HILTON SAN DIEGO MISSION VALLEY - FIRST FLOOR

- CARMEI BALLROOM
- IIIA
- IIIB
- NEWPORT
- ENCINAS
- CARLSBAD
- ATRIUM
- DEL MAR

Main Entrance

Elevator

Lobby

Bar Lounge

Main Entrance

Gift Shop
2011 Symposium Committee

Chair: Bansi Patel
Co-Chair: Anna Klostermann
Past Chair: Steve Brody
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  - Gary Tornquist
  - Leszek Langiewicz

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Merchandising: Daniece Carpenter
Exhibits/Patrons Arrangements: Jill Berg
Marketing Chair: Anna Klostermann
Special Projects and Photography: Richard Georgerian
## PSES BOARD OF DIRECTORS

<table>
<thead>
<tr>
<th>Executive Committee</th>
<th>Name</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>President</td>
<td>Murlin Marks</td>
<td>'10-'11</td>
</tr>
<tr>
<td>President Elect</td>
<td>Elya Joffe</td>
<td>'11</td>
</tr>
<tr>
<td>Past-President</td>
<td>Jim Bacher</td>
<td>'10-'11</td>
</tr>
<tr>
<td>Secretary</td>
<td>Daniece Carpenter</td>
<td>N/A</td>
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<tr>
<td>Treasurer</td>
<td>Jan Swart</td>
<td>N/A</td>
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<tr>
<td>Vice President-Communications</td>
<td>Dan Roman</td>
<td>'11-'12</td>
</tr>
<tr>
<td>Vice President – Member Services</td>
<td>Thomas Ha</td>
<td>'11-'12</td>
</tr>
<tr>
<td>Vice President-Technical Activities</td>
<td>Ivan Vandewege</td>
<td>'11-'12</td>
</tr>
<tr>
<td>Vice President - Conferences</td>
<td>Doug Nix</td>
<td>'11-'12</td>
</tr>
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## Directors at Large

<table>
<thead>
<tr>
<th>Term Expires 12/11</th>
<th>Term Expires 12/12</th>
<th>Term Expires 12/13</th>
<th>Ex Officio (without vote)</th>
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</thead>
<tbody>
<tr>
<td>Jim Pierce</td>
<td>Daniece Carpenter</td>
<td>Silvia Diaz Monnier</td>
<td>IEEE TAB Division VI</td>
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<td>Director (Jeffery Voas)</td>
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<tr>
<td>Ivan Vandewege</td>
<td>Kevin Ravo</td>
<td>Stefan Mozar</td>
<td>IEEE HQ</td>
</tr>
<tr>
<td>Jack Burns</td>
<td>Elya Joffe</td>
<td>Doug Nix</td>
<td>BoD GOLD Member</td>
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<tr>
<td>Richard Pescatore</td>
<td>Douglas Kealey</td>
<td>Thomas P. Shefchick</td>
<td>Chapter Chairs and</td>
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<td></td>
<td>Richard Nute</td>
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<td>Standing Committee Chairs</td>
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</table>

## Vice President - Communications

<table>
<thead>
<tr>
<th>Committees</th>
<th>Chairperson</th>
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<tr>
<td>Newsletter Editor</td>
<td>Gary Weidner</td>
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<tr>
<td>Marketing Committee</td>
<td>Anna Klostermann</td>
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<tr>
<td>Email List / EMC-PSTC</td>
<td>Jim Bacher / Dave Heald</td>
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<tr>
<td>PSES IEEE Communities</td>
<td>Jim Bacher / Dave Heald / Dan Roman</td>
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<tr>
<td>Webmaster / Internet</td>
<td>Dan Roman</td>
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<tr>
<td>LinkedIn Admin</td>
<td>Dan Teninty</td>
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</table>
Full day registration is entitled to Symposium record/workshop notes (CD only), exhibit hall, all paper sessions and Welcome reception.

**Opening Ceremonies and Keynote Speaker**

Please join us at the Opening ceremonies. They are scheduled for Monday, October 10, 2011, 9:00 AM – 10:00 AM in Carmel II-III.

**Welcome Reception**

Welcome to the 8th IEEE Symposium on Product Compliance Engineering. The Symposium Steering Committee invites attendees to join old friends and meet new acquaintances during an evening of food and beverage reception Monday from 5:30 PM – 7:00 PM. Tickets to this event are free for full registrants. Companion and one-day registrants are charged $50. Food and soda provided with drink tickets. The Welcome Reception will be held in the Exhibitors area.

**Exhibit Hours**

<table>
<thead>
<tr>
<th>Morning</th>
<th>Lunch</th>
<th>Afternoon</th>
<th>Evening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday 10:00 AM</td>
<td>11:30 AM –</td>
<td>3:00 PM –</td>
<td>5:30 - 7:00 PM Reception</td>
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<tr>
<td>10:30 AM</td>
<td>1:00 PM</td>
<td>3:30 PM</td>
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<tr>
<td>Tuesday 10:00 AM</td>
<td>11:30 AM –</td>
<td>3:00 PM –</td>
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<td>1:00 PM</td>
<td>3:30 PM</td>
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</table>

The 2011 IEEE PSES Steering Committee encourages the Exhibitors to attend the technical sessions. Therefore, the Exhibits will be closed during the technical sessions.

**Registration Hours**

<table>
<thead>
<tr>
<th>Monday 7:00 AM – 5:30 PM</th>
<th>Tuesday 7:00 AM – 5:30 PM</th>
<th>Wednesday 7:00 AM – 10:00 AM</th>
</tr>
</thead>
</table>

Registration will be located in the conference center lobby throughout the Symposium.
Technical Session Hours

<table>
<thead>
<tr>
<th>Session Hours</th>
<th>Morning Break</th>
<th>Lunch</th>
<th>Afternoon Break</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday 9:00 AM – 5:30 PM</td>
<td>10:00 AM – 10:30 AM</td>
<td>11:30 AM – 1:00 PM</td>
<td>3:00 PM – 3:30 PM</td>
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<tr>
<td>Tuesday 8:00 AM – 5:30 PM</td>
<td>10:00 AM – 10:30 AM</td>
<td>11:30 AM – 1:00 PM</td>
<td>3:00 PM – 3:30 PM</td>
</tr>
<tr>
<td>Wednesday 8:00 AM – 12:30 PM</td>
<td>10:00 AM – 10:30 AM</td>
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</table>

Special Meetings
Technical Activities Committee meetings: Wednesday, October 12, 2011, 8:00 AM - 9:00 AM in the Newport II, Carmel I, and Laguna Rooms.

Speaker’s Breakfast: On the day of your presentation, please join us for a special speaker’s breakfast in the Encinitas Room. The time for breakfast is from 7:00 AM – 8:00 AM.

