



## Reliability Society

### NEWSLETTER

Vol. 51, No. 2, May 2005

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## President's Message



#### Dear IEEE Reliability Society Members:

In this brief message, I'd like to update you on: (1) the general status of the Society, and (2) what actions have been taken and will be taken by the Administrative Committee (ADCOM) throughout the rest of 2005.

To begin, the financial state of the Society is healthy as a result of an excellent surplus during 2004. That surplus was the result of strong investment returns, and careful cost containment by the ADCOM. Also, we recently modified the by-laws of the Society to allow for officer elections (for the next year) to occur far earlier than in the past. That allows the newly elected officers to begin to grow into their roles and work with the outgoing officers. This will also allow for better continuity between successive management teams.

Our officers for 2006 have already been elected, and I am happy to announce that they are:

President -- Bill Toni  
VP Meetings -- Sam Keene  
VP Tech Ops -- Shuichi Fukuda  
VP Membership -- Marsha Abramo  
VP Pubs -- Christian Hansen

In our April ADCOM meeting in San Jose, a variety of motions and actions were brought before the ADCOM, and I'd like to now highlight a few of those. To begin, we have decided to set aside \$10K for student scholarships in 2006. We are looking into the process of how to judge and evaluate students to determine merit. That task is underway.

Secondly, we have successfully started the process to bring back standards 1413/1413.1 to the Society. That process is not totally completed, but we do not anticipate any problems.

Third, we are in the process of building an operations manual for how all of the elected positions and groups within the Society operate. This was a core recommendation that came out of the Society Review that we underwent in San Francisco in February. Further, we have been asked to create a set of core values for the Society, define our best business practices, re-evaluate our field of interest statement as well as our mission statement, and will be asked to provide this information back to IEEE by the end of the year. In short, the evaluation committee that examined the Society felt that we lacked certain discipline that other Societies have. While I disagree with that finding, I do believe that putting more information about who we are and how we operate in writing is a beneficial (although painful) exercise.

Fourth, we opted to spend \$7.5K to further advance our cyber-security initiative. If you recall, this initiative is designed to open up a new set of opportunities in the area of ?trust? and ?trustworthy? systems. These new areas will involve safety, fault tolerance, security, and other needed factors related to system and component trust. The cyber-security initiative has to date only been funded by volunteer effort and the Institute. To create our first working product, we were asked to spend this small amount of money, and we hope to have this product completed by July 1.

Fifth, we are in talks with the Institute about working on a variety of new products related to trust. The cyber-security initiative is only the first that we foresee. We may create new conferences, a magazine, and educational offerings. All are in the discussion stages at this time, and so throughout the remainder of 2005, we will be deciding which to select. We did,

however, vote to seed a new reliability conference in Asia in 2006, and we also set aside funds in 2006 for other conferences related to reliability and trust. And later this year, we will be sponsoring tutorials in Japan (that will be tied into a major conference there).

And finally, our next ADCOM meeting will be in Monterey, CA. Dr. Bret Michael of the Naval Postgraduate School has offered to host the event, and that will occur on July 30<sup>th</sup>.

In summary, your ADCOM is working very hard to be responsive to the members while mindful of the rules that the Institute places on how the ADCOM operates and what we can offer.

Have a Great Summer!

**Jeffrey Voas**

<mailto:JEFFREY.M.VOAS@SAIC.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 [Lchase@ieee.org](mailto:Lchase@ieee.org).

<b>February</b>	<b>Inputs due January</b>
<b>May</b>	<b>Inputs due April</b>
<b>August</b>	<b>Inputs due July</b>
<b>November</b>	<b>Inputs due October</b>

Publishing of advertisements will be available in future issues. Advertisements will be accepted in common graphic format.

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### **Society Announcements**

#### **Congratulations!!! Our 2006 Elected Officers are:**

President -- Bill Tonti

VP Meetings -- Sam Keene

VP Tech Ops -- Shuichi Fukuda

VP Membership -- Marsha Abramo

VP Pubs -- Christian Hansen

#### **Chapter Congress 2005**

The Chapter Congress will be held July 30, 2005 in Monterey, CA in conjunction with the EXCOM/ADCOM meeting. Chapter Chairs or representatives are invited.

Contact Loretta Arellano

Chapter Advocate

[Ljarellano@raytheon.com](mailto:Ljarellano@raytheon.com)

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### **Society Solicitations**

#### **Reliability Society Engineer of the Year Award for 2005**

The IEEE Reliability Society is soliciting nominations for its Reliability Society Engineer of the Year Award for 2005. This award is aimed to recognize key contributions to the Reliability profession within the last few years. Nominees will be considered according to the following

criteria:

- **Reliability Contributions**
  - Reliability Technical Contributions
  - Reliability Management Contributions
  - Reliability Publications
  - Contributions to Reliability Education
- **Professional Services to IEEE**
  - Reliability Society Service
  - Other IEEE service positions

An administrative superior of the nominee (e.g. department head, supervisor, or chapter chair) should make and submit the nomination. The nomination package should consist of a one-half page biography of the nominee plus up to four pages of concise descriptions of the accomplishments. For technical contributions, please concisely describe why the contribution is unique. For managerial and educational contributions, please concisely explain the obtained benefits. Please limit identified publications to only those in which the nominee was the sole or principal author. The accomplishments should be organized according to the above-described criteria. The nominations must be submitted by 1 October 2005. Send the nominations to Dennis Hoffman, your Society's Jr. Past President, at [d.hoffman@ieee.org](mailto:d.hoffman@ieee.org)

### **Reliability Society Lifetime Achievement Award for 2005**

The IEEE Reliability Society is soliciting nominations for its Reliability Society Lifetime Achievement Award for 2005. The IEEE Lifetime Achievement Award was created to recognize sustained outstanding contributions to the field of Reliability Engineering. Typically the contributions will span the career of the individual, usually in excess of 25 years. The contributions meriting this award must clearly be within the area of Reliability Engineering.

Nominations must be submitted by a peer or supervisor of the nominee. Self nominations or nominations from a member of the IEEE Reliability Society Nominations and Awards Committee will not be accepted. The nomination package should consist of a one-half page biography of the nominee plus up to four pages of concise descriptions of the nominee's lifetime accomplishments / achievements. Nominations may be submitted until the end of September 2005. Send the nominations to Dennis Hoffman, your Society's Jr. Past President, at [d.hoffman@ieee.org](mailto:d.hoffman@ieee.org)

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## **Chapter Activities**

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## **Technical Operations**

### **Society Technical Committee Recruiting Notice**

The IEEE Reliability Society national organization is recruiting technical committee members and possibly committee chairpersons for the following technical committees: Software Reliability, System Safety Technology, Human Interface Technology, Mechanical Reliability, Standards & Definitions, CAD/CAE, Microelectronic Technologies, Industrial Systems, Sensor Systems, Information Technology & Communications, Consumer Electronics, International Reliability, Aerospace & Defense Systems, Testing and Screening Technology, Automotive Systems, Energy Systems, 6 Sigma Reliability, Medical Systems, Reliability Design, Warranty, Nuclear Reliability, Maintainability Technology, Assurance Technology, and Emerging (New) Technology.

