



**Nov 2015 Newsletter**  
**The IEEE Reliability Society**  
**Joint Section Chapter: Boston - New Hampshire - Providence**  
**Sep 2015 – Nov 2015**  
<http://www.ieee.org/bostonrel>

We rebounded from summer break via an activity-filled September with our chapter chair serving as local host and paper session moderator for the ASTR (Accelerated Stress Testing and Reliability) 2015 conference in Cambridge, as well as two excellent chapter meetings. Our first September meeting was held at MIT Lincoln Laboratory in the Stata Center with speaker Dr. John Thomas presenting Systems Theoretic Process Analysis (STPA), a powerful new hazard analysis method designed to capture often overlooked causes of accidents like incomplete, incorrect, or missing requirements, dysfunctional component interactions, software errors, and unexpected human behavior. Our second meeting was hosted by Teradyne in North Reading, co-sponsored by the Northeast ESD Association, with Louis DeChiaro of the Naval Surface Warfare Center and Peter Hagelstein of MIT sharing the podium to cover recent advances in low-energy nuclear reactions (LENR). Both meetings were highly attended with intriguing presentation content. Our October Monthly Meeting featured Craig Hillman of DfR Solutions on the approach, methodology, tools and implementation of Physics of Failure, emphasizing the practical beneficial impact/ROI to a company's engineering costs, time to market and warranty returns.

The ongoing success of the chapter is a testament to our enthusiastic advisory committee, chapter officers, with special recognition this quarter to (a) Jeff Clark, past chair and website manager, (b) Neeta Agarwal, newsletter and social media coordinator, and last, but certainly not least, (c) Aaron DerMarderosian, Jr., past chair and chapter secretary, whose recent relocation to Florida from Massachusetts has reinforced the dedicated service he provided to the Boston Chapter for well over a decade. We are looking forward to a strong finish to 2015 with our November meeting at MACOM in Lowell, our annual Past Chairs Dinner in December featuring an IEEE AESS Distinguished Lecturer, and January meeting with special guest speaker Milena Krasich of Raytheon IDS.

Best Regards



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### **Recent Activities:**

- Sept 9, 2015 "A New Systems Approach to Safety Analysis", Dr. John Thomas of MIT
- Sept 23, 2015 "LENR Phenomena and Potential Applications", Peter Hagelstein and Louis F. DeChiaro
- Oct 14, 2015 "Physics of Failure: Approach, Methodology, Tools and Implementation", Dr. Craig Hillman is the Chief Executive Officer of DfR Solutions at Lincoln Laboratory, Lexington MA.
- Nov 18, 2015 "ESD Risks Created by 2014 Changes to ANSI/ESD S20.20-2014 (World Wide ESD Handling Standard)", Ted Dangelmayer president of Dangelmayer Associates, L.L.C Co-sponsored by Northeastern ESD Association

### **Upcoming Events:**

Visit <http://www.ieee.org/BostonRel> to register

- Dec , 2015 Past Chairs Dinner in December featuring an IEEE AESS Distinguished Lecturer,
- Jan 14, 2016 Meeting with special guest speaker Milena Krasich of Raytheon IDS on Proper Reliability Growth Modelling and Implementation.

## Recent Chapter Activities

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### "A New Systems Approach to Safety Analysis"

On September 9, 2015 Dr. John Thomas, Research Engineer in the System Engineering Research Laboratory at MIT, presented on Systems Theoretic Process Analysis (STPA) a powerful new hazard analysis method designed to capture often overlooked causes of accidents like incomplete, incorrect, or missing requirements, dysfunctional component interactions, software errors, and unexpected human behavior. Although traditional analysis techniques have been effective at reducing accidents caused by well-known component failures, modern complex systems have introduced new problems that can be much more difficult to anticipate, analyze, and prevent. A new class of accidents, component interaction accidents, has become increasingly prevalent in today's systems and can occur even when systems operate exactly as designed and without any individual component failures. Although STPA can be used for hazard analysis, it is also being used during early development to derive the necessary safety requirements and drive design decisions as they are being made thereby preventing mistakes and reducing costly rework. While STPA is relatively new, it is now being used in many industries including aerospace, automotive, nuclear, petrochemical, and defense industries.

### "LENR Phenomena and Potential Applications"

On September 23, 2015 Professor Peter Hagelstein, Associate Professor at the Massachusetts Institute of Technology, and Dr. Louis DeChiaro, physicist with the US Naval Sea Systems Command (NAVSEA), presented on Low Energy Nuclear Reactions (LENR) in electrochemical experiments with palladium and deuterium. There is no agreement at present among those in the field as to what physics is involved in these experiments, even though there have been a large number of proposals.