Exhibitor’s Breakfast: On each day of your exhibiting, please join us for a special Exhibitor’s breakfast in the Encinitas Room. The time for the breakfast is from 8:00 AM – 9:00 AM.

Room Assignments
Exhibit Hall, and AM/PM breaks
Box lunches, Monday Welcome reception
Monday, Tuesday, & Wednesday
First Floor– Carmel II-III

Speakers/Exhibitors breakfast room
Monday, Tuesday, and Wednesday
Encinitas Room
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Underwriters Laboratories Inc. (UL) is a global leader in product safety certification that has been testing products for more than 115 years. UL provides a broad range of integrated compliance services to the high technology (Consumer Electronics, Computing and Peripherals, Telecom Products) industry including international safety certification services, electromagnetic compatibility testing (EMC), performance testing in accordance with Telcordia GRs and ETSI specifications in the areas of NEBS, outside plant and fiber optics. UL also provides comprehensive consulting on engineering support services, training, and testing relating to energy efficiency and RoHS requirements for restricted substances.

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Microsoft is a world-class provider of computer operating systems, productivity software products, Xbox gaming systems, Zune music, and innovative PC peripherals. Microsoft is the proud provider of gifts for our speakers and volunteers at the 2011 ISPCE!
Advanced Test Equipment Rentals offers effective solutions on rentals, leases, and sales of
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ARC Technologies Inc. is a leading manufacturer and supplier of
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Website: www.asresearch.com

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Website: www.case4n6.com
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CSA International is a global solutions provider of product testing and certification services for electrical, mechanical, plumbing, gas, medical and a variety of other products. Recognized in the U.S., Canada and around the world, CSA International certification marks appear on billions of qualified products worldwide.

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iNARTE, Inc., a non-profit association, Certifies qualified practitioners in Product Safety Engineering. Certification benefits the individual engineer and technician, their company, and the global product safety community by establishing an internationally recognised standard of individual professional excellence.

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We also offer product certification and compliance testing at our locally operated laboratories in many countries around the world. With our accredited, modern and efficient testing facilities, our customers receive professional services in the areas of Safety, Wireless, EMC and Telecom.

Grand opening of our new 10m EMC chamber in San Diego (Carlsbad) was May 2011!!

We deliver timely and cost-effective global market access, certification and testing services, and our CB Scheme participation is the backbone to achieving this. Nemko is also an accredited Certification Body for Quality (QMS) and Environmental (EMS) Management Systems in accordance with ISO 9001, ISO 14001, and ISO 13485 as well as Energy/Environment (Energy Star). Our experienced and professional auditors provide prompt and efficient services, resulting in on-time certification of your products.

Northwest EMC Inc. is an independent, accredited commercial EMC compliance test laboratory. The company has locations in California, Minnesota, New York, Oregon, and Washington. Facilities include FCC listed 10M, 5M, and 3M chambers with a full complement of immunity and wireless testing capabilities. SAR Evaluations and DFS testing are now being offered.

TÜV SÜD America, a subsidiary of TÜV SÜD AG, is a business-to-business firm providing international safety testing and certification services. With over 600 experts in North America, TÜV SÜD provides NRTL and SCC Certification, CB Scheme Certification, Field Evaluations, SEMI Evaluations and other Industrial Machinery Services. Additional services include Restricted Substances, CE Marking assistance, International Compliance, EMC/Environmental Testing and Quality Management System Certification. TÜV also provides CE Marking assistance for the European market, Electromagnetic Compatibility (EMC), Electrical & Mechanical testing, and many additional global conformity assessment services that help companies gain product compliance to enter individual country markets. For more information, visit www.TUVamerica.com.
Underwriters Laboratories Inc. (UL) is a global leader in product safety certification that has been testing products for more than 115 years. UL provides a broad range of integrated compliance services to the high technology (Consumer Electronics, Computing and Peripherals, Telecom Products) industry including international safety certification services, electromagnetic compatibility testing (EMC), performance testing in accordance with Telcordia GRs and ETSI specifications in the areas of NEBS, outside plant and fiber optics. UL also provides comprehensive consulting on engineering support services, training, and testing relating to energy efficiency and RoHS requirements for restricted substances.
Stephen Wenc is president of UL Environment, a wholly-owned subsidiary of UL (Underwriters Laboratories). UL is an independent Standards Development Organization, Testing Lab and Certification Body with a Mission to enhance life safety and facilitate global commerce. As president, Steve leads global operations and development of the company’s business in the environmental sector. Steve is a member of the US Green Building Council, UL Environment’s representative on the Sustainable Building Alliance and an advisory board member for the Disney Planet Challenge Program. He also is a member of the American Bar Association and the Chicago Bar Association.

STEPHEN H. WENC
President UL Environment Inc.
President & Managing Director – Europe & Latin America