The basic work for each technical committee consists of developing plans associated with the reliability aspects of the respective field, both present day tactical issues, and long term strategic direction. This is accomplished through four short quarterly written reports that are edited and compiled by the reliability society technical operations editor, and placed in the Reliability Society newsletter, which can be found on our [Web site](#). Additionally, an annual written assessment of the technology in the committee's area of interest is requested. This Annual State of Reliability Technology Report is published world wide, and receives a high level of readership and interest from communities that extend well beyond the IEEE and the Reliability Society. It has become the societies cornerstone publication.

Other work may include the development of standards, guidelines and educational tutorials through the society infrastructure. Working in one of the technical committees is an excellent opportunity to "network" and keep your knowledge current. If you are interested, please contact me and send a short biography with an indication of your experience in the field of interest.

If you do not have a direct interest in either of the above opportunities, please pass this to a fellow reliability, hardware, software, or systems engineering professional who might have an interest.  
Thanks for your consideration.

Shuichi Fukuda  
VP Technical Operations  
E-mail: [ShuFukuda@aol.com](mailto:ShuFukuda@aol.com)

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A list of the Technical Committees and their Chairs:  
[IEEE RS Technical Committees](#)

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### **Technical Committee Activities Focus Spot**

#### **Excerpts from the Annual state of Reliability Technology Report**

To be included in future newsletters!

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### **Announcements**

[IEEE Transactions on Reliability, Special Issue on Reliability Studies on Nanotechnology](#)  
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## Prognostic Health Management (PHM); The Basics

By Lon Chase

*This article is intended to provide an overview of the PHM methodology. Detailed description of the prognostic technologies and in-depth discussion of the ?science? behind prognostics are not within its scope. Hopefully the reader will obtain sufficient general awareness and knowledge of PHM to spur further research on the topic if desired.*

### Introduction

Traditional fault monitoring dealt with detection, reporting and system response to hardware failures. This resulted in a reactive based reliability and maintenance. Failures occurred and the system degraded or failed altogether. The system's intended function was lost, partially or fully, requiring repair before restoration of function. No matter how good the fault detection and diagnostics, the system still failed unexpectedly. In the least, this inconvenienced the user, or in the worst case, resulted in catastrophic failure with potential safety implications.

Recent challenging requirements for system availability and reduction of support, particularly high end systems, is driving the need for a paradigm shift in health monitoring and maintenance. Systems can be much more complex, yet are expected to have greater reliability than just a few years ago. The traditional reactive methods of detection and repair do not provide the system availability required without an extensive support system. Although still in its infancy for many industries, proactive health management is gaining applications as a replacement to old reactive health management technology. This methodology is termed Prognostic Health Management (PHM) and supports achievement of Condition Based Maintenance (CBM) support concepts.

Why is this different than traditional bit-in-test (BIT) and diagnostics based health management systems and what is the benefit? The use of extensive BIT capability achieves the goal of failure detection and reporting. Diagnostic processing of failure indications can significantly improve isolation to the failed component or subsystem. While this may aid in conducting corrective maintenance, operational reliability is not benefited. The ability to predict conditional or hardware failures using PHM allows a reduction in impact to system operation and the system's logistics footprint (i.e. resources needed to maintain a system). Maintenance can then be scheduled at the convenience of both the user and the maintainer. Not only does this reduce the system and support resources required, but can significantly reduce impact and potential safety concerns for the operator.

### Prognostic Overview

Simply put, prognostics is the prediction of failures before they occur. System monitoring for failure precursors, continuous or periodic, is accomplished by sensing, recording and interpreting product physical parameters. A product's condition and/or degradation is characterized and determination made of either the fraction of degradation or the remaining life of the product. A prognostic trigger point is selected to provide sufficient advanced warning so that precipitation of failure can be avoided. A graphical representation of this methodology is shown with the bathtub curve depicted in Figure 1.

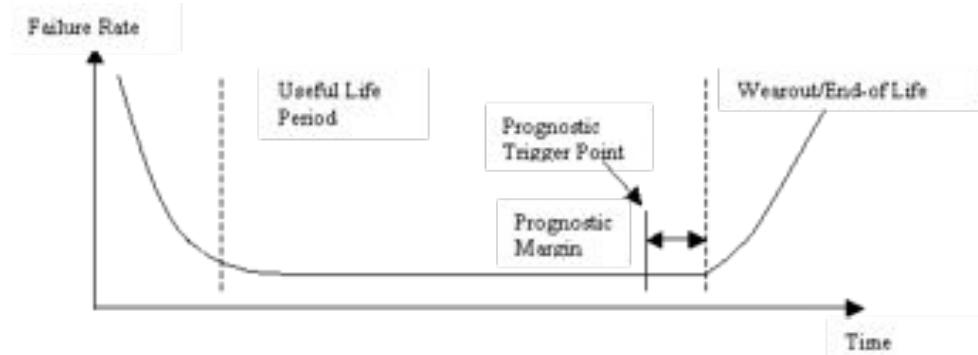


Figure 1. The Bathtub Depiction of Prognostics

Maintenance based on failure prediction has been used in some applications for several years. Monitoring for precursors to wear-out have been used in mechanical and structural systems where degradation is predictable and directly measurable. Bearing and structure vibration profile monitoring and characterization have provided this capability. Examples where prognostics are used include:

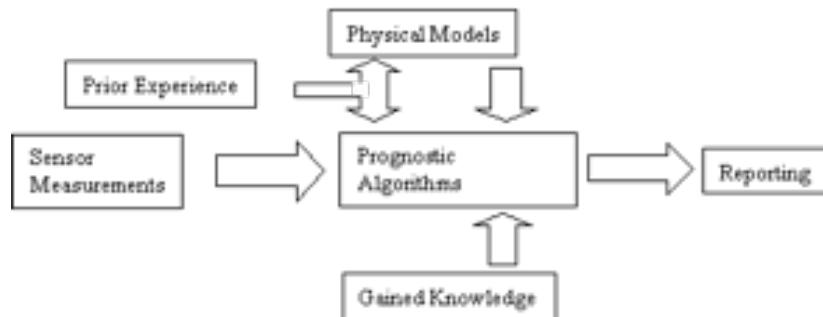
- ? *Monitoring on aircraft engines can detect potential failures and notify ground personnel of required repairs prior to the aircraft arriving at its next destination[1].*
- ? *Motor driven machinery are monitored for vibration indicating mechanical degradation and communicate impending failure to control systems.*

Prognostics must be planned and implemented during initial system design. This is not a methodology that can be implemented after the fact. System analysis methodologies and designing in integrated system capabilities are required. The prognostic methodology requires several basic components to function:

- ? Identification of failure predictors,
- ? Sensors for measurement of conditions, stresses and wear levels,
- ? Data storage and analysis capability,
- ? Damage and degradation models, and
- ? Estimations of degradation levels.

The methodology is graphically depicted in figure 2. In practice, these components are easier to describe than to implement in most complex system. A more detailed description is provided in following paragraphs.

