/>

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See Also:

RAMS Home  
<http://www.rams.org/>

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**An Invitation To:**

**RAMS**<sup>®</sup>  
*The Annual Reliability  
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**OUR 55<sup>th</sup> YEAR**



January 26 - 29, 2009

The Worthington, A Renaissance Hotel

200 Main Street

Fort Worth, TX 76102 USA

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# Reliability as a Competitive Advantage — From Theory to Practice

The role of reliability in business and industry is clearly maintaining its value as the global economy evolves in these financially turbulent times. Whatever type of reliability work you do, the cost of failure is most likely increasing and likewise so is the value of reliability.

The 2009 RAMS® “Reliability as a Competitive Advantage: From Theory to Practice” paper and tutorial submissions have been completed and the Program Committee has carefully designed a balanced topical content between theory vs. practice and elementary vs. advanced. The objective is to provide you with research, applications, and ideas that can help you apply your skills to help your company, division, department, agency, or just you - deliver more reliable products and services at competitive costs.

The 2009 Keynote Speaker this year is the Honorable William E. Wright from the United States Chemical Safety and Hazard Investigation Board. Mr. Wright will share with us several actual situations through computer animation of how organizational, equipment, and human reliability influence the complex nature of reliability in the chemical process industries. The title of his keynote address is: Reliability – At what price?

This past year also has seen records in crude oil prices and a lot of discussion about the role of environmentally acceptable oil drilling to help manage gasoline and related product costs. Crude oil is of little value unless it can be removed from the earth, transported, and refined. Since drilling is the first essential element in creating value from this natural resource, we are fortunate to have as the 2009 Banquet Speaker, Martin Craighead, Group President, Baker Hughes Drilling and Evaluation. He will share pictures and video of the current technologies used in this highly equipment intensive industry. The title of his presentation is: Deeper, Faster, Hotter: Reliability's critical role in the search for oil and gas.

## An Exciting New Opportunity – The RAMS Certificate Program

RAMS is well known for its delivery of an outstanding tutorial program, and RAMS 2009 will include a continuation of this tradition. At RAMS 2009, attendees can choose from an offering of twenty tutorials. The topics of these tutorials range from the basic concepts of R&M engineering to advanced topics in cutting-edge areas of R&M research and application. In keeping with RAMS tradition, attendance at tutorials is included as part of your registration.

At RAMS 2009, a new program is being offered for tutorial attendees – the RAMS Certificate Program. For a fee of \$75, RAMS attendees can enroll in this two-level certificate program. The objective of this program is to improve and add structure to the RAMS educational experience. Participation in this program is optional. All tutorials are still open to all attendees.

Completing the first level of the certificate program requires attendees to attend five core concept tutorials. The five core tutorials are (titles subject to minor change):

- Introduction to R&M Modeling
- Introduction to Life Data Analysis
- Introduction to Failure Modes and Effects Analysis
- Introduction to Fault Tree Analysis
- Introduction to R&M Management (Reliability from Design Inception to Product Retirement)

The tutors for the core tutorials were solicited by the RAMS Management Committee based on their successful experience in preparing and presenting RAMS tutorials. The structure of the RAMS 2009 program is such that an attendee can attend all of these tutorials on Monday and Tuesday of the Symposium.

Completing the second level of the certificate program requires attendees to attend an additional ten tutorials across at least two Symposia. Attendees are free to choose these ten tutorials based on their own professional needs and interests. Upon completion of the program, attendees are sent a printed certificate and a letter of completion including a list of tutorials attended. Due to the currency of the material, the Certificate Program must be completed within 4 years of the attendance of the first core tutorial. For further information on the RAMS Certificate Program please contact Dr. Richard Cassady <cassady@uark.edu>.

RAMS is unique in the field of international conferences around the world in that it is produced and supported by ten professional societies that share the common objectives of improving safety, reliability, and efficiency. There is no doubt that these three tenets are of growing importance in the world community over an increasing range of products and processes.

In January, 2009, RAMS will mark its 55th year in Fort Worth, Texas. Regardless of the products, systems, and processes that create your reliability universe, there is a great deal more to learn than can be obtained in any classroom, library or literature search. Please join us in Fort Worth for a rich, human-based experience, in a unique, historical environment, where we can learn from each other.

Dr. Richard Jones, General Chair, 2009 RAMS  
Solomon Associates  
([chair@rams.org](mailto:chair@rams.org))

**The Management Committee and Board of Directors gratefully acknowledge our 2009 RAMS Corporate Patrons.**

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## Program Highlights

**Tutorials** — We offer an informative and educational set of tutorials, ranging from introductory topics in reliability and maintainability engineering, to intermediate tutorials for further study, to special topic tutorials introducing new and innovative technologies. A number of tutorial sessions are linked to technical paper sessions, providing a lead-in to understanding the latest developments in the assurance technologies. The tutorials are presented by leading researchers and practitioners in the field.

**Panel/Paper Sessions** — Sessions are linked to tutorials to bridge the gap between theory and experience. Panels are structured to provide an open exchange of information between technology experts, corporate executives, and Symposium attendees. Paper sessions provide technical details addressing how principles are applied. Access to authors is provided for follow-up subsequent to presentation of papers.