2011 PSES SYMPOSIUM KEYNOTE ABSTRACT

Bridging the Gap between Safety and Sustainability

Safety, given its paramount importance to the practice of engineering, is a crucial aspect of engineering education. Although engineering curricula cover safety, more can be done and would be highly beneficial. In this talk, the speaker addresses how safety education is managed in engineering programs and could be improved. In addition, he presents several initiatives he has been involved in to enhance safety education in engineering and business, including student competitions and case studies. A range of engineering case studies he has prepared will be reviewed. He will also discuss his activities with Minerva Canada, a not-for-profit corporation dedicated to embedding safety management into the curricula of business and engineering programs and thereby improving business effectiveness. To provide a broader context, the speaker will discuss the relevant outcomes of the recently held National Engineering Summit, particularly in relation to the Safety and Security Stream which he helped organize.
## Monday Presentation Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Newport I - Forensics Track</th>
<th>Newport II</th>
<th>Carmel I - Environmental Track</th>
<th>Laguna - Upstairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00-8:00</td>
<td>Speaker Breakfast - Encinitas Room</td>
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<tr>
<td>8:30 - 9:00</td>
<td>Opening Plenary - Carmel II&amp;III</td>
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<tr>
<td>9:00-10:00</td>
<td>KEYNOTE - Carmel II&amp;III</td>
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<tr>
<td>10:00-10:30</td>
<td>Break - Carmel II&amp;III</td>
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</tbody>
</table>
| 10:30-11:30| Utility Guy Wires - A Potential Electrical Hazard  
Nosh Medora | Functional Safety and Ethical Concerns  
Elya Joffe | Measuring Energy Efficiency for IT and A&V  
Jon Ivar Tidemann | Impact Analysis on Test Items between IEC 60065, IEC 60950-1 and IEC 62368-1  
Martin Lin |
| 11:30-1:00| Lunch - Carmel II&III |            |                                 |                   |
| 1:00-2:00  | AC & DC Adapter Safety Considerations  
Ashish Arora | Occupational Hazards of the Safety Engineer  
Jon Ivar Tidemann | Hazard base safety assessment for consumer electric household products  
Yasuo Harada |
| 2:00-3:00  | Safety Considerations when Designing Portable Electronics with Electric Double-Layer Capacitors (Supercapacitors)  
Ginger Walden | Clarification on repetitive impulses requirement Information Technology  
Lal Balra | Natural Resources Canada (NRCan) Energy Efficiency Regulations  
David Dulmage | Safety Considerations for Surge Protective Devices Employed in Information Technology Equipment  
Flore Chiang |
| 3:00-3:30 | Break - Carmel II&III |            |                                 |                   |
| 3:30-4:30  | Advanced Tools for Forensic Analysis  
Ken Budoff | Minimum Ignition Power Fundamentals  
Gary Tomquist | Energy Star - for IT and A&V Equipment  
David Dulmage | IEC 62368-1’s Allowance for Application of Non-Prescriptive HBSE to Innovative Products  
Thomas M Burke |
| 4:30-5:30  | Arcing Faults in Low and Medium Voltage Electrical Systems - Why Do They Persist?  
Nosh Medora | Touch Current Analysis of Power Supplies Designed for Energy Efficient Regulations  
William Meng | Exporting IT and A&V products into Mexico  
Jon Ivar Tidemann | PANEL DISCUSSION – “IEC62368-3rd party perspective” - Certification Panel of Test Labs and Certification Bodies |
## Tuesday Presentation Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Location</th>
<th>Track/Session</th>
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<tbody>
<tr>
<td>7:00-8:00</td>
<td></td>
<td>Speaker Breakfast - Encinitas Room</td>
</tr>
<tr>
<td>8:00-9:00</td>
<td>Newport I</td>
<td>General Guidelines: Lithium Cell Selection and Battery Pack Design</td>
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<tr>
<td></td>
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<td>Eddie Forouzan</td>
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<tr>
<td></td>
<td>Newport II</td>
<td>Power supply cords</td>
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<tr>
<td></td>
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<td>Lal Bahra</td>
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<td></td>
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<td>Maneuvering the Minefield:</td>
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<td>Successfully Preparing for and Testifying at Corporate Employee Depositions</td>
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<tr>
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<td>Edgar J Gutierrez</td>
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<td>Metamaterial Patterning to Improve the Septum of a GTEM Chamber Performance:</td>
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<td>RR - Ring Resonator Cells Stamped and Tested on the APEX</td>
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<td>Humberto de Araujo</td>
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<td></td>
<td>Carmel I</td>
<td>Implications of Temporary Overvoltages for Insulation Coordination for Equipment within Low-voltage Systems</td>
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<td></td>
<td>Laguna - EMC</td>
<td>Electromagnetic Interference and Exposure From Household Wireless Networks</td>
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<td></td>
<td>Track II</td>
<td>Yakov P Shkolnikov</td>
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<tr>
<td>9:00-10:00</td>
<td>Newport I</td>
<td>Embedded Lithium-Ion Polymer Batteries Its Qualification, Certification and Market Acceptance In Innovative Devices</td>
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<td>Anthony Wong</td>
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<td></td>
<td>Newport II</td>
<td>Type Testing of Component Power Supplies and Transformers</td>
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<td>Brian O’Connell</td>
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<td></td>
<td>Applied Safety Science and Engineering Techniques – (ASSET)</td>
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<td></td>
<td>Thomas Lanzisero</td>
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<td></td>
<td></td>
<td>A New Proposal for EMC Technique Using DSM</td>
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<td></td>
<td>Keiichi Ohizumi</td>
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<tr>
<td>10:00-10:30</td>
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<td>Break - Carmel II&amp;III</td>
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<tr>
<td>10:30-11:30</td>
<td>Newport I</td>
<td>Modern Smartphone Challenges Associated with New Battery Technology</td>
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<td>Todd Sutton</td>
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<td>Applied Safety Science and Engineering Techniques – (ASSET)</td>
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<td>Keiichi Ohizumi</td>
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<tr>
<td>11:30-1:00</td>
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<td>Lunch - Carmel II&amp;III</td>
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<tr>
<td>Time</td>
<td>Newport I - Battery Track</td>
<td>Newport II</td>
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<tr>
<td>1:00-2:00</td>
<td>A Comparison of Select Li-Ion Cell</td>
<td>IEC 61730/UL 1703 - Safety Standards for</td>
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<td>and Battery Safety Standards</td>
<td>Crystalline and Thin-film PV</td>
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<td></td>
<td>Tom O'Hara</td>
<td>Regan Arndt</td>
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<tr>
<td>2:00-3:00</td>
<td>CTIA IEEE 1625 Certification - An</td>
<td>IEC 61730/UL 1703 - Safety Standards for</td>
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<td></td>
<td>Introduction</td>
<td>Crystalline and Thin-film PV - CONTINUED</td>
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<td></td>
<td>Jan Swart</td>
<td>Regan Arndt</td>
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<td>3:00-3:30</td>
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<td>Assessing the Thermal Stability of</td>
<td>Assessment and Control of Ignition Risk of HT</td>
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<td>Commercial Lithium-Ion Cell</td>
<td>Induction Motor for Increased Safety Ex ‘e’ as per Indian Standard for Explosive Atmospheres</td>
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<td>Kevin White</td>
<td>Bhagirath Ahirwal</td>
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<td>4:30-5:30</td>
<td>Lithium and Lithium Ion</td>
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<td>Transportation Overview</td>
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<td>Charlie Monahan</td>
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### Wednesday Presentation Schedule

<table>
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<tr>
<th>Time</th>
<th>Newport I</th>
<th>Newport II</th>
<th>Carmel I</th>
<th>Laguna</th>
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<tr>
<td>7:00-8:00</td>
<td><strong>Speaker Breakfast - Encinitas Room</strong></td>
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| 8:00-9:00        | WORKSHOP: Human-Centered Systems Engineering  
George Michael Samaras | TAC Meeting - ITE                     | TAC Meeting - Forensics                      | TAC Meeting - TBD                            |
| 9:00-10:00       | WORKSHOP: Human-Centered Systems Engineering  
George Michael Samaras | Reporting Requirements for  
Lasers & Laser-Containing Products  
Anne M. Venetta Richard | Tying the electrical event to the equipment problem  
Peter Perkins | Product Safety Requirements -  
When your Product Becomes Part of the Building  
Bob Griffin |
| 10:00-10:30 AM   | **Break - Carmel II&III**                                                  |                                               |                                               |                                             |
| 10:30-11:30      | WORKSHOP: Human-Centered Systems Engineering  
Steve Stegner | HOT TOPIC DISCUSSION - 100W on USB?  
Grant Schmidbauer | IEC 61010-1 3rd Ed: 2010-06  
Grant Schmidbauer |
| 11:30-12:30      | **Sample**  
RoHS Recast: Short Timeline for Compliance With the New RoHS Directive (2011/65/EU)  
James Calder  
Impact of VoIP services on the Level of Head Exposure to Radiation from 3G Smartphones  
Hayat Abdulla  
Safety Considerations for Wireless Base Station Equipment  
Don Gies  
Product Safety Guidelines for Prototype and Limited Use Commercial Devices  
Jack M Burns |                                               |                                               |                                             |
Monday, October 10