Figure 2. Notional PHM System



### Prognostic Components

Prognostics will not be possible without a solid basis in planning, preparation, and design work. The basic design and process components required for an effective PHM system include:

#### Identification of Failure Predictors

Prior to being able to predict failures, potential failure mechanisms must be identified and prioritized. Failure mechanism identification may be based on failure data from similar systems and/or design analysis during development. Applicable design analysis methods include pareto listing of failure mechanisms, Failure Mode Effect and Criticality Analysis (FMECA) and Physics of Failure (PoF) modeling. In addition to identification of key failure mechanisms, existing prognostic technology must be understood to match capabilities to useful failure predictors.

#### Sensors

The next aspect of PHM is the capability to measure conditions or stresses indicating impending failure or degradation in the physical system hardware. Physical hardware monitoring provides a key input for diagnostics and ultimately to the ability to perform effective prognostics. An integrated approach during system development identifies the location of sensors based on failure predictors and prognostic technologies. Where measurements will be made and how to make them is determined during design analysis to achieve the overall PHM objectives.

Several sensor technologies and types that may be appropriate for degradation monitoring include.

- ? Environmental condition monitoring achieved with physical sensors such as accelerometers and

temperature sensors,

- ? Structural and rotating machinery vibration profile measurement with accelerometers,
- ? Component level monitoring possibly with sacrificial in-situ sensors imbedded within components,
- ? Electrical parameter measurement using electrical circuitry.

Whatever sensors are implemented, they must support effective detection of failure precursors.

#### Data Storage and Analysis Capability

Systems utilizing PHM methodologies must have data storage and processing capability in order to store and process sensor data, perform diagnostics and execute prognostics algorithms. Data retention for all sensors must be sufficient for comparative profiling. The sampling and refresh rates are all designed to achieve the necessary resolution within the capability of the system hardware and resource allocation. Likewise, processing capability must support analysis of the data in order to calculate diagnostics and prognostic outputs. The extent of the capabilities necessary depending on prognostic complexity, however, are generally within technologies available in systems that are prime candidates for prognostics if sufficient resources are allocated.

#### Damage and degradation models

Prognostics requires reference information or data in order to make prediction of damage or degradation status. The data to be used in prognostics may come from many sources; experience databases, physical failure models, dependency models, reliability models and/or physical sensors for example.

- ? Experience gained from field operations of similar hardware, historical databases and development testing feeding relational models,
- ? Physics-of-Failure (PoF) generated models (e.g. Weibull), statistically or empirically derived, from predictive failure mechanisms,
- ? Dependency models linking functions, failures and symptoms,
- ? Probabilistic reliability predictions to the replaceable component level,
- ? Sensors data from multiple sources as described in the preceding paragraph.

Multiple data sources and degradation models are likely to be integrated for use in complex system prognostics. The models are also not necessarily static but can be evolutionary (upgradeable) as better information becomes available.

#### Determination of failure degradation

PHM uses the data collected and the available predictive models to apply analysis techniques for determining the progress of degradation toward failure or remaining time before failure. These prognostic analysis techniques may incorporate relational data based algorithms, statistical model based algorithms and/or machine learning methods individually or together in this analysis. The measurement of failure degradation or remaining life allows the assignment of a prognostic trigger point (refer to Figure 1) to alert the system/users of impending failure and the requirement for preventative maintenance.

Simpler common methods of prognostics use relational databases as the reference for degradation. Of course, the simplest form is use of reliability prediction models against measured operating time in a Reliability Centered Maintenance concept. Other more effective relational database comparative methods include:

Comparing actual measured environmental exposure to estimated wearout or life models. An example would be a solder joint fatigue models predicting increasing probability of failure with thermal cycle exposure. Temperature monitoring sensors record thermal cycle data over product usage thereby allowing the determination of progress toward the predicted failure point.

Another variant of this methodology is the measurement of physical hardware parameter profiles and comparison to known degradation profiles. As an example, measurement of vibration levels or profiles on rotational machinery can be recorded and compared to known degradation models. Calibration or normalization at time zero and degradation from this point measured over time provide the indicator of statistical trending toward a known trigger point.

More complicated prognostic approaches are being developed using multivariate sensor fusion, state estimators, and machine learning technologies to predict failures. State estimation methods use filter techniques (fixed or adaptive) to weigh data as input vectors. Likewise, neural networks, reasoners other artificial intelligence learning processes perform evaluation of inputs against known failure information and developed failure characteristics.

#### **Summary**

Traditional embedded diagnostic processes are generally well developed and understood but increasingly do not support initiatives for reduction of lifecycle support cost in complex systems. PHM methodologies provide an additional benefit in the ability to predict impending failures. Using techniques such as embedded sensors, relational modeling, algorithms and machine learning methods, progress toward failure or remaining time to failure can be determined. This allows maintenance to be scheduled when more convenient to the user and maintainer. This means less impact to the user, including potential safety considerations, and fewer maintenance resources. While showing a benefit, PHM capabilities require sensor technology, predictive characteristics of failures, and additional development effort (i.e. must be designed in). Additionally, the ability to insert prognostic upgrades as failure knowledge increases optimizes its capability. Prognostic capability for complex systems has been limited in most areas, however, increasing emphasis within multiple industries is increasing the feasibility of implementing PHM.

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### Rating and Uprating of Electronic Products

by Diganta Das, Michael Pecht, and Neeraj Pendse

Use of electronic parts beyond their manufacturer specified ratings is widespread and cuts across many industry sectors. Unfortunately, the process is often ad hoc and based on outdated ideas and methodologies with unquantifiable risks. Uprating is a process to assess the ability of a part to meet the functionality and performance requirements of the application in which the part is used outside the manufacturer recommended operating range.

Rating and Uprating of Electronic Parts is the first practical guide for engineers involved in uprating electronic parts. The aim of the book is to give the reader a well-defined, risk-informed methodology which will enable one to determine whether an electronics part will meet the performance requirements when used outside the manufacturer specified ratings, as listed in the part datasheet.

This book is based on the work performed by the authors together with electronics industry worldwide and has been reviewed positively by industry and academia. After studying this book, you will be able to:

- ? determine how to find a part that will meet the datasheet specifications of the application environment, including the temperature ratings
- ? avoid pitfalls and risks associated with using parts outside their rated specifications
- ? apply a methodology to uprate a part for your target application conditions
- ? mitigate the technical and legal risks associated with the use of parts outside the performance specifications
- ? address future trends and needs related to part ratings

Who is this book for?

This book is for the component engineers, test engineers, purchase engineers, engineering managers, system engineers, design engineers, quality assurance personnel and manufacturing engineers, associated with the selection, qualification, and management of electronic parts. The book is meant to support the complete supply chain that may make or use uprated parts; including product manufacturers, electrical test laboratories, after-market part suppliers, regulatory bodies, part manufacturers and even legal counsels.

CALCE EPSC

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#### **Drs. Walsh and Pham Are Recipients of 2005 Fellow Honors**

Dr. Thad L.D.Regulinski, FIEEE

Chair, Reliability Society Fellow Evaluation Committee

Dr. Lois D. Walsh of the Air Force Research Lab, and Dr. Hoang Pham of Rutgers University have been named IEEE Fellows for their outstanding contributions to the reliability discipline, according to an announcement made on December 1, 2004 by the IEEE Board of Directors.

Dr. Walsh is cited as a technical leader for her contributions to electronic device reliability, for advancing the state-of-the-art of high performance computing, and quantum/biological nanoscale computing architectures. Dr. Pham is cited as an educator for his contributions to analytical techniques for modeling the reliability of software systems.