**Exhibits Program** — The 25th annual RAMS Exposition will feature exhibits in key technical areas such as Supportability, CAD/CAM/CAE/CAT, Failure Analysis, R&M Software, ESS, and Logistics. Come visit and “test drive” the exciting products. For information on exhibiting, write Scien-Tech Associates, Inc., P.O. Box 2097, Banner Elk, NC 28604-2097 USA or call 1-828-898-6375. FAX: 1-828-898-6379. Email: dbarbsta@aol.com

**Computer Aided Engineering (CAE) Capabilities and Solutions** — See advanced CAE capabilities being developed by industry, government, and university research centers. Additionally, RAMS exhibitors will highlight their latest CAE capabilities through exhibits and demonstrations.

**Advisory Board Panel** — Leaders from industry and government will discuss the technical, management, and training issues associated with using reliability as a competitive advantage in today’s global business environment. Symposium attendees may submit questions in advance to the panelists or raise them from the floor.

**ASQ Certified Reliability Engineer, Six Sigma Black Belt and Six Sigma Green Belt Examinations** — Special arrangements have been made with the American Society for Quality (ASQ) to offer the ASQ Certified Reliability Engineer (CRE), Six Sigma Black Belt (SSBB) and Six Sigma Green Belt (SSGB) examinations at the 2009 RAMS Symposium. These 4 hour examinations will be held on Thursday morning, January 29. The exams are open book and any silent, hand-held, battery-operated calculator without an alphabetic keyboard will be permitted. Please note that a PICTURE IDENTIFICATION IS REQUIRED FOR ADMITTANCE. For full details about ASQ’s certifications, please visit ASQ’s Certification website at: <http://www.asq.org/training-and-certification.html> On line registration for the exams is available at: <https://secure.asq.org/certification/rams-2009-application.html> The deadline for advance registration and a guaranteed seat for the exam is January 2, 2009. Walk in registration, up until noon on Wednesday of the Symposium, will be permitted on a space available basis for the CRE and SSGB examinations only.

**Ralph A. Evans/P.K. McElroy Award and Alan O. Plait Awards** — The Ralph A. Evans/P.K. McElroy Award for the best paper of the 2008 Symposium and the Alan O. Plait award for Best Tutorial of the 2008 Symposium will be presented at the Wednesday night banquet.

**Conference Hotel** — RAMS 2009 is being held at the beautiful Renaissance Worthington Hotel located in the Sundance Square restaurant and entertainment district. The Worthington is a AAA four diamond hotel.

**Job Posting Board** — This year RAMS is sponsoring a job posting board to list openings in the assurance sciences. ANY business interested in describing its employment opportunities to the world’s premier gathering of assurance professionals is asked to contact Ray Sears at 1-603-863-2832. The bulletin board will be made available to all RAMS attendees. It is an extraordinary opportunity to get your employment message out!

**Publications of Previous Symposia Available** — Copies of proceedings and tutorial notes from previous RAMS are available from: Annual Reliability & Maintainability Symposium, c/o IPS Group, Inc., 4405 Tarpon Lane, Alexandria, VA 22309 USA. For pricing and availability information, please e-mail: [sales@rams.org](mailto:sales@rams.org) or order via our Web site at [www.rams.org](http://www.rams.org).

**Special Travel Rates** — Special discounted airfare for the 2009 Reliability & Maintainability Symposium in Fort Worth, TX on January 26-29, 2009 has been negotiated by IEEE. Please see the registration information on the inside back cover for additional details.

**Plan now to present a paper, tutorial or to attend the Year 2010 RAMS at the  
Doubletree Hotel, San Jose, California USA.  
For more information, visit our Web site at: [www.rams.org](http://www.rams.org).**

### 2008 RAMS EXHIBITORS

ARINC  
Cincinnati Sub-Zero  
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For exhibit information contact: **David F. Barber, Jr.**, Scien-Tech Associates, Inc.,  
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## TUTORIALS

An informative and educational set of tutorials, from introductory to special topics, is included in the program. Introductory tutorials cover basic topics in reliability and maintainability engineering; intermediate tutorials present the latest approaches; and special topic tutorials introduce new and innovative technologies. A number of tutorial sessions are linked to technical paper sessions, providing a lead-in to understanding the latest developments in the assurance technologies. The tutorials are presented by leading researchers and practitioners in the field, and are accompanied by an extensive set of tutorial notes and references for further study. For more information on the tutorial program, contact: **Caroline P. Lubert, James Madison University**, lubertcp@jmu.edu, 1-540-568-2922.

### INTRODUCTION TO PROBABILISTIC METHODS IN RELIABILITY MODELING

**C. Richard Cassady, Ph.D. University of Arkansas**

This tutorial provides attendees with basic coverage of the traditional, fundamental probability models used to describe, improve, and optimize system reliability and maintainability. The course content includes a probability primer, a review of static reliability models, a random variable primer and a detailed review of time dependent "black box" reliability models.

### ACCELERATED DEGRADATION TESTING AND ANALYSIS

**Dr. Guangbin Yang, Ford Motor Company**

Accelerated degradation test is an emerging technique for effectively estimating the reliability of many products. Traditionally, accelerated life test is usually employed to estimate product life distribution at the design stress level. This tutorial presents accelerated degradation test methods, degradation models, estimation of model parameters, relationships between degradation and reliability, and estimation of reliability at the design stress level.