7:00 AM - 8:00 AM - Speaker Breakfast
Room: Encinitas

8:00 AM - 8:30 AM - Exhibitor Breakfast
Room: Encinitas

8:30 AM - 9:00 AM - Welcome Message
Room: Carmel II-III

IEEE PSES Symposium Welcome
Bansi Patel - Symposium General Chair

9:00 AM - 10:00 AM – Keynote
Room: Carmel II-III

“Bridging the Gap between Safety and Sustainability”
Stephen H. Wenc (President UL Environment Inc.)

10:00-10:30 – Break & Exhibit Inspection
Room: Carmel II-III

Time: 10:30-11:30
Room: Newport I

Utility Guy Wires - A Potential Electrical Hazard
Nosh Medora (IEEE, US)
Alexander Kusko (Exponent, US)

Abstract: Electrocutons can occur in low and medium voltage systems, when a person comes in direct contact with a conductor at a high voltage or when there is a conductive contaminant which creates an electrically conductive path across an insulating member. Electrocutons can also be caused by an electrically conductive path from the top of a power pole to close proximity to ground where people and vehicles are present. This may be caused by an energized power line that breaks and falls towards the ground or may be due to a utility guy wire that makes accidental contact with the primary voltage conductors. The electrical industry has adopted various codes and standards in an attempt to improve and enhance equipment safety, and decrease the possibility of the occurrence of arcing faults and electrocution due to guy wires. The NESC and other standards provide requirements for installation and safety of utility guy wires. Incidents of guy wire arcing faults and electrocutions that we have worked on were reviewed to determine the possible reasons for the guy wires creating a hazardous condition and the damaging effects of that hazard, the degree of destruction, and specifically identify the root cause of that particular incident. The objective of this paper is to review and investigate the hazard conditions created by guy wires, in low and medium voltage electrical systems and further to determine the effectiveness of existing safety measures and any additional safety measures that would possibly reduce the hazardous condition.
**Functional Safety and Ethical Concerns**  
Elya Joffe (KTM Project Engineering, IL)

**Abstract:** Technology has a profound influence on society. New possibilities and new risks arise as a consequence of the employment of new technologies and products. Thus, decisions made during design processes shape the possibilities and risks of products. Some decisions, for example, can have a large influence on the safety of people using the product lifecycle. These decisions are ethically relevant: safety is an ethical issue.

Every engineer will be faced with an ethical dilemma sometime during his working career. Engineers are also required to make ethical decisions every day during the regular course of engineering work. Rarely in any engineer's career is there an incident like the "Challenger" disaster where the explosion of a launch vehicle with people on board occurs, but it is always a possibility. Personnel involved in safety-critical application development should possess a balance of high-quality professional skills. Ultimately, it is unethical to develop safety-related systems without following the best practice available.

This presentation addresses the question of potential conflicts between safety and ethics and the manner this conflict can be addressed and resolved.

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**Measuring Energy Efficiency for IT and A&V**  
Jon Tidemann (Nemko AS, NO)

**Abstract:** Measuring Energy Efficiency for IT and A&V. There are measuring challenges for using IEC 62301 which basically has been chosen as the standard for all low power measurements within electrical and electronic products. This presentation identifies the problematic areas and how the second edition of the standard from 2011 has tried to mitigate them.

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**Impact Analysis on Test Items between IEC 60065, IEC 60950-1 and IEC 62368-1**  
Martin Lin (Underwriters Laboratories Taiwan Co., Ltd., TW)

**Abstract:** For decades, safety evaluations for A/V (Audio/Video) apparatus and ICT (Information/Communication Technology) equipment have been conducted per two different standards (i.e., IEC 60065 and IEC 60950-1 respectively). However, modern technologies tend to blur the boundary. For examples, more and more people would watch movies on a laptop, or surf the internet on a smart TV, etc. Since 2002, IEC TC 108 had recognized the problem and has started to develop a new single standard IEC 62368-1 to accommodate both A/V and ICT equipment, utilizing Hazard Base Safety Engineering principles. The first edition of IEC 62368-1 has been published in January, 2010, and the 2nd edition is planned to be published around the end of 2012. In order to be ready for the transition from IEC 60065 or IEC 60950-1 to IEC 62368-1, it's imperative to know what are the differences and impacts that possibly imposed on current design practice. For this purpose, UL (Underwriters Laboratories) has developed comparison charts for clauses, test equipment and test items between IEC 60065, IEC 60950-1 and IEC 62368-1. This paper provides an overview of the comparison charts and will discuss several case studies on selected topics pertaining to tests.

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**11:30 - 1:00 - Lunch**
AC & DC Adapter Safety Considerations
Ashish Arora (Exponent, US)
Darko Babic (Exponent Failure Analysis Inc., US)
John Martens (Exponent, US)

Abstract: Most consumer products today are sold with a switching power supply that delivers power to operate the product and to charge the product's rechargeable battery. Depending upon the application of the product, the switching power supply could be an AC/DC converter (AC adapter), a DC/DC converter (DC adapter) or a combination of the two in a single enclosure. An AC adapter typically converts the 120 Vac/240 Vac power from a wall outlet to a lower DC value for use by the product. A DC adapter is often used in an automotive environment and typically steps down the 12 V vehicle supply voltage to a lower voltage suitable for use with the product. Most AC adapters and DC adapters follow one of several standard circuit designs for voltage conversion. However, in addition to requiring circuitry to convert the higher input voltage to a lower DC voltage necessary to power the product, the adapters also use circuitry designed to ensure that failures of one or more components within the adapter do not expose the user to a safety hazard. This principle of safety also applies to the mechanical design of the adapter. Several industry standards are designed to test the safety performance of an adapter under various electrical, mechanical and environmental abuse conditions. In addition, consumer product designers typically have their own abuse standards to which the adapter must comply. Since the overall design and assembly of the adapters can vary significantly from one manufacturer to another, possible failure modes of the adapter may be evaluated and the adapter design may be such that it prevents any single failure from leading to an electrocution or fire hazard. This presentation describes the typical designs of both AC adapters and DC adapters used in the consumer products industry. The presentation also provides a summary of several standards that exist to address and evaluate the safety of the adapters, including a description of the type of tests intended to evaluate the safety of the adapters. The presentation will include a discussion on additional features of the adapter designs that are typically studied and analyzed to ensure the long-term safe performance of the adapter. Some typical quality control issues will be highlighted and failure scenarios will be detailed such as issues with the design of the circuit board as well as issues with mechanical elements and materials of construction.