Dr. DeChiaro



Prof Hagelstein

Professor Hagelstein and Dr. DeChiaro gave a brief outline of some of the theoretical ideas currently being contemplated. Progress continues but there are changes in the focus of the research and in the researchers involved. There is interest on the part of investors and industry, stimulated by the possibility of commercial products and the prospect of a new technology. Recent approaches discussed in public in recent years were presented with a summary of the progress reported by the entrepreneur community, including Andrea Rossi (Industrial Heat, Inc.), Dr. Mitchell Swartz (Nanortech, Inc.), and Robert Godes (Brillouin Energy Technologies, Inc.). Finally, recent status changes at USPTO regarding LENR inventions were presented.

Brief review of LENR: Back in 1989 Martin Fleischmann and Stanley Pons astonished the world with a variety of claims involving LENR in electrochemical experiments with palladium and deuterium. The most significant of the claims was the generation of large amounts of energy, presumed to be of nuclear origin, but without a commensurate amount of energetic nuclear radiation. The existence of such an effect goes

against textbook nuclear and solid state physics, and no acceptable explanation was put forth at the time. Most early efforts to replicate the anomalies claimed were unsuccessful. The Fleischmann-Pons Experiment was not accepted by mainstream scientists then and is not accepted today. Over the years a substantial amount of effort has been put in by groups that were able to replicate the excess heat effect, to make sure that the effect was real, and to gain some understanding. Fleischmann and Pons had argued that the D/Pd loading ratio needed to be high in order to see excess heat; this was found to be the case in experiments that followed. A correlation was found between the excess power produced and the deuterium flux at the cathode surface. In some experiments increased excess heat was seen at elevated temperature. He-4 was observed in the gas phase, correlated with the energy produced, and in amounts consistent with the mass difference (24 MeV) between D2 and He-4.

### **“Physics of Failure: Approach, Methodology, Tools and Implementation”**

On October 14, 2015 Dr. Craig Hillman Chief Executive Offices of DfR Solution presented on how Physics of Failure (PoF) is the leveraging the knowledge and understanding of processes and mechanisms that induce failure to predict reliability and improve product performance. PoF is a critical element in best practices in Design for Reliability. The concept of Physics of Failure, also known as Reliability Physics (RP), involves the use of degradation algorithms that describe how physical, chemical, mechanical, thermal, or electrical mechanisms evolve over time and eventually induce failure. The specific term arose from an attempt to better predict the reliability of early-generation electronic parts and systems; however, the concept of Physics of Failure is common in many structural fields. Presented was an introduction to PoF and RP terminology, philosophy, approach, methods and tools for designing Quality, Reliability and Durability (QRD) into products and systems. The PoF/RP approach integrates reliability into design activities via a science-based process for evaluating the potential failure susceptibility and risks of specific materials, structures and technologies in specific applications. This enables a virtual “analyze and optimize” form of reliability growth where susceptibility to failure risks can be design out or mitigated, while a design is still on the CAD screen, rather than by physically building, testing and fixing prototype parts. Attendees will find this information useful for implementing a PoF or RP program (or, more importantly, reducing engineering costs, time to market, and warranty returns).



### **“ESD Risks Created by 2014 Changes to ANSI/ESD S20.20-2014 (World Wide ESD Handling Standard)”**

On November 18, 2015 Dangelmayer president of Dangelmayer Associates, L.L.C presented on the latest version of the worldwide industry standard for electrostatic discharge control programs ESD Association Standard for the Development of an Electrostatic Discharge Control Program for – Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) (ANSI/ESD S20.20 - 2014) that introduced technical risks that must be understood to avoid damaging ESD sensitive products.

There are numerous changes, both editorial and technical, that will be discussed along with their benefits and risks. The changes include new tests and the need for additional test equipment. This highly interactive presentation included the new test methods, demonstrations and videos. This meeting was Co-sponsored by Northeastern ESD Association

<http://nechapter-esda.org>



**Link to past presentations** <http://ewh.ieee.org/r1/boston/rl/presentations.html>

## Chapter Participation and Outreach Efforts

### I. Chapter Seeks Volunteers



We are interested in having you help out as a volunteer contributing as much or as little as you would like. We have a good team of volunteers that help us keep things going so if you would like to join us, there is probably ample opportunity to choose how you would like to contribute. Email or talk to any of us at the next monthly presentation, or attend one of our Advisory Committee meetings.

For updates on upcoming events: <http://ewh.ieee.org/r1/boston/rl/events.html>.

*Readers can contact chapter newsletter editor Ken Rispoli at [kenneth\\_rispoli@hotmail.com](mailto:kenneth_rispoli@hotmail.com) with any comment/suggestion or if interested in contributing to our next issue. Thanks.*

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