### RISK MANAGEMENT PRINCIPLES AND TECHNIQUES

**Richard B. Jones, Solomon Associates**

Even though risk management is not a new topic in life, science, or business, there has been a growing emphasis on applying formal risk-based methods to decision-making. This tutorial provides a foundation for scientists, engineers, and business executives to explicitly apply risk-based approaches to help solve problems in their disciplines. The emphasis in the tutorial is on understanding risk and its many attributes, using both subjective and quantitative examples.

### INTRODUCTION TO R&M MANAGEMENT (RELIABILITY FROM DESIGN INCEPTION TO PRODUCT RETIREMENT)

**Dr. Duane L. Dietrich, ReliaSoft**

This tutorial presents an outline of a cohesive structure for reliability testing throughout a product's life cycle. In this structure the design of each successive test is based on analysis, expert opinion, past data obtained from similar products in the field and data from earlier tests. The appropriate location and use of several different reliability tests are discussed and the implementation of engineering change orders to fielded units, to reduce failures, is covered.

### SYSTEM SAFETY: PRINCIPLES AND BEST PRACTICES

**Dev G. Raheja, PE, CRE, Design for Competitiveness, Inc**

This tutorial is presented by a veteran of the System Safety Society. The goal is to introduce the science of system safety and how to implement safety measures proactively and efficiently. It is intended for beginning level engineers and intermediate level practitioners in design and safety. Technical managers in all engineering fields will find it a good overview of system safety.

### INTRODUCTION TO LIFE DATA ANALYSIS

**Dr. Clifford H. Lange, Structural Integrity Assoc., Inc. and Dr. Caroline P. Lupert, James Madison University**

This tutorial provides an introduction to key concepts and techniques used in statistical analysis of reliability, maintainability and supportability data. The rationale behind the use of qualitative and quantitative tools to advance the understanding of underlying failure mechanisms is explained. Key concepts associated with statistical analysis of data are defined and widely used analysis techniques are discussed in terms of the mechanics of analysis and interpretation of results.

### ACHIEVING AVAILABILITY COST-EFFECTIVELY IN COMPLEX SYSTEMS

**Pierre Dersin, Ph.D., ALSTOM Transport Information Solutions**

Availability is one of the key performance criteria in today's complex systems. In this tutorial, different types of policies will be discussed as well as modeling methods will be presented in order to compare maintenance policies and testability characteristics, and to assess their impact on the system availability as well as life-cycle-cost.

### FRACAS CORRECTIVE ACTION FUNDAMENTALS, BEST PRACTICES, & APPLICATION

**Jennifer Akers, Brad Cline, Relx Software Corporation**

This tutorial introduces basic information about closed loop corrective action processes such as FRACAS. Closed loop corrective processes may collect a wide range of data, from test and field data to repair data. Customizable outputs can be any number of both qualitative and quantitative outputs. Also addressed are several of the key obstacles, best practices suggestions, a proven methodology, and several case studies relevant to closed loop corrective action processes.

### INTRODUCTION TO FAULT TREE ANALYSIS

**Professor John Andrews, Loughborough University**

A fault tree represents the causes of a specified system failure mode in terms of the failure modes of the system components. The analysis of the fault tree can produce two types of results: qualitative and quantitative. Qualitative results specify the minimal contributions of component failures which can result in system failure. Quantification provides the probability or frequency of the system failure modes. The tutorial will explain the mathematics used to perform a fault tree analysis. A considerable focus of the tutorial will also be on the development of the fault tree model from the engineering system.

### OPTIMIZING MAINTENANCE AND REPLACEMENT DECISIONS

**Professor Andrew K. S. Jardine, University of Toronto**

The objective of the tutorial is to focus on managing risk through using the techniques of optimization and selecting the most appropriate analytical tools. Whether the decision is about the replacement of component-parts or entire equipment units, the concept of making the very best decision will be the principal concern of the tutorial. All decision problems are supported by case studies.

### FUNDAMENTALS OF FAILURE MODES AND EFFECTS ANALYSIS

**Dr. John B. Bowles, University of South Carolina**

This tutorial focuses on how to perform a FMEA, shows how the analysis results are used, and shows how it should be integrated into the design process to maximize its effectiveness. The methodology can be usefully employed throughout the design cycle from concept exploration to production and deployment. A brief discussion of tools designed to reduce the amount of labor involved in a FMEA and their ability to facilitate analysis is provided.

## **MARKOV-CHAIN MODELING AND ANALYSIS**

**Dr. Lisa M. Maillart, University of Pittsburgh**

Markov chains are a class of stochastic processes that can be used to model a wide variety of issues related to reliability and maintainability. This tutorial covers the fundamental concepts of discrete-time and continuous-time Markov chains and some advanced concepts related to Markov modeling and decision-making.

## **DESIGN FOR RELIABILITY**

**Valter Loll, Nokia Mobile Phones R&D**

The purpose of this tutorial is to describe how the reliability activities change as a company goes from a Test Analysis and Fix product development strategy into a design for reliability strategy. The reliability specialists must be directly involved in many of the activities through the product development process to ensure that the hardware and software design engineers have the information they need to include reliability into the product design.