Occupational Hazards of the Safety Engineer
Ted Eckert (Microsoft Corporation, US)

Abstract: Our jobs as product safety engineer require us to abuse products to determine their limits. Our Hipot tests involve high voltages. We have ground bond tests with high currents. We set fire to plastics and we use chemicals to test the durability of labels. Stability tests may require tipping very heavy test samples. Safety test laboratories need to be set up to ensure the safety of the test engineers and technicians. The rooms need to comply with the local electrical and building codes, and the procedures need to comply with the local occupational safety and health requirements. Properly implemented procedures can reduce the risk of injury without incurring significant hassle.
European Directive for Energy Related Products 2009/125/EC  
Jon Tidemann (Nemko AS, NO)

Abstract: European Directive for Energy Related Products - existing and future regulation for IT and A&V. How to determine whether your product falls within or outside the scope of the directive, and guidelines for standby power measurements for networking products.

Hazard base safety assessment for consumer electric household products  
Yasu Harada (Osaka University, JP)  
Tetsusei Kurashiki (Osaka University, JP)  
Masaru Zako (Osaka University, JP)

Abstract: Product safety and quality issues have been discussed globally. It is important that the safety design should be laid in the stage of the product's design of the manufacturing process in order to reduce the potential safety incident rate of house hold appliances. In this paper, we propose the safety assessment using hazard based approach. Until now, the safety of a product has been evaluated on the basis of past incident cases, and manufacturers have been trying to avoid reoccurrence of the similar incidents by consideration of the causes of past incidents. But this approach is still not perfectly effective in reducing cases in the market. So we analyze the incident report in Japan on hazards of the past incident case. We incorporate major hazards into Fault Tree Analysis, FTA, diagram to analyze the causes of the products incidents including the important components of consumer electronics appliances. The hazard based FTA helps to cover all the causes the incidents. We also incorporate the safeguard components in FTA. The reliability of components is calculated and the safety merit of the products is derived over the product life cycle using a Monte-Carlo simulation.

We propose that the hazard based product safety assessment be applied to derive the safety merit of the product design, which gives the criteria for the product design for the service period of product and maintain the manufacturer’s safety design level from the design stage. By using this scheme, the identical criteria for safety requirement for all kinds of products categories can be standardized for product safety.

Safety Considerations when Designing Portable Electronics with Electric Double-Layer Capacitors (Supercapacitors)  
Ginger Walden (Exponent Failure Analysis Associates, US)  
Jeremiah Stepan (Exponent Failure Analysis Associates, US)  
Celina Mikolajczak (Exponent Failure Analysis Associates, US)

Abstract: Electronic Double-Layer Capacitors (Supercapacitors) have energy densities that are roughly two orders of magnitude greater than their traditional capacitor counterparts. The high charge and discharge rate, long life, low internal resistance, high output power, and improved energy density of the supercapacitors has introduced the possibility of these devices being used in portable electronics. Supercapacitors can be used together with batteries as a supplemental power source when high bursts of current are needed, or as a stand-alone power source. As of now, there are no standards that specifically address safety considerations when designing electronics that implement supercapacitors. This paper discusses how we can apply what we already know from safety standards for rechargeable battery technology and expounds upon issues specific to capacitor technology that is not addressed in these standards.
Clarification on repetitive impulses requirement
Lal Bahra (Dell Inc., US)

Abstract: A presentation on the same subject was made in the 2006 PSE symposium where the effort was to demonstrate how the various values were calculated. In this new presentation, the effort is on the application of the principles in actual power supply design in accordance with 2.2.3 of IEC 60950-1, 2nd Ed. When the power supply goes into the hiccup mode (irrespective of whether it generates a single pulse or multiple pulses, there is no AC or DC limit during the hiccup mode. It is simply a peak voltage measurement. It can be a single peak (single impulse) or multiple peaks (multiple impulses). Within the 20 ms or 200 ms window for $t_1$, there may be a single peak or multiple peaks. This is followed by another $t_2$ time duration of > 1 s or > 3 s in which the voltage must drop to the V1 limit as shown in the Figure 2E of IEC60950-1. Therefore, there is no need to classify it as AC or DC. The maximum peak voltage is measured and this peak voltage shall be within the appropriate limits of hiccup mode requirements. The single or multiple peaks must fit in the $t_1$ time slot and must be preceded by a $t_2$ time slot where the voltage remains within the normal SELV circuit limits.

Natural Resources Canada (NRCan) Energy Efficiency Regulations
David Dulmage (Nemko Canada, Inc., CA)


Safety Considerations for Surge Protective Devices Employed in Information Technology Equipment
Flore Chiang (Underwriters Laboratories Taiwan Co., Ltd., TW)

Abstract: The use of surge suppression devices has proliferated in the last decade, primarily addressing the need for equipment to be immune to external influence caused by atmospheric disturbances and switching transients. Safety concerns associated with the persistent conduction and deterioration over time had arisen after several field incidents. This paper will attempt to provide an overview of the use of SPD in electronic equipment and the respective safety considerations.

3:00-3:30 - Break & Exhibit Inspection
Room: Carmel II-III
Advanced Tools For Forensic Analysis
Ken Budoff (Microsoft Corporation, US)

Abstract: Often in the process of forensic analysis or safety assessments, we are faced with situations where non-destructive testing or unique investigative techniques are necessary. This presentation will introduce some new tools, test equipment and techniques that can assist the Forensic Engineer with these analyses. Several of the tools and equipment being introduced will be demonstrated and time will be made available for students to get some hands on experience.

Minimum Ignition Power Fundamentals
Gary Tornquist (Microsoft Corp., US)

Abstract: This paper examines why fundamentally there should exist a minimum power capable of causing ignition in electrical equipment, without trying to determine the value of the limit. Considerations include heat transfer, fluid dynamics of air, and generally how combustion scales. An idea for lab experiment to investigate minimum power is presented. The paper concludes by asking: "Why are there no Micro-fires?" as this illustrates by counter example the existence of a minimum ignition power.