Currently Dr. Walsh serves as chief of a thirty-person team manning the advanced computing architectures effort at AFRL in Rome, NY. She was cited not only for her demonstrated leadership but also for her research competence and expertise in pioneering the development of innovative surface analysis and diagnostic techniques, which led to greater understanding of microelectronic device reliability. Among her many accomplishments Dr. Walsh was solely credited for establishing a world-class research facility at AFRL which attracted numerous extramural researchers and university faculty to work along with her team.

Dr. Pham who is on the faculty of the Industrial and Systems Engineering Department of Rutgers University serves currently as Industrial Engineering Undergraduate Director and Associate Director of the NSF Industry/University Quality and Reliability Engineering Center. He was cited for his prolific efforts in publishing over 70 refereed papers in scholarly journals , 14 book chapters, and 5 books on software reliability. Among his numerous activities he serves as editor-in-chief of the International Journal of Reliability, Quality and Safety Engineering, as associate editor of of IEEE Transactions on Systems, Man, and Cybernetics, and editor-in-chief of the World Scientifics book series on Industrial and Systems Engineering.

By earning the highly coveted IEEE Fellow honor, Drs. Walsh and Pham have enhanced the prestige of their respective institutions; have enriched of knowledge base of their respective disciplines, and have set an example, most worthy of emulation, to their professional colleagues who may want to set their own sights on joining the ranks of distinguished IEEE Fellows, who number only one-tenth of one percent of the total IEEE membership.

Reliability Society members wishing to e-mail their congratulations to the new Fellows may reach Dr. Walsh at [\[email\]](#) and Dr. Pham at [\[email\]](#).

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**ADCOM April 16, 2005 (IRPS 2005)**

**San Jose Marriott**

Meeting Minutes:

0. Attendance:

- a. EXCOM: Tonti, Voas, Abramo, Hoffman, Keene, Fukada, Street, Kowalski
- b. ADCOM: Tonti, Voas, Keene, Abramo, Street, Kuo, Kowalski, Hansen, Fukuda, Michael, Hoffman, Gullo, McLinn,
- c. ADCOM Guest: Viega

1. Welcome: **Voas**

2. Accept January, 2005 Minutes: **Tonti : ADCOM approved the 1/2005 Minutes**

3. Review of previous Action Items: **Tonti**

**1) ADCOM Photos:**

*W. Tonti to transmit all prior ADCOM photos to the RS Historian, Dave Franklin*

Status: Completed

**2) RAMS IP**

*Formation of a committee: Robert Loomis (Chair) , Tom Fagan and Christian Hansen are to review and propose an equitable arrangement for RS use of the intellectual property generated by the RAMS symposium.*

*2005 ?On Line?, Should carry for future years.*

**3) RS Tutorials:**

*Bill Tonti to forward to Alan Street the Business model developed for the RS tutorials.*

Status: Completed

*Jeff Voas to investigate. synergistic conferences the S/W tutorial would have a high degree of success if timed in accordance with another event.*

*Sam Keene (The S/W tutorial chair) to ask the authors for their respective availability in 2005.*

*4/16/05 Status: Jeff to align a reasonable Homeland Security weekly event.*

DHS: Joe Jarzombek. Possible contact- Educational content (Viddes/Online). Has funding to formulate educational seminar/series. Jeff Voas to query DHS and determine if an RS seminar is a first step.

**4) All Tech Ops Conference:**

*Shuichi Fukuda will poll the tech ops chairs to assess who is willing to prepare conference material.*

*Shuichi Fukuda, Alan Street, and David Barber will work together and determine if a cost effective venue is available in Japan.*

**5) RS Trustworthy Magazine**

*ADCOM members willing to work on this activity (Trustworthy Computing) to contact Bill Tonti.*

Status: 4/14/05. Sam Keene / Jeff Voas have infrastructure to move this forward.

IEEE views this as being much broader than just a magazine. i.e. Trust = All Society Contributions? EDS + Power + Computing etc? RS brokers ?Trust?.

*Next Steps: Matt Loeb to provide research survey to ADCOM in 7/05.*

RS needs to identify a candidate to participate in a ?SCAN SURVEY? Volunteers???

**6) Progress on RS/JRELS joint meeting (Shuichi Fukuda)**

*Shuichi to take this to the next step and begin a dialogue.*

**7) Option to purchase Conference Proceedings**

*Action Item: Jeff Voas/ Dick Kowalski to investigate the should / could items at the upcoming TAB meeting, and to formulate these via an electronic vote*

4/16/2006 Status ?Membership Options? ?. For 2006 limited options are available for proceedings. IEEE HQ willing to work for this in 2007.

**8) RS Scholarship**

*Way Kuo (owner) proposed that the RS sponsor a scholarship. Way to develop a scholarship model for ADCOM to vote on.*

4/14/05 Proposal (Tonti)

*Provided 4 \$1000.00 scholarships/year, renewable based on merit.*

*Scholarship based upon student essay, Academic Record, Resume.*

*Evaluators: ??*

*One scholarship per undergraduate class.*

*Assist students via recommendation letter for internships.*

*Tonti makes the motion to set aside \$10,000 in an engineering scholarship fund for 2006. Way Kuo seconds the motion. Motion passes. Details to follow under the direction of DENNIS HOFFMAN.*

**9) 1413/1413.1 Standard.. Not limited to just this standard.**

*Motion: Dennis Hoffman: Bring 1413 and 1413.1 ownership back to the Reliability Society. Dave Franklin seconded. 1 opposed: Ted Freeman. Motion passes.*

*Motion: Dave Franklin: Motion to approve par 1413. Dennis Hoffman seconded. Motion passes.*

*Action Item: Dennis Hoffman / Yvonne Lord to execute the aforementioned requests for 1413 and 1413.1.*

*4/14/05 Status: D. Hoffman:*

*Mutual agreement reached to dissolve SCC 37 and then transfer these documents and Working Group to the Reliability Society, pending a June Standards Board meeting. There is no anticipated barrier regarding this action.*

*Follow-up Item: Letter of Intent From RS Officer to R.H. Hulett or David Ringle to formalize the RS request.  
Status: Complete.*

**10) Committees or Sub-Societies operating in specific technical sub-areas of the Reliability Society field of interest -- every AdCOM member should support at least one technical area.**

*Action Item: All ADCOM members to review the Tech Ops committees, and join one of them, reporting back to Bill Tonti.*

*Status: ???*

*N&A Comm: Fully Staffed*

*Finance: One volunteer.*

*Tech Ops: ??*

4. Discussion on the results from SRC and PRC meetings in San Francisco, 2005: **Voas** and **Hansen**

*Review Question:*

*What are the RS core values? What are the RS Business practices?*

*Requires RS to publish these in 2005:*

*FOI, Mission Statement*

*Some ADCOM discussions on this topic follow:*

*Distinguished Lecture Program inactive at present.. Globalization*

*Pubs Review - Take Away:*

*Process of Publications, i.e. editor appointment needs to be defined in ops manual. More globalization for editors.*

5. Treasurer?s Report (2004, 2005, 2006, Society net worth, newly approved ?new initiative? spending opportunities): **Kowalski**