## **STATISTICAL ANALYSIS OF FIELD DATA FOR REPAIRABLE SYSTEMS**

**Dr. David C. Trindade and Dr. Swami Nathan, Sun Microsystems, Inc.**

The purpose of the tutorial is to present simple graphical methods for analyzing the reliability of repairable systems. Many talks and papers on repairable systems analysis deal primarily with complex parametric modeling methods. Because of their highly esoteric nature, such approaches rarely gain wide acceptance into the reliability monitoring practices of a company. This tutorial will present techniques based on non-parametric methods which have been successfully used within Sun Microsystems

## **DEVELOPING "DEGREE OF BELIEF" IN TESTING**

**Tearesa L. Wegscheid, and Greg P. Smith, Whirlpool Corporation**

How many samples do we need and for how long do we test? What does a 90% confidence level mean and is that the same as being 90% confident that the design is good? As a reliability professional, how do we answer such questions? The goal of the presentation is to make a distinction between a confidence level and the "degree of belief" and discuss ways to develop a "degree of belief" in testing.

## **PRACTICAL PROCEDURES FOR OBTAINING VIABLE OUTPUTS FROM SIMULATIONS**

**Kenneth E. Murphy, Brass Analytics and Charles M. Carter, ARINC Engineering Services, LLC**

This tutorial provides practical simulation methods for resolving common reliability parameters with sufficient precision. Construction of convergence plots that indicate when to terminate a simulation study are discussed. Numerous examples are provided to illustrate the convergence concepts and solidify the material. The tutorial also discusses common random numbers, antithetics, multiple computing aggregation, delayed statistics gathering and random startup simulations.

## **STATISTICAL WARRANTY FORECASTING**

**Dr. Vasilij V. Krivtsov, Ford Motor Company**

This tutorial reviews probabilistic models and statistical methods used for the forecasting of warranty claims and their associated cost. The discussion is illustrated by case studies from the author's corporate and consulting experience. Also included is an overview of certain aspects related to warranty data collection and analysis, such as, for example, data "maturation" phenomenon. The tutorial is intended for the basic-to-intermediate audience level, although a few advanced topics will be covered too.

## **HUMAN RELIABILITY ANALYSIS**

**Joseph R. Fragola, PE, Valador, Inc.**

This tutorial will introduce the student to the role that Human Error plays in system risk and the methods used to assess quantitatively that risk in the context of an overall Probabilistic Risk Assessment.

## **PROGNOSTICS**

**Dr. J. Wesley Hines, University of Tennessee**

The purpose of this tutorial is to introduce attendees to empirical modeling techniques for process and equipment monitoring, detection, diagnostics, and prognostics. The tutorial will provide a brief background and an overview of the theoretical foundations. The course will be applications oriented in that the assumptions inherent in the techniques will be explained so that the appropriate technique can be selected and applied to solve specific engineering problems. Case studies are included.

## **OPTIMIZATION METHODS**

**Dr. Thomas Yeung, Le'Ecole de Mine and Dr. Edward A. Pohl, University of Arkansas**

This tutorial provides an overview of the use of optimization in a variety of reliability and maintenance settings.

## **PAPER SESSIONS**

Over 90 technical papers are planned for 23 Paper Sessions. These papers were selected from a much larger number of abstracts received in response to the 2009 Annual Reliability and Maintainability Symposium Call for Papers. Selection is based on quality of the paper and relevance to the Symposium.

## **COMPLEX SYSTEM RAM MODELING AND ANALYSIS**

This session covers a range of modeling and analysis of complex systems. These include improved analysis of fiber bundle models, a new probabilistic assessment tool for repairable and non-repairable systems, using quantitative evaluations for evaluation of weighted networks, and integrated model to measure the reliability of a System of Systems (SoS).

## **WEIBULL ANALYSIS**

The Weibull Analysis Session will promote the use of some advanced methods for improving the accuracy and capability of the widely used Weibull variability model. The Weibull distribution is the world's most popular model for life data analysis, and offers solutions in other areas such as Six-Sigma quality control programs and maintenance analysis.

## **ACCELERATED LIFE TESTING**

New ways to think about accelerated life test (ALT) will be covered in this session. Topics include accelerated degradation test (ADT), application of Bayesian inference to ALT models for the estimation by Maximum of A Posteriori (MAP) method, and six challenges to consider during the planning and implementation of an ALT.

## **RELIABILITY PREDICTION**

Reliability prediction analysis focuses on calculations of the rate at which a system or its component will fail. Prediction is one of the most common of reliability analyses. This session will present some reliability prediction techniques based on warranty data, random operating stresses and mechanical loads as well as operating temperature impact. These techniques can be generalized for other sources of data as well.

## **STUDENT SESSION 1 - PROGNOSTICS AND ACCELERATED LIFE TESTING**

This session is the first of three sessions highlighting student research in reliability and maintainability. The papers in this session focus on prognostic and accelerated life testing techniques and the impact of these techniques on product design, evaluation, and performance. These papers are eligible for the new RAMS Student Paper Awards that will be presented at the Symposium Banquet on Wednesday night.

## **STUDENT SESSION 2 - R&M MODELING AND OPTIMIZATION**

This session is the second of three sessions highlighting student research in reliability and maintainability. The papers in this session focus on the use of mathematical modeling for evaluating and improving reliability and maintainability performance. These papers are eligible for the new RAMS Student Paper Awards that will be presented at the Symposium Banquet on Wednesday night.

## **SPECIAL SESSION - NASA**

The session presents a spectrum of applications of reliability and risk technology within the NASA civil servant and contractor community.