Energy Star - for IT and A&V Equipment
David Dulmage (Nemko Canada, Inc., CA)

Abstract: Energy Star - for IT and A&V Considering the change in regulation starting in January 2011, how the new program has been implemented, what manufacturers need to know, and how and where testing and certification can be accomplished.
IEC 62368-1’s Allowance for Non-Prescriptive HBSE to Innovative Products
Thomas Burke (Underwriters Laboratories Inc., US)

Abstract: IEC 62368-1, Edition No. 1 covers audio/video, information and communication technology equipment within its product scope. Once an energy source has been identified and classified, the Standard contains both performance and construction options to determine the effectiveness of required safeguards for ordinary persons, instructed persons and skilled persons having contact with the equipment. This Standard was developed by IEC TC108 using Hazard-based Safety Engineering (HBSE) with a goal to facilitate consistency in the application of the requirements under a global conformity assessment system. However, it was anticipated that there also would be times when new and innovative technologies, materials and methods of construction are utilized by manufacturers in electronic products covered under its scope, and these new aspects may not be specifically covered by the Standard. In the past, this has resulted in some difficulties applying product safety standards, with delays achieving certification and introducing innovative and ground-breaking products to global markets. Fortunately, IEC 62368-1 contains provision in its sub-clause 4.1.5 for applying non-prescriptive, basic HBSE principles for “technologies, and materials or methods of construction not specifically covered in this standard...” This provision allows for timely and efficient application of IEC 62368-1 to innovative forms of high technology products, helping to address a past impediment that sometimes prevented manufacturers from achieving certification and introducing products to global markets in a timely manner.

Arcing Faults In Low and Medium Voltage Electrical Systems - Why Do They Persist?
Nosh Medora (IEEE, US)
Alexander Kusko (Exponent, US)

Abstract: Arcing faults can occur in low and medium voltage systems, causing high temperatures of the order of tens of thousands of degrees, resulting in severe damage to equipment and arc flash hazards with severe burns and possibly death. The electrical industry has adopted various codes and standards in an attempt to improve and enhance equipment safety, and decrease the possibility of the occurrence of arcing faults and thus mitigate the dangerous effects of arcing faults to humans. However, the NEC and other standards do not address the hazards associated when the equipment doors are open and a maintenance worker accidentally creates an arcing fault.

Incidents of arcing faults that we have worked on were reviewed to determine the computed damaging effects of that fault, the degree of destruction, and specifically identify the root cause of that particular arcing fault.

The objective of this paper is to review and investigate the reason for the large number of arcing faults in low and medium voltage electrical systems and further to determine why, there are so many arcing fault incidents in spite of increased levels of protection and installation of fail-safe mechanisms and procedures.
**Touch Current Analysis of Power Supplies Designed for Energy Efficient Regulations**
William Meng (Underwriters Laboratories Inc., TW)

**Abstract:** Every year, hundreds of thousands of switching mode power supply (SMPS) are manufactured and shipped to users all over the world. Most of these power supplies used with information and communication technology equipment or consumer electronics are either certified to IEC 60950-1 or IEC 60065, or other derivative ones. In most safety tests, operation conditions are clearly defined if they were found to influence the test results. Historically, the loading conditions of SMPS have not been specified in most standards as they were found to have little influence on the measurement. However, with the proliferation of energy efficiency (eco-friendly) regulations, linear power supplies are falling out of favor, furthermore, a variety of techniques (e.g. to reduce power consumption of stand-by mode) are developed in this efficiency game. For instance, to latch off some portion of circuit while no-load condition or change operation frequency with the loading conditions. This paper intends to summarize how touch current measurement is affected by loading conditions in modern design, and how do we select an appropriate method to simulate the worst-case scenario.

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**Exporting IT and A&V products into Mexico**
Jon Tidemann (Nemko AS, NO)

**Abstract:** Exporting IT and A&V products into Mexico. New energy efficiency labeling requirements in Mexico. Requirements come into force autumn 2011, what is required, and how to meet the requirements.

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**PANEL DISCUSSION - IEC62368-1 Certification Panel of Test Labs and Certification Bodies**
Bill Lowe (CSA International)
Morten Andersen (Nemko AS)
Dan Sullivan / Uwe Meyer (TUV Rheinland of North America, Inc.)
Kevin L. Ravo (Underwriters Laboratories)

Will the upcoming Hazard Based Safety standard for Information and Consumer Electronics be as difficult to certify real products to as some safety pundits predict? Find out how leading NRTL’s are planning to handle the biggest standards transition for these product classes in many years.

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**5:30-7:00 - Welcome Reception**
**Room:** Carmel II-III
Tuesday, October 11

7:00 AM - 8:00 AM - Speaker Breakfast
Room: Encinitas

8:00 AM - 9:00 AM - Exhibitor Breakfast
Room: Encinitas

Time: 8:00-9:00
Room: Newport I

General Guidelines: Lithium Cell Selection and Battery Pack Design
Eddie Forouzan (ARTIN Engineering, US)

Abstract: The selection of an appropriate lithium cell and its integration into a battery pack design involves various steps. The end product and its application are typically the guiding factors; however, the proper understanding of different lithium cell chemistries and designs, in harmony with the final battery pack design requirements steer our way to a better selection process.

Recent cell design advancements, including but not limited to new cathode materials, have provided engineers with many options to choose from. The cell's performance window, design criteria and inherent safety level are some of the factors which must be taken into account. Some general guidelines will be provided in this presentation.

Time: 8:00-9:00
Room: Newport II

Power supply cords
Lal Bahra (Dell Inc., US)

Abstract: A power supply cord is an essential element of all cord connected electrical equipment; it is needed to connect the equipment to electrical mains supply. The power cord can be hard wired to the equipment or it can be a detachable type power cord. The non-detachable power cord consists of a plug, the cordage and a strain relief device to secure the cordage to the equipment enclosure. The detachable power cord, also known as power cord set, consists of a plug, cordage and a connector. This seems to be simple component but when it comes to regulatory approvals from different countries; it becomes a pretty complicated component. There may be different requirements for different countries regarding markings for country agency labels or certificate of compliance, letter of approval, certificate of approval or registration and these can be different for the plug, cordage and the connector. There are different requirements for a power cord if it is packed in the same box as the computer equipment versus when it is shipped as a repair or replacement component. Some countries want only the cord that is suitable for them in the box containing the equipment and no other country power cord. Some countries allow you to just provide proper instruction for the selection of the power cord while others do not rely on such instructions.
Maneuvering the Minefield: Successfully Preparing for and Testifying at Corporate Employee Depositions
Edgar Gutierrez (Bowman and Brooke LLP, US)

Abstract: Corporate engineers/employees are often called upon to testify on behalf of a corporate defendant in product liability litigation, either as a specifically named witness or, as the "person most knowledgeable/qualified." Engineers are not usually trained as "professional testifiers." As such, engineers who may be called upon to testify on behalf of their corporate employers face a particularly grueling task as they must defend the questioned design and adequately convey the company's "story" behind that design. Most engineers are not properly trained or sufficiently experienced to accomplish this task. This presentation therefore is intended to discuss the topic. It is geared toward the novice engineering witness who may have little to no experience testifying as a corporate witness. It covers the importance of the corporate witness testimony, how to adequately prepare for the deposition and a sampling of the topics and questions likely to be encountered.