*These Items are discussed under separate cover through Dick?s prior e-mails*

6. Jr. Past Presidents Reports (by-laws, elections, re-structuring the RS [Power-point presentation], etc.): **Hoffman**

*Dennis presented the following model, sent to the ADCOM under separate cover.*

*Net:*

*Compensated based manager Tech Ops assignment proposed. More discussion to follow in June ADCOM.*

*Dennis has taken on the broad responsibility to assemble an RS Tech Ops Manual*

*Ops manual draft to Dennis: 6/15/05. EACH OFFICER is required to formulate a draft document for their respective position.*

*Dick K, Dick Doyle, Loretta, Bob Loomis action item to look for older RS manual input. Tonti/Voas action to query EDS/CS for ops manuals.*

*Net: A working Group formed under Dennis Hoffman to revamp FOI, possibly RS name, structure, and Ops manual (discussed above) Dennis to send out details under separate cover.*

7. Update on meeting between Keene and M. Loeb (April 14<sup>th</sup>, 2005): **Keene**

*IEEE (M. Loeb) requested an RS ADCOM volunteer for a SCAN SURVEY.*

*No one has volunteered at this point.*

*Stakeholder Issue: Continue funding Cyber Security funding (\$30K requested)*

*Action Item: Sam Keene to ascertain what the state of this project will be after an additional \$30K investment, and what are the expected productization plans from the intended parties. ADCOM will vote via e-mail on future funding pending these results.*

*4/14/05 Status: Present \$7.5K is now the request to extend through July.*

*Motion made by Sam Keene to fund Cyber Security in the amount of \$7.5k. Jim McLinn seconded. Brett Michael and Sam Keene will form a vision statement from this project. Discussion of ownership rights are in question. Motion Passes.*

8. VP TechOps (any TechOps updates and the November conference in Japan), **Fukuda**

*Suichi Fukuda makes the motion to fund up to five invited speakers for the Japanese November conference. Motion is tabled.*

9. VP Membership to discuss membership decline and any new info on Chapters. Also, we need to discuss ESREF and a potential conference with them: **Abramo**

10. New Business: **McLinn** (DSB study on defense microelectronics), **Diganta Das** (SCC 37 Standards activities), **Keene, Voas, John Viega** (guest) to discuss his view of trust and how the Society can move forward on its own to create a ?trust brand?.

Diganta Das

SCC 37 dissolved. To move back to RS

IEEE Std 1413. RS to put in a new par.

IEEE Std 1332

IEEE Std 1413.1

IEEE Std 1624

John Viega presented on ideas for driving revenue under the potential Trust initiative. He proposed creating journals and conferences focused on academic review of the trustworthiness of industry solutions, helping to bridge the gap between academia and industry. He also sees a market for IEEE-led training and awareness in this space. Mr. Viega also proposed standards in the application security space, and sees a path where the IEEE could license such standards to companies running certification programs.

11. VP Meetings and Conferences to discuss the next ADCOM, and any conference close-out information of interest as well as any info on IRPS 2005: Street

Conference is now set for Monterey, Ca.

*Schedule:*

*ExCom Meeting - Friday, 29 July from 1:00 pm to 5:00 pm.*

*AdCom Meeting - Saturday 30 July from 8:00 am to 5:30 pm*

*Dinner/Awards Banquet - TBD, but almost certainly at the Hyatt*

*Chapters Congress - Sunday 31 July fro 8:00 am to 12:00 pm.*

*Loretta - Bret will need a list of Chapter attendees, and we will*

*need to provide Bret with any guests not normally part of the*

*AdCom/ExCom attendee list.*

Action Item Updates and Motions:

11) RS Displays (3 of them):

Lou Gullo and Scott Abrams to contact Marsha Abramo and update the two full size and one table top display. See Dick Kowalski for budget inputs. The west coast display update is needed for the IRPS meting in 4/2005.

Status: ADCOM will keep one full size display on the east coast (M Abramo) and one on the west coast (A Street). Working group at the 4/16/05 ADCOM meeting to determine the materials to update the display with. Tabletop display??

12) Medical Technology Policy Committee:

Action Item: Bill Tonti to contact Tech Ops chairman or a Medotronics engineer and ask for respective support.

Status: Request formulated, No response. Action closed.

**POST 1/2005 ADCOM MEETING: Motions via e-mail vote:**

**Motion #1: Non-elected AdCom Officer**

I (Dennis Hoffman) make a motion that the RS ByLaws be changed to allow officers to be elected while an elected member of the AdCom, even though that person might be in the last year of their AdCom term and might not be re-elected to the AdCom to fulfill their officer term, and since that person is an elected officer would be an ExCom and AdCom member with vote (however not re-elected to AdCom). Once an elected officer for a specific position, that officer can be re-elected without being an elected member of the AdCom, however that person could not run for another officer position. A person in this situation would be expected to run for AdCom election each following year.

Example: Person is in last year of 3 year AdCom term, could stand for officer election, could be elected an officer in May 2005 for a officer term in 2006, runs for re-election for 2006/2007/2008 term in the fall of 2005 but is not re-elected, would be a VP in 2006 while not an elected member of the AdCom, and be an AdCom member by virtue of being elected an officer.

Reason: Allow N&A committee more flexibility in selecting officer slate and allowing qualified people to run for officer election while facing a term limit. Being able to take advantage of gained AdCom experience.

Motion: Passed (60%)

**Motion #2: Term Limit Increase**

I (Dennis Hoffman) make a motion that the RS ByLaws be changed to add one year of service to which an officer can hold a specific position:

-- President is now limited to two (2) consecutive one year terms -- would change to three (3) consecutive one year terms

-- VPs are now limited to three (3) consecutive one year terms -- would change to four (4) consecutive one year terms

Reason: Present term limits are too short to allow an officer to really have time to develop and implement a program. We have experienced this time and time again. Examples: Pubs area in developing new database and phase over plan. Membership area in developing survey, getting survey out, evaluating, and then reacting to what was learned. Asking Jeff to remain President for a third term. Having an effective Tech Ops functions.

Motion: Passed (75%)

**Motion #3: Non-AdCom Member Allowable for President**

I (Dennis Hoffman) make a motion that the RS ByLaws be changed to allow the N&A Committee to consider elected AdCom members and non AdCom members as Presidential candidates from which a President-select will be drawn to be on the slate for officer election. Any non-AdCom member would have to have sufficient recent AdCom and officer experience (within two years for being considered) and have a continuing (on-going) close relationship with the AdCom to be considered for the office of President.

Reason: This will allow an AdCom member, who gets caught in the AdCom class term lay out or in a non re-election by the membership at large, to be considered for President by the N&A Committee and then by the AdCom during officer election.

Motion: Passed (73%)

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**NEW MOTIONS FOR ADCOM CONSIDERATION 4/16/05**

***Motion #4 RS/System Council Alliance:***

4/16/05: William Tonti makes the motion for the Reliability Society to become a member of the new Systems Council, to be formed in 2006. This would also provide another opportunity for our two societies (SMC and RS) to partner together. Sam Keene seconds the motion. The motion is amended to include the council accountability below. This motion applies to all present and future councils that are asking for funds in 2006. Funding is \$5K/council plus travel to the RS annual meeting.