## **STUDENT SESSION 3 - RISK ANALYSIS AND SYSTEM SAFETY**

This session is the third of three sessions highlighting student research in reliability and maintainability. The papers in this session focus on the analysis of risk and/or safety as it related to system reliability. These papers are eligible for the new RAMS Student Paper Awards that will be presented at the Symposium Banquet on Wednesday night.

## **APPLICATIONS IN AEROSPACE**

This session will present a number of reliability and performance analyses that focus on aerospace applications. The balance between reliability and performance is a key factor in the development of space exploration architecture, mission, vehicle, or technology design. A more accurate reliability prediction will be an opportunity to optimize a space vehicle design and lower the likelihood of a critical system failure.

## **SYSTEM SAFETY PROCESSES**

This session includes a diverse set of papers that discuss various aspects of how RAM analysis techniques and process methodologies support System Safety.

## **APPLICATIONS IN AERONAUTICS**

This session encompasses several reliability, availability prediction techniques and safety approaches in the domain of aeronautic design and production. It aims to demonstrate that reliability and availability management need to address specific aspects from complex system accelerated life tests to supplier requirements and management.

## **INFRASTRUCTURE RISK ASSESSMENT**

Various authors explain how they used approaches such as combining performability and reliability, physics-based analysis, Bayesian networks, statistical diagnostics, and real-world risk management, in order to improve availability and reduce the risk associated to developing or operating infrastructures.

## **RAM MANAGEMENT**

This session covers government and industry efforts to improve the manner in which reliability programs are managed. It includes specific presentations on new standards and discusses a methodology for determining the return on investment associated with reliability programs.

## **REPAIRABLE SYSTEMS 1**

This session discusses methodologies and techniques that can be used in determining or establishing optimal maintenance strategies considering system age, and maintenance effectiveness.

## **FMEA — DISSECTED AND IMPROVED**

Even though FMEA is a tool used successfully by many, several improvements can be made to the methodology, to make it robust. This session deals with the practical success stories of the tool across the industrial spectrum, its shortcomings and ways to enhance the methodology to make it effective and powerful. Both beginners and advanced users will learn to get more out of using FMEA for failure mitigation, risk management and reliability.

## **REPAIRABLE SYSTEMS 2**

Various issues regarding repairable systems are discussed in this session, including modeling, testing, optimization and the use/misuse of MTTF/MTBF.

## **RELIABILITY GROWTH**

This session discusses reliability growth techniques. It presents examples of the benefits of reliability growth and offers new methodologies for measuring and assessing the reliability growth on discrete systems.

## **COMMUNICATION NETWORK AND SERVER CONNECTIVITY ANALYSIS**

Whether it's IP networks or database systems, they need to be evaluated for reliability and availability. This session covers everything from unavailability analysis of IP networks, reliability of IP networks, modeling of enterprise server memory systems and impact on availability of switchover times in distributed database systems.

## **SYSTEM RELIABILITY MODELING AND ANALYSIS**

New methods in performing system reliability modeling and analysis are discussed. These methods include a reliability analysis for standby systems, a truncation approach combined with the decomposition method for system fault tree analysis, consideration for 2 types of shock for a fault tolerant system, and analysis of a power system used in a high speed rail application.

## **PROGNOSTICS AND HEALTH MANAGEMENT**

This session addresses various aspects of how reliability design decisions ensure Condition Based Maintenance and Prognostics and Health Management strategies that result in a competitive advantage.

## OPTIMIZATION METHODS

Optimization is crucial in system design and in program operation. This session presents several optimization methods to achieve various goals. From task scheduling to spares allocation, optimization issues are discussed. Reliability, maintainability, and cost analyses are addressed which lead to the optimized design or operation.

## RELIABILITY OF ELECTRONIC DEVICES AND COMPONENTS

This session presents several papers on specific electronic-oriented issues. Early unbalanced failure modes, corrosion, modeling of microelectronics are among subjects that are presented by experts of the domain.

## SOFTWARE RELIABILITY METHODS

Software Reliability methods are the focus of this session. Topics include: software reliability growth modeling of fault detection and correction processes; software complexity metrics and testing effectiveness; use and improvements of *SysML* in reliability; and software failure modes and effects analysis applied to interfaces.

## PANEL SESSIONS AND WORKSHOPS

### GENERAL CHAIR'S WELCOME AND KEYNOTE SPEAKER

**Dr. Richard Jones**, *General Chair, 2009 RAMS*

The 2009 Keynote Speaker this year is the **Honorable William E. Wright** from the United States Chemical Safety and Hazard Investigation Board. Mr. Wright will share with us several actual situations through computer animation of how organizational, equipment, and human reliability influence the complex nature of reliability in the chemical process industries. The title of his keynote address is: Reliability – At what price?

### ADVISORY BOARD PANEL

Leaders from industry and government will discuss the technical, management, and training issues associated with using reliability as a competitive advantage in today's global business environment. Symposium attendees may submit questions in advance to the panelists or raise them from the floor.

### RELIABILITY: HOW TO MEASURE THIS CONCEPT

The panel has been invited to discuss reliability measures. This includes the effective and not so effective methods. How to best use and avoid misuse of these important business and operations metrics. Learn how to talk about reliability in a meaningful manner across your organization and supply chain.

### R&M EXHIBITORS' PRESENTATIONS & DEMONSTRATIONS

R&M CAE tools continue to evolve in support of industry's business processes. Our RAMS Exhibitors will highlight their latest functionality through brief presentations and demonstrations in a neutral setting. Please check outside the room for the vendor presentation schedule.