Metamaterial Patterning to Improve the Septum of a GTEM Chamber Performance: RR - Ring Resonator Cells Stamped and Tested on the APEX
Humberto de Araujo (University of Campinas, BR)
Luis Kretly (Unicamp, BR)

Abstract: As the EMC - Electromagnetic Compatibility is an incessant necessity nowadays, because the increases of electronic devices, different approaches support the pre-compliance tests (EMC/EMI/EMS) setups which have consolidated standards and regulations. These setups include TEM/GTEM cells, Magnetic Loop, Magnetic probe, Workbench Faraday Cage, OATS - Open Area Test Site and others. Based on the advantages in terms of frequency range and cost-effectiveness, a GTEM to operate from 500 MHz - 18GHz was designed. In this work, a metamaterial patterning was applied to the septum (metallic plate constructed by cooper) of the GTEM chamber, in order to obtain a better coupling between the EM field and the DUT (Device Under Test). The main analysis is carried out on the excitation sector of the GTEM chamber - APEX. The APEX is the transition from the 50 Ω coaxial cable to the rectangular transmission line. It takes about 10% of the overall length of the chamber with a front panel large enough to mount a N connector. The APEX should be mounted on the body by a flange which ensures mechanical robustness and a good electrical connection. To avoid reflections, the match between the connector and the center conductor should be carefully projected. The basic metamaterial cell pattern employed here consists of a ring resonator - RR (Ring Resonator) or CLL (Capacitively Loaded Loop) in SRR (Split Ring resonator) or CSRR (Complementary Split Ring Resonator) configuration topologies. The cells are oriented depending on the wave direction from the device to the measuring port or from the exciter side to the device under test. Actually, resonant type metamaterial transmission lines are very similar to CLL lines. Experimental results are compared to the simulated ones and show the tuning characteristic advantages of the patterned septum in comparison with the plain one. This new and promising technique appears to improve the GTEM chamber overall performance.
Embedded Lithium-Ion Polymer Batteries Its Qualification, Certification And Market Acceptance In Innovative Devices
Anthony Wong

Abstract: Today innovative consumer electronic devices have embraced embedded lithium-ion polymer (LIP) batteries. These batteries offer a new degree of design freedom to the device designers. Qualifying embedded LIP requires close cooperation between battery manufacturers and the device OEMs. Such knowledge sharing is one of the key success factors in developing thinner and lighter weight consumer electronic devices.

Type Testing of Component Power Supplies and Transformers
Brian O'Connell (Tamura Corp of America, US)

Abstract: There are some test requirements that are specific to each of the various information technology, medical, and laboratory product safety standards. Component power converters must be compatible with local electric codes, so there can be test requirements not in the scoped safety standard, but are found in a national version of the standard or in local electric codes.

The presentation will focus on the design and conduct of a type test to indicate conformity to specific safety requirements for component power converters and isolation transformers, and to provide insight for the power component customer on when to repeat or add some type tests based on the end-use installation and conditions of acceptability.

Implications of Temporary Overvoltages for Insulation Coordination for Equipment within Low-voltage Systems
Flore Chiang (Underwriters Laboratories Taiwan Co., Ltd., TW)

Abstract: The term 'temporary overvoltages' has been first introduced to product safety standards for information and communication technology equipment as one of the causes of VDR (voltage dependent resistor) fire and burst, and then has been factored in the determination of working voltages. Unlike a.c. mains transient overvoltages, temporary overvoltages are due to the fault in low-voltage power distribution system and medium-voltage or high-voltage power distribution system from which the low-voltage system is derived. This paper will attempt to provide an overview of the cause and the implications of temporary overvoltages in safety considerations.
Electromagnetic Interference and Exposure From Household Wireless Networks
Yakov Shkolnikov (Exponent, Inc and Drexel University, US)
William Bailey (Exponent, Inc and Cornell University Medical College, US)

Abstract: In the last few years, the use of wireless technology for household products has greatly increased led by applications such as smart meters, internet connected TVs, and Bluetooth links to home theater systems. In the coming years, it almost certain that wireless technology will have a nearly ubiquitous presence in households through a variety of mundane household appliances, toys, and other consumer products. Yet, with this technology comes an increased perception of risk by end-users fueled by fears of cancer and other health effects as well as concern about potential interference with life-saving products such as medical devices. This paper discusses concepts of radio frequency exposure and electromagnetic interference as they relate to the wireless communication networks that are likely to be used in household environments.

10:00-10:30 - Break & Exhibit Inspection
Room: Carmel II-III

Modern Smartphone Challenges Associated with New Battery Technology
Todd Sutton

Abstract: “I want the one with the more GeeBees” is a common request from the average smartphone customer. What they don’t see is that the “GeeBees” will burn a lot more energy. To supply that energy we use bigger batteries. But then the phone becomes bigger and heavier, so we look to new battery chemistries. However this brings along another list of challenges and costs. This talk will walk through a few of these tradeoffs including Size and Power Consumption.

Applied Safety Science and Engineering Techniques - ASSET
Thomas Lanzisero (UL Inc, US)

Abstract: Applied Safety Science and Engineering Techniques (ASSETs) merge hazard based safety engineering and safety science principles in an overall framework of a safety management process to achieve, maintain and continuously improve safety. The ASSET process is synthesized from current, industry-standard risk assessment and risk management guidelines, including recent ISO, IEC and ANSI publications.
A New Proposal for EMC Technique Using DSM
Keiichi Ohizumi (O2 Inc., JP)
Atsushi Maeda (O2 Lab., JP)

Abstract: A unique approach, Design Structure Matrix, which is one of the method defining a causal relationship in complex systems. It is so common analysis in mechanical engineering. Nowadays it is becoming impossible for an engineer to keep up with the technical details aspects of various electrical devices available for use. So, the design and layout of electrical product for EMI suppression at the source must always be optimized, while maintaining system-wide functionality. And this is also a job for both the electrical engineer and mechanical engineer. Consequently, it is clarified that an optimization of design process of product is able to be not only in chronological order, but also design-information order, using DSM. DSM may highlight a lot of “Hidden Schematic” in EMC issue.

11:30 -1:00 - Lunch
Room: Carmel II-III

Time: 1:00-2:00
Room: Newport I

A Comparison of Select Li-Ion Cell and Battery Safety Standards
Tom O’Hara (Intertek, US)

Abstract: A comparison and contrast of select Li-Ion battery safety standards is presented. Focus is the portable, consumer market.