Motion Passes.

Excom Discussion:

- RS funds councils: Return?
- Broadens our Field of Interest
- Planting seeds for a new society

Net: Benefits IEEE, but not the sponsoring society per say.

RS Business Model:

- Require a minimum of 2 technical papers/year for funding.
- Request a minimum of 2 SME talks at RS sponsored conferences.
- Technical and Business Report at annual RS ADCOM meeting.
- A minimum of 2 newsletter articles/year.
- Annual Technical Report contributor and either a member or Tech Ops Chair reporting to the tech ops chair.
- RS Reps responsibility to insure the above is agreed upon.

Contact information: Bob Rassa Planned Inception: 2006.

This activity is synergistic with RS/SMC joint conference venture

**The following Motion passed in the 1/1/05 ADCOM is repeated here for completeness:**

*2006 joint conference RS/SMC    Reps: Sam Keene/Bill Tonti*

*Background: S. Keene and W. Tonti investigated the option of RS joining the SMC Society. In a report by Bill and Sam this was deemed to not be pursued by RS. However, both RS and SMC agreed in principal to spawn a new joint RS/SMC conference containing subject matter of interest to both societies. Hoang Pham, who is the SMC representative, is in contact with Sam and Bill and initial planning for a 2006 conference is underway. Sam and Bill also met with IEEE headquarters. They are also in support of this endeavor. At this point both societies will have to agree to seeding the conference. Actual seed money cannot be determined until a budget is submitted to IEEE. The motion below is to allow RS to proceed with the conference development in anticipation of an approved budget. Again, funds will not be disbursed until a budget is approved.*

*W. Tonti Motion: RS to cap \$25K in seed money for an RS/SMC joint Conference. Seconded by Dave Franklin.*

*Motion passes.*

*Motion #5: to create an ADCOM New Business Line Item:*

4/16/05: William Tonti makes the motion to create an expense line item in the amount of \$125K annually to be used to incubate new RS projects. Such projects are to be funded by an ADCOM formal vote.

Discussion: RS is not doing anything substantial to promote Reliability with its cash on hand. This fund is geared towards the pragmatic use of our funds to promote, and educate Reliability with the objective of increasing membership through technical exchanges, as voted on by ADCOM. Substantial funds on hand are required in order to sustain activities in this space.

RS Discussion:

TAB/FINCOM requires placeholders for the general use of these funds:

RS Recommends:

Trust Magazine

Asian Reliability Meetings.

RS annual Short Courses: e.g. Software Reliability, Semiconductor Reliability  
University Reliability Physics Outreach  
RS wholly sponsored ?new? conference incubation  
RS individual Distinguished Lecture Funding/Stipend.  
Motion Passes, pending a definition of projects with a financial model attached.  
The model was prepared by Tonti, Doyle, and Kowalski for the following projects.

*Motion #6 RS Society Alliance*

Dennis Hoffman makes the motion that RS maintain a Field of interest (FOI) that covers / broadens our territory ?all the ?ilities?. Ted Freeman seconds the motion.

Discussion: Are we going to narrow or broaden our FOI. i.e. do we just leave reliability as the FOI, or all the ?ilities?.

Motion Passes.

*Motion #7 RS Society Alliance:*

4/16/05: Ted Freeman makes the motion for the Reliability Society to fund other IEEE societies. This would also provide another opportunity for societies to partner with RS. William Tonti seconds the motion. The motion is amended to include the society accountability below. This motion applies to all present and future societies that are requesting funds in 2006. Funding is \$10K/society plus travel to the RS annual meeting.

Funding requires the following conditions:

Require a minimum of 2 technical papers/year for funding.

Request a minimum of 2 SME talks at RS sponsored conferences.

Technical and Business Report at annual RS ADCOM meeting.

A minimum of 2 newsletter articles/year.

Annual Technical Report contributor and either a member or Tech Ops Chair reporting to the tech ops chair.

RS Reps responsibility to insure the above is agreed upon.

Motion does not pass

*Respectfully Submitted,*

*William Tonti 5/23/2005*



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### IEEE Reliability Society Newsletter Submission

from the Boston Chapter

May 2005



**Bruce Chaput (left), Vice President of Manufacturing at RSA Security, Inc., accepts a Certificate of Appreciation from Jim Fahy, Boston Chapter Chair**

The Boston Chapter is wrapping up its 43rd season of technical meetings, which are held from September through May.

We have a new venue for our meetings this season: RSA Security, Inc. in Bedford, MA. RSA Security is in the business of secure information access and identity protection products. We presented a Certificate of Appreciation to RSA Security at our December 2004 meeting for their tremendous support of the Chapter (see photo). We thank them for their commitment to reliability and the IEEE.

We began our season in September 2004 with a lively discussion forum on No Trouble Founds (NTFs) called ?In Reliability Technology, NTF is a Four Letter Word,? moderated by Joe Dzekevich of Raytheon Company and Gene Bridgers of Teradyne. In October, Nihar Senapati of Avici Systems presented ?An Approach to System Level Highly Accelerated Testing (HALT).? In November, Jeff Clark of the MITRE Corporation gave a talk on ?Global Positioning System (GPS) Landing System Availability.? We ended the year in December with a brief on the Army Transformation Reliability Improvement Program (ATRIP) titled ?Changing the Reliability Culture of the Army, DoD, and Our National Industrial Base,? by Bob Kuper, Executive for Reliability at US Army ARDEC. This was our annual Past Chairs Dinner Meeting, for which we invite all past Chapter Chairs to attend and be recognized.

New officers began their terms in January 2005. They are Jeff Clark (Chair), Aaron DerMarderosian of the Raytheon Integrated Defense Systems (Vice Chair), Joe Dzekevich (Secretary), and Don Markuson of ArrAy Inc. (Treasurer). Other AdCom members include Nihar Senapati (Publicity), Gene Bridgers (Lecture Series), Jim Fahy of EMC Corporation (Website), and Giora Kedem of RSA Security (Member at Large).

Our season also continued in January with a joint meeting with the Electrostatic Discharge (ESD) Association on ?Class 0 ESD ? A Driver for Transformation of ESD Control Programs in Electronics Assembly,? presented by Ted Dangelmayer and Terry Welsher of Dangelmayer Associates. In February, Kaveh Azar of Advanced Thermal Solutions gave a talk on ?Electronics Cooling: Trends, Challenges, and Cooling Options.? In March, Romano Annecchiarico and Gene Bridgers of Teradyne spoke on ?HALT Frost Risk Due to High Air Flow.? We decided to focus on the softer side of engineering in April when we asked Leslie Gabriele of Gabriele & Company to hold an interactive meeting on ?Personal Power and the Art of Perception.?

The Chapter will close out its season in May with a brief on ?The Reality of Lead Free Reliability,? by Craig Hillman of Design for Reliability (DfR) Solutions.