## RAMS 2009 Registration Options and Rates

The registration fee for the Symposium is \$950.00. Discounts are available for those registering online with a credit card prior to January 9, 2009, for members of sponsoring societies, for students, and for groups of six or more. Please go to [www.rams.org](http://www.rams.org) for details and to register. Hotel reservations must be made directly with the hotel before January 5 to qualify for the RAMS discount rate. There is a link to the hotel web site on the RAMS Registration web page [www.rams.org/registration](http://www.rams.org/registration). If you need further information for symposium registration please contact:

#### RAMS Registration Contact Information:

Dr. Raymond W. Sears, Jr.  
23 Fairway Drive  
P.O. Box 1407  
Grantham, NH 03753-1407 USA

Phone: 1-603-863-2832 (8 AM - 10 PM Eastern Standard Time)  
E-mail: [r.w.sears@ieee.org](mailto:r.w.sears@ieee.org) (For information only)

#### Hotel Information:

The Worthington, A Renaissance Hotel  
200 Main Street  
Fort Worth, TX 76102 USA

Phone: 1-800-228-9290  
1-817-870-1000  
Fax: 1-817-338-9176

## IEEE Travel Services for RAMS

For your convenience, airline tickets and car rentals may be booked through IEEE's corporate travel agency, World Travel Inc.

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Grantham, NH 03753-1407 USA

**Annual Reliability AND  
Maintainability Symposium**

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**An Invitation To:**

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**OUR 55<sup>th</sup> YEAR**



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The Worthington, A Renaissance Hotel  
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## 2009 IEEE International Reliability Physics Symposium (IRPS)

The 47<sup>th</sup> IEEE International Reliability Physics Symposium (IRPS) will be held at the Fairmont the Queen Elizabeth Hotel, Montreal, Quebec, Canada, April 26 ◆ 30, 2009. For nearly 50 years IRPS has been the leading conference in the area of microelectronics reliability. This comprehensive meeting is an ideal opportunity for scientists and engineers to present their latest results and also to stay current with recent developments in the reliability community.

IRPS was started in the 1960s by the military and aerospace communities, and is now jointly sponsored by the IEEE Electron Devices Society and the IEEE Reliability Society. The meeting has consistently drawn attendees from North America, Europe, Asia, and other parts of the world. This year, to reflect the trend towards the increasing number of fables companies, a new technical focus on fables semiconductor companies is being introduced. Tutorials and papers which address the technical challenges assuring product reliability in a fables/foundry environment will be part of the program.

The highlight of the conference consists of three days of parallel technical sessions in which scientists and engineers working in the area of microelectronics reliability present their original research. The presentations focus on areas such as identification of new failure mechanisms in emerging technologies, improvement in understanding of known failure mechanisms, and demonstration of new techniques for reliability evaluation. Technologies addressed include silicon-based integrated circuits, compound semiconductor devices, and emerging devices such as organic electronics and nanoelectronics. Specific topical areas to be addressed at IRPS 2009 are:

- ◆ Product Reliability and Burn-In
- ◆ Non-Volatile Memory
- ◆ Qualification Strategies
- ◆ Circuits
- ◆ Assembly and Packaging
- ◆ Failure Analysis
- ◆ MEMS
- ◆ Device and Process
- ◆ Transistor
- ◆ Interconnects
- ◆ Device Dielectrics
- ◆ ESD and Latch-Up
- ◆ Process Induced Damage
- ◆ Nanoelectronic Device Reliability

In addition to the technical platform presentations, presenters submit papers that discuss their work in more depth. Electronic copies of all conference papers will be provided to each attendee.

Other opportunities at the conference include:

**Tutorial Program.** Two days of tutorials will be presented covering various areas of microelectronics reliability. Examples of tutorial topics are areas such as fables/foundry reliability requirements, high-k

stack reliability, BEOL reliability, and fundamentals of reliability wear-out mechanisms. For each tutorial, a recognized expert collects and presents key information, offering a comprehensive overview of the topic to the attendees. This provides people new to the field with a thorough introduction to the topic, and also affords experienced researchers an opportunity to review and discuss with their colleagues important reliability issues and challenges that are currently faced in the industry. Copies of the presenters' slides will be provided to attendees.

**Reliability Year-In-Review.** At the year-in-review, a summary of the most significant new developments in the reliability community over the past year is given. This serves as a convenient, single source of information for attendees to keep current with the recent reliability literature. A copy of the year-in-review slides will be provided to attendees.

**Evening Workshops.** The evening workshops provide attendees with an opportunity to discuss key areas of concern in an informal setting under the guidance of a moderator experienced in the field. Many of the workshops are directly coupled to the technical program, thereby providing a venue for in-depth discussion of the topic.

**Evening Poster Session.** The poster session provides an additional opportunity for authors to present their original research. The setting is informal and allows for easy discussion between authors and other attendees.

**Equipment Demonstrations.** Held in parallel with the tutorial and technical sessions, the equipment demonstrations provide a forum for manufacturers of state-of-the-art laboratory equipment to present their products. Attendees are encouraged to visit the manufacturers' booths for information and demonstrations.

Best paper, best poster, and best student paper awards will be given. To qualify for the best student paper award, the IRPS presenter must be a student and must also be the first author of the paper.