Time: 1:00-2:00
Room: Newport II

IEC 61730/UL 1703 -Safety Standards for Crystalline and Thin-film PV
Regan Arndt (TUV SUD America, US)

Abstract: This presentation will initially describe the basic function and composition of the Photovoltaic cell and module in relation to its electrical characteristics during solar irradiance and temperature, including a brief overview of PV systems. From there, the presentation continues to describe the testing requirements for photovoltaic modules in order to provide safe electrical and mechanical operation during their expected lifetime. Specific topics are provided to assess the prevention of electrical shock, fire hazards, and personal injury due to mechanical and environmental stresses in accordance with IEC 61730 and UL 1703 safety standards that are used for certification.
Semantic Annotation of Product Safety Information
Erik Gilsdorf (Technische Universität Darmstadt, DE)

Abstract: Due to an increasing number of regulatory restrictions and a rising product complexity, compliance and safety management have become key issues for enterprises today. Besides the requirements to build safe products, extended documentation of safety compliance and in-use restrictions have to be archived and published by law. Some research projects have already tackled the problem of visually identifying hazards zones within virtual environments. Other approaches deal with the formal analysis of safety issues in expert systems for conformity checks. What is still missing is the bridge between visual representation and documentation. The virtual reality approaches do not support storage and processing of identified hazards, furthermore 3D models have to be prepared and converted to VR formats, which does not allow "online" analysis. Expert systems only cover an abstract, textual definition of hazard zones, which separates the safety domain from design. This paper describes a framework for "product safety information" to identify, track and document hazards and protective measures throughout the product lifecycle. The underlying data model supports integration of geometric references into the safety information, similar to the use of product manufacturing information like GD&T. Thus pictorial and textual safety information can be annotated to 3D CAD models and used for communication of engineering changes related to safety issues in early design stages. Later in product life this information can then be embedded into user documentation or service manuals.

Electromagnetic Compatibility (EMC) Design Modification Considerations in Electronic Equipment
Norman Bernas (Norman Bernas Consulting Inc., CA)

Abstract: Light Rail Systems, also known as municipal Rapid Transit Systems, inherently encompass within their area of operation, virtually all aspects of the Electromagnetic Compatibility (EMC) and Electromagnetic Interference (EMI) spectrum. This extends to the multitude of rail signaling equipment which is jam-packed with an abundance of microprocessor based electronics gear required for the safe and efficient operation of modern Light Rail Systems. The Light Rail signaling equipment which is subjected to severe EMI must function properly under all circumstances and so all aspects of EMC/EMI are considered during the equipment design and formal EMC testing. This is crucial, considering that the safety of the passengers, which after all, is the main focus and motivation for a state-of-the-art Light Rail System, depends on it. The scope of this paper is to provide details of a low cost solution to the problem of one aspect of EMC certification, namely, excessive powerline harmonics. This example not only applies to rail signaling systems, but may be applied to a broad spectrum of electronics systems, since the principles applied are universal.
CTIA IEEE 1625 Certification - An Introduction
Jan Swart (Exponent Inc., US)

Abstract: IEEE 1625 standard is a system level standard and was developed for rechargeable batteries for multi-cell mobile computing devices. Overall compliance to IEEE 1625 is dependent on conformity to each and every sub clause of the standard. Compliance with IEEE 1625 cannot be achieved by any particular multi-cell mobile computing device or subsystem alone without considering the conformity of all subsystems within the system as well as the end user. IEEE 1625 standard has established criteria for design analysis quality and reliability. The CTIA has developed a certification program based on all 'shall' clauses of IEEE 1625. The CTIA program categorize the host and its subsystems. This presentation describes the CTIA certification program and how it applies to a Li-Ion and Lithium polymer rechargeable battery powered mobile computing device.

IEC 61730/UL 1703 -Safety Standards for Crystalline and Thin-film PV modules - CONTINUED
Regan Arndt (TUV SUD America, US)

Abstract: This presentation will initially describe the basic function and composition of the Photovoltaic cell and module in relation to its electrical characteristics during solar irradiance and temperature, including a brief overview of PV systems. From there, the presentation continues to describe the testing requirements for photovoltaic modules in order to provide safe electrical and mechanical operation during their expected lifetime. Specific topics are provided to assess the prevention of electrical shock, fire hazards, and personal injury due to mechanical and environmental stresses in accordance with IEC 61730 and UL 1703 safety standards that are used for certification.

Would your Product Safety Testing Workstation Comply with OSHA 1910 Electrical Safety Requirements
Dwayne Davis (Associated Research Inc., US)

Abstract: Would your Product Safety Testing Workstation Comply with OSHA 1910 Electrical Safety Requirements? Performing a routine product safety test should not be hazardous to the employee conducting the test. It is the employer's responsibility to provide a safe work environment free from any potential hazards. Employers should also implement safety related work practices and procedures and train the operator to avoid any potential hazards. Is your Product Safety Testing Workstation set up for Productivity or Safety? Most electrical accidents in the workplace are a direct result of one of the following three factors; unsafe equipment or installation, unsafe environment, or unsafe work practices. A responsible employer can help ensure a safe working environment by using electrical safety testers with a safety agency listing. Recognizing this OSHA requires that electrical instruments used in the workplace be listed by a Nationally Recognized Testing Laboratory (NRTL). Are your Employee's thoroughly familiar with the safety procedures for their particular job?
Power Loss Detection as a Solution to Foreign Object Detection in a Contactless Power System

Neil Kuyvenhoven (Fulton Innovation, US)
Cody Dean (Amway, US)
Joseph Melton (Fulton Innovation, US)
Joshua Schwannecke (Access Business Group, US)
A.E. Umenei (Amway, US)

Abstract: Wireless power transfer has been around for many years, current research in this technology has lead to systems with higher efficiency and more applicability over varying distances. Though there are many advantages to wireless power transfer, safety concerns associated with the technology exist as well. These include concerns surrounding high voltage on resonant coils, electromagnetic energy exposure, and unintentional foreign object heating. The Wireless Power Consortium (WPC) has a call to detect metal objects (MOD) located in the power transfer field.

This research addresses metal objects as defined by the WPC as well as other non-metallic objects that may dissipate power in a magnetic field; therefore, this article expands MOD to foreign object detection (FOD). The work proposes a parasitic loss detection (PLD) model as an approach to FOD by modeling and characterizing the energy lost in a wireless power system. The model considers electronic component losses and magnetic material losses in an attempt to quantify the specific energy lost due to parasitic element or foreign object heating. There are alternative methods to the FOD problem, however, this paper highlights the benefits of PLD as it compares to the alternatives. Using predictive techniques which take into consideration operating conditions (e.g. load, position, frequency), the model can quantify the magnitude and location of losses from measurements on the primary side and reported power usage on the secondary side of the wireless power transfer system.

Using PLD as a method of FOD, it has been demonstrated that foreign objects can be detected in the magnetic field when their power absorption reaches 0.5W. The detection is accomplished by on board measurements quantifying the losses in the system; no external sensing (e.g. temperature, optical, pressure) is required