Jeff Clark

Chair, Boston Chapter



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Lon Chase,

Dallas Chapter Chair

The Dallas IEEE Section held its annual awards banquet on April 16, 2005. The Dallas Reliability Society chapter presented the Outstanding Volunteer award to Faye Bilger. Faye was an outstanding volunteer for the Reliability Society Dallas chapter this year. She continues her tradition of superior professional support over the last several years, and has exceeded expectations as always. Faye has energetically taken on Program Chair responsibility for the chapter and made a significant contribution to its activities. Faye is very active as a professional in the community through local school science fair judging, activities through Raytheon's Women's Leadership Network, IEEE in Action and Habitat for Humanity. Faye has become a essential part of the local Reliability Society chapter.

**Chapter Technical Program****Title: ?The Facts about Predicting and Managing Software Reliability?**

Date: Tuesday, March 22, 2005, 6:30 P.M.

Speaker: Mrs. Ann Marie Neufelder, SoftRel

**Program Summary:**

Software reliability prediction methods have evolved significantly in the last 2 decades. During the 1970s and 1980s, the prediction methods weren't usable until late in the software development lifecycle when it was too late to make key tradeoffs or improvements.

In the late 1980s and 1990s, one parameter prediction models based on either the Software Engineering Institute Capability Maturity Model level or the industry/application type were developed. While these models were simple to use, they were not conducive to establishing short or medium term improvement scenarios. They are also some accuracy issues because they have so few input parameters.

In 1988, The US Air Force Rome Laboratory produced a publicly available multi-parameter prediction model that was tailored specifically to aerospace and aircraft systems. This model hasn't been updated since 1992 and is

difficult to use for applications that aren't related to aerospace or aircraft systems.

Today, there is multi-parameter prediction model for software that can be used very early in development while there is still time to manage the reliability. Additionally, the prediction model can also be combined with reliability models for hardware so as to allow for management of the system level reliability. This multi-parameter model has been observed to be significantly more accurate than early one parameter models and is also more versatile and more current than the Rome Laboratory model. This model is kept up to date every 18-24 months with real data from several industries including defense, aerospace, space, medical devices, and semiconductor manufacturing equipment. Currently, more than 150 software characteristics have been modeled.

This presentation will highlight how the prediction model works and the data required for it. Most importantly, the speaker will also show some interesting correlations between escaped software defects and certain development, organization and product characteristics. Finally, the presentation will show how the predictive model can also be used to predict the probability of a late software delivery.

**Speaker:**

Ann Marie Neufelder has been the owner of SoftRel since 1991. SoftRel provides software reliability training, software tools and services. Since 1983, Ann Marie has been applying reliability engineering to real software systems. She has measured the reliability and development characteristics at more than 80 organizations.

Ann Marie's accomplishments include authoring a Military Handbook on Software Reliability with Boeing Corporation in 1997, authoring a Sematech Guidebook on Software Reliability in 1995, Authoring a hardback book "Ensuring Software Reliability" in 1993, and receiving a US Patent in 1993 for a prediction model PStiMate patent number #5,473,741 - Method for Determining the Time To Perform Raster Image Processing (RIP).

Ann Marie has numerous publications on software topics which includes: "The Naked Truth about Software Engineering", "The Facts about Predicting Software Defects and Reliability", "How to Measure the Impact of Specific Development Practices on Fielded Defect Density", "How to predict software defect density during proposal phase", "System and Software Reliability and Assurance Notebook" and "Tactical Software Reliability".

Ann Marie resides in Portland, Oregon but is from Texas and spends a significant amount of time in the Dallas, Texas area with her husband Tom and daughter Rachel.

**Title: ?Factors Influencing the Occurrence of Black Pad Defect?**

Date: Tuesday, April 19, 2005, 6:30 P.M.

Speaker: Jodi Roepsch

**Program Summary:**

Recent studies of PWB's and components with the ENIG plating stackup indicate there are many factors that influence the occurrence of black pad defect. Such factors include pad geometry, copper surface roughness, solder mask, phosphorus content, stress and nickel grain structure. Total stress in the plating, which results from a variety of sources including applied stress, phosphorous content and grain structure, plays a very significant role in black pad formation. Because the effect of these stress related factors is cumulative, it can be misleading to consider the impact of factors independently of each other. This presentation will detail the influence each of these factors has on the formation of black pad defect.

**Speaker:**

Jodi Roepsch is a Senior Failure Analysis Engineer with honors for Shared Services Failure Analysis Lab. She has been with Raytheon, formerly Texas Instruments, since 1996. She has a Masters Degree in Materials Science from the University of North Texas. She has also been certified as a Six Sigma Specialist. In recent years, Jodi has contributed to many publications/presentations pertaining to the preparation and characterization of aerogels for use in the semiconductor industry, failure analysis of components, PWB's and materials. Jodi's main job function is to support internal projects within Raytheon by performing failure analysis for production and field returns as well as analyses for research and development. The main tool used for these analyses is SEM/EDS. Jodi also holds the position of Safety Coordinator/Chemical Hygiene Officer. She holds memberships to ASM, IMS, SMTA, MSA and TSM. She currently is Program Chair for the Texas Society for Microscopy.



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### Denver Chapter

The Denver Chapter put on two talks at the Annual Denver Section Conference. Drs Samuel Keene spoke on Six Sigma Contributions to Reliability and Bill Tian presented "Designing in Reliability". The conference was held at the University of Colorado on April 9.

*Sam Keene*

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### Report by Singapore REL/CPMT/ED Chapter

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#### 1. Technical talk and short courses

- ? 12 January 2005, Assoc. Prof. K.S. Narayan, Jawaharlal Nehru, Centre for Advanced Scientific Research Jakkur Bangalore, India gave a talk on ?Optically induced features in polymer based field effect transistors?.
- ? 5 January 2005, Professor Vijay K. Arora, Wilkes University, USA gave a talk on ?Ohm?s law failure: new insights into the charge transport in the multivalley band structure of GaAs?.
- ? 27 January 2005, Mr. Chuan Seng Tan of Massachusetts Institute of Technology gave a talk on ?Sky is the Limit: Multi-layer Three-Dimensional Integration Achieved by Wafer Bonding?.
- ? 14 March 2005, Professor Arokia Nathan of the University of Waterloo, Canada, an EDS DL, gave a talk on ?Nanoscale Elastic Circuits?.
- ? 28 March 2005, **Mr Chen Jinghao of the National University of Singapore gave a talk on ?Novel Nano-crystals and SONOS-type Nano-dots Flash?.**

#### 2. Conference - 12<sup>th</sup> IPFA (IPFA 2005)

The 12th International Symposium on the Physical and Failure Analysis of Integrated Circuits (IPFA 2005), Asia?s leading IC Failure Analysis conference, will be held 27 June - 1 July 2005 at Shangri-La's Rasa Sentosa Resort, Singapore. The Symposium is devoted to the fundamental understanding of the physical mechanisms of device failures, and issues related to device reliability, especially in advanced process technologies. In conjunction with the three day technical symposium, two days of tutorials will be held on the 27 and 28 June 2005. The technical sessions are: Advanced FA, Die Level FA, Package FA, Sample Preparation Metrology and Material Characterization, Novel Device Reliability, Novel Gate Stack/Dielectrics, Advanced Interconnects and BEOL Reliability, ESD/EOS and CMOS Latch-up. As a departure from tradition, there will also be a poster session on the second day. The Keynote Speaker will be Dr. Shi-Chung Sun, Senior Vice President of Technology Development at Chartered Semiconductor Manufacturing, Singapore. The invited Speakers include Dr. Michael Bruce (AMD), Dr. Camelia Hora/Dr. Stefan Eichenberger (Philips Semiconductors), Dr. Mahadeva Iyer Natarajan (IMEC), Prof. Jacob Phang (NUS, Singapore), Dr. James Stathis (IBM), Dr. Luc Tielemans (Qtest), and Dr. Ehrenfried Zschech (AMD). As part of best paper exchange program with ISTFA, the Best Paper from ISTFA 2004 will be presented at IPFA 2005 while the best paper in failure analysis at IPFA 2005 will be presented at ISTFA 2005. For further information, visit the IPFA website at <http://www.ieee.org/ipfa>.