Finally, this is an exciting year for IRPS. This will be the first IRPS held outside of the United States. We encourage everyone to consider attending this year's IRPS in beautiful Montreal, Canada. Montreal is actually two cities in one: a beautiful old city and an active modern city. Come be a part of the excitement and join us at IRPS 2009!

For further information, visit the IRPS website, [www.irps.org](http://www.irps.org). You may also contact the 2009 IRPS General Chair, Ronald Lacoë, either by email at [ronald.c.lacoe@aero.org](mailto:ronald.c.lacoe@aero.org), or by phone at 1-310-336-0118. We look forward to seeing you in Montreal!

Robert Kaplar  
2009 IRPS Publicity Chair  
Sandia National Laboratories  
Albuquerque, NM, USA

## CALL FOR PAPERS

IEEE Systems Journal  
Special Issue on Biometrics Systems

The increasing needs for security as well as medical diagnosis make biometrics more and more valuable world-wide, both as theory; technologies, design methodologies, and applications are concerned.

To create a biometric system various issues need to be studied in an integrated way: from sensing to measurement procedures, from signal analysis and interpretation to quality assessment, from feature extraction to classification and analysis, from knowledge creation to extraction, from algorithms to data structure, from computational complexity to system performance, from system engineering to software engineering, from privacy to social implications, and much more. Integration and cooperative combination are another key aspects of biometrics systems and applications.

This special issue is directed to collect original papers that address any aspect of the design, implementation and application of biometrics systems, by focusing on a system-level perspective. The detailed call for papers is available at <http://www.dti.unimi.it/~piuri/pages/ISJ-SpecialIssueBiometricsSystemsCFP.pdf>

The submission deadline is January 15, 2009. Acceptance notification is expected by April 15, 2009 and publication in August 2009.

Guest Editors of this special issue are: Vincenzo Piuri, University of Milan, Italy; Jie Tian, Chinese Academy of Sciences, China; and Evangelia Micheli-Tzanakou, Rutgers University, USA.

Questions about the special issue should be directed to Prof. Vincenzo Piuri ([vincenzo.piuri@unimi.it](mailto:vincenzo.piuri@unimi.it)).

## CALL FOR PAPERS

IEEE Transactions on Instrumentation and Measurement  
Special Issue on Biometric Instrumentation and Measurement

Biometrics is a growing and important applications area receiving significant interest as a result of the criticality and the social impact of its applications. In addition, the increasing worldwide interest in security makes biometrics even more valuable and desirable, from many perspectives including its theory, technologies, design methodologies, and applications. The constituencies that may benefit from this ever growing field include academia, industry, government, and the general public.

To create a biometric system various issues need to be studied in a comprehensive and integrated way: from sensing to measurement procedures, from signal analysis and interpretation to quality assessment, from feature extraction to classification and analysis, from knowledge creation to extraction, and much more. Integration and cooperative combination are other key aspects of biometrics applications.

This special issue is focused on publishing original papers that address instrumentation and measurement aspects of the design, implementation and applications of biometrics. The detailed call for papers is available at <http://www.dti.unimi.it/~piuri/pages/TIM-SpecialIssueBiometricIMCFP.pdf>

The submission period is February 15 - March 1, 2009. Notification of final acceptance is expected by June 30, 2009 and publication in December 2009.

Guest Editors of this special issue are: Fabio Scotti, University of Milan, Italy; David Zhang, The Hong Kong Polytechnic University, Hong Kong; Evangelia Micheli-Tzanakou, Rutgers University, USA

Questions about the special issue should be directed to Dr. Fabio Scotti ([fabio.scotti@unimi.it](mailto:fabio.scotti@unimi.it)).

# CALL FOR PAPERS

## Computer-Aided Validation and Verification of Architectures for Complex Systems

(July/August 2009 issue)

**Deadline for submissions: 17 November 2008**

**Guest editors: Bret Michael (Naval Postgraduate School)  
and Phillip Laplante (Penn State University)**

Today's complex systems come in many different forms, such as distributed, reconfigurable, system-on-chip, service-oriented, and even system of systems. Architecture plays an important role in shaping the behavior and quality of these systems. In particular, architecture is distinguishable by the fact that it influences non-functional attributes of a system that are difficult to detect using computer-aided technology.

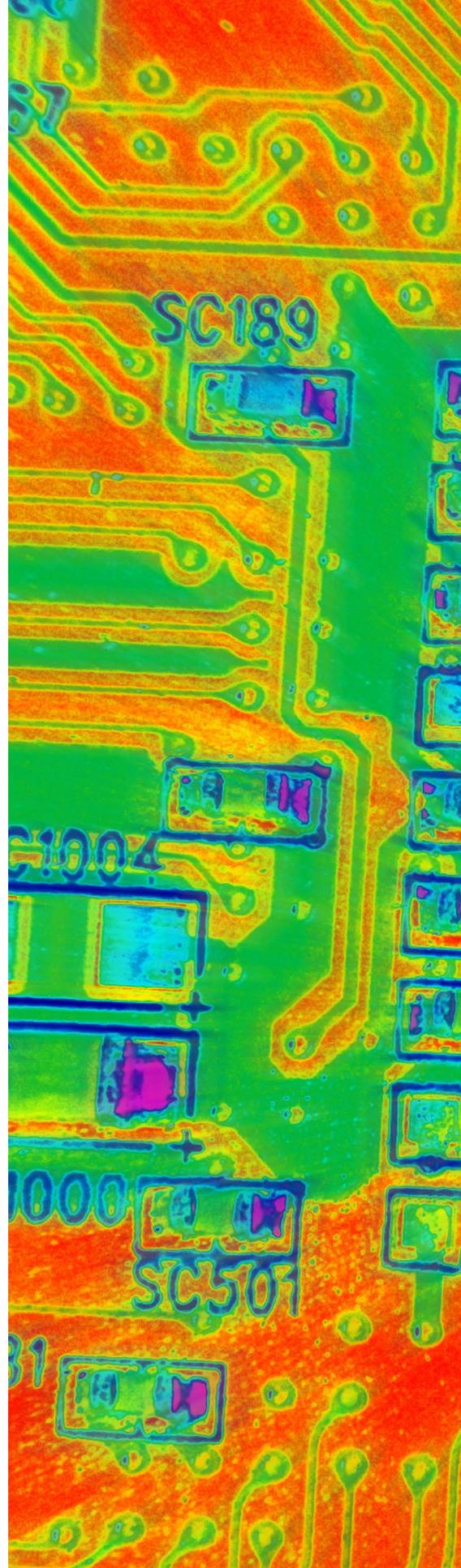
At present the validation and verification (V&V) of system architecture is a human-centered effort. We invite papers that address the use of computer-aided technology to assess architectural decisions, and their impact on product specification (validation) as well as correct product implementation (verification).

We seek feature articles with an in-depth coverage of topics relating to computer-aided V&V of architecture. Among potential topics are:

- Runtime monitoring
- Automatic test generation
- Model checking
- Schedulability
- Protocol analysis
- Performance analysis
- Modeling and simulation
- Rapid system prototyping

---

*Submissions will be subject to peer-review resulting in refereed scientific papers. Articles should be understandable to a broad audience of people interested in security and privacy and be less than 6,000 words. The writing should be down-to-earth, practical, and original. Authors should not assume that the audience will have specialized experience in a particular subfield. All accepted articles will be professionally copyedited according to the IEEE Computer Society style guide.*



**Submit a manuscript:**

**[www.computer.org/portal/pages/security/author.xml](http://www.computer.org/portal/pages/security/author.xml)**

**Preliminary Announcement**

**Reliability OutReach Seminar & Workshop**

**Developing Highly Reliable and Trustworthy  
Engineering Systems**

**14-15 September 2009  
University of Greenwich,  
World Heritage Site, Prime Meridian, London, England**

**Day 1 - Seminar**

**Safety and Reliability on the NASA Space Shuttle-A Look Back**

Alfred Stevens, Director of the Safety Advocate's Office in Florida (Retired), United Space Alliance

**Microelectromechanical Systems (MEMS) Reliability**

Richard L. Doyle, P.E., Consultant

**Developing World Class Products with "Design for Six Sigma" (DFSS) Tools**

Dr. Samuel Keene, Six Sigma Master Black Belt, Keene and Associates

**Reliable by Design?**

Scott B. Abrams, P.E., President, The Omnicon Group Inc.

**Compliance is not enough**

Bob Page, Reliability Plus

**Product Reliability – Managing the Time-Bomb**

Dr. Nihal Sinnadurai, CEO & CTO, ATTAC

**Juggling the Software Assurance Puzzle Pieces**

Dr. Jeffery Voas, Director of Systems Assurance and Technical Fellow, SAIC

**System Prognostics**

Prof. Chris Bailey, Director, Computational Mechanics & Reliability, University of Greenwich

**A Walk Through Obtaining a U.S. Patent**

Dr. William R. Tonti, President IEEE Reliability Society, Manager IBM CMOS Modelling and Release

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## Preliminary Announcement

# Reliability OutReach Seminar & Workshop

## Day 2 – Workshops & Breakout Sessions

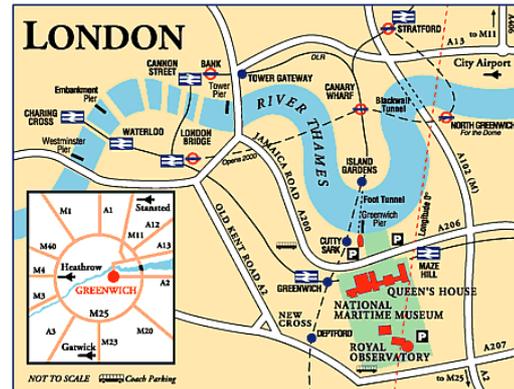
Specific Topics will be selected from Day 1 Seminars to enable detailed discussion and debate. Breakout sessions will be held for specific topics to be pursued.

### Accommodation

A number of hotels including the IBIS and Novotel are located within walking distance to the University. Some University accommodation may also be available. Further details will be announced in the near future.

### Greenwich

Located in South East London Greenwich is World Heritage Site. With the stunning buildings of the University of Greenwich, the Maritime Museum and the Royal Observatory there is plenty to do. In addition to its historical heritage Greenwich has excellent restaurants, pubs and a market.



### Travel

Greenwich is connected by train to all of the London Airports and well connected to the London Underground and Bus System. The nearest train station is Cutty Sark on the Docklands Light Rail (DLR) system which is a pleasant five minute walk from the University campus.



Welcome to the Reliability OutReach Seminar and Workshop at the University of Greenwich