#### 3. The Chapter donated a sum of S\$800 to two activities organized by the Student Chapter of the Nanyang Technological University branch. These are the IEEE Science Symposium (2005) and IEEE - Student Professional Awareness Conference.

By KL PEY

Chair, Singapore REL/CPMT/ED Chapter



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## Tech Ops Committees

Status of Tech Ops technical committees:

### Technologies:

- | <u>Name</u>                   | <u>Chair</u>  |
|-------------------------------|---|
| 1) Reliability Design         | <b>vacant</b>   |
| 2) Software Reliability       | Sam Keene s.keene@ieee.org  |
| 3) MicroElectronics           | <b>vacant</b>   |
| 4) Human Interface            | Ken Lasala: k.lasala@ieee.org   |
| 5) International Reliability  | Joe Fragola fragola@prodigy.net   |
| 6) Warranty                   | Judith Koslov Judith.Koslov@Sun.com                                     |
| 7) Testing and Screening      | Anthony Chan h.a.chan@ieee.org  |
| 8) Standards and Definitions  | Y. Lord yvonne.lord@ngc.com /<br>T. Brogan Thomas_L_Brogan@raytheon.com |
| 9) CAD / CAE                  | <b>vacant</b>   |
| 10) Mechanical Reliability    | Dick Doyle ddoyle@cts.com   |
| 11) System Safety             | Takeshia Khoda kohda@vib.kuaero.kyoto-u.ac.jp                           |
| 12) Assurance                 | James Bret Michael bmichael@nps.navy.mil                                |
| 13) Six Sigma Reliability     | Sam Keene s.keene@ieee.org  |
| 14) Maintainability           | Stefan Mozar s.mozar@ieee.org   |
| 15) Emerging (new) Technology | <b>vacant</b>   |

### Systems:

- |   |   |
|---|---|
| 16) Aerospace and Defense                   | Lon Chase l.chase@ieee.org              |
| 17) Automotive                              | Guangbin Yang gyang1@ford.com           |
| 18) Information Technology & Communications | <b>vacant</b>                           |
| 19) Energy Systems                          | Mark Lively MbeLively@aol.com           |
| 20) Medical                                 | Patrick Corcoran patcorkshome@yahoo.com |
| 21) Consumer Electronics                    | Fred Schenkelberg fms@hp.com            |
| 22) Sensors                                 | Ken Lasala (acting) k.lasala@ieee.org   |
| 23) Industrial Systems                      | Hiroshi Yajima yajima@sdl.hitachi.co.jp |

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## IEEE Transactions on Reliability, Special Issue on Reliability Studies on Nanotechnology

Guest Editors: J.-C. Lu, W. R. Tonti and S.-L. Jeng

### AIM

Over the past two decades, the ability to measure and manipulate matter at the scale of atoms and molecules has led to the discovery of novel materials and phenomena. These advances underlie the multidisciplinary areas of research and development known today as ?nanotechnology.? Now, nano-technology has been recognized as a revolution that will impact virtually every sector of our economy and our daily lives. In the nano era, device sizes will be in the range of several nanometers, leading to a potential for high degree of failures, due to (i) special physics and chemistry properties of materials in nano scale, (ii) transient faults resulting from reduced noise tolerance at reduced voltage and current levels in device or system design, (iii) faults due to ageing in the processes of using molecular and other techniques for creating nano-devices, and (iv) manufacturing defects.

### Scope

Contributions should discuss the application of reliability methods in nanotechnology research. Interdisciplinary papers are particularly welcome. Possible topics of applications, within this scope, include but are not limited to:

- ? Reliability of nanostructured materials
- ? Reliability design in nanoscale products and systems
- ? Reliability testing and failure-mode analysis for nano-devices and ?systems
- ? Reliability, analysis and fabrication of Self-Assembled-Systems
- ? Aging, degradation, failure-rate, reliability models for nano-devices and ?systems
- ? Lifetime assessment techniques of nanoscale products
- ? Manufacturing quality issues related to reliability of nano-products
- ? Reliability standards for nanoscale products and systems
- ? Trade-offs between design, reliability and performance of nanoscale products
- ? Reliability prediction and assurance considering variations in device manufacturing performed by different supply-chain organizations.

### Submission Guidelines

Papers must be submitted to the **guest editor** J.-C. Lu at [JCLU@isye.gatech.edu](mailto:JCLU@isye.gatech.edu)

Although there is no restriction on length, we would prefer shorter papers (20 pages or less) to longer ones, for the sake of greater diversity and more thorough reviewing. Authors are therefore encouraged to be as concise as possible.

Electronic submissions are encouraged, and may be sent as one email. The message should contain the whole paper in PDF or Word. Authors who cannot meet these requirements should submit five hard copies by post instead.

All submitted papers will be refereed according to the usual *IEEE Trans. on Reliability* refereeing process.

**To aid planning and organization, we would appreciate an email or a letter of intent to submit a paper (including author information, a tentative title and abstract, and an estimated number of pages) as early as possible.**

### Important Dates

Official announcement of call-for-papers in the <i>IEEE Trans. on Reliability</i>	June, 2005
Letter of intent	September 1, 2005
Submission of papers:	May 1, 2006
Invitation for paper revision	August 15, 2006
Possible second revision	November 30, 2006
Notification of acceptance:	January 5, 2006
Delivery of final LaTeX or Word file:	January 30, 2007
Publication of special issue:	June, 2007

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## Asian Reliability Conference

This is the web address about the Asian reliability Conference to be held in China:

[www.quality-reliability.cn](http://www.quality-reliability.cn)

Thank you very much.

Way Kuo

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## 2005 Integrated Reliability Workshop

IEEE Integrated Reliability Workshop 2005 to be held during Oct 17-20, 2005 at Stanford Sierra Camp, Fallen Leaf Lake, CA.

The Integrated Reliability Workshop focuses on ensuring semiconductor reliability through fabrication, design, testing, characterization, and simulation, as well as identification of the root cause defects and physical mechanisms responsible for reliability problems. It provides a unique environment for understanding, developing, and sharing reliability technology for present and future semiconductor applications as well as ample opportunity for discussions and interactions with colleagues.

Hot reliability topics for the workshop include: high-k and nitrided SiO<sub>2</sub> gate dielectrics, product reliability and burn-in, NBTI, Cu interconnects and low-k dielectrics, reliability modeling and simulation, SiGe and strained Si, III-V, SOI, optoelectronics, single event upsets, and reliability assessment of novel devices and future "nano"-technologies

Sincerely,

krish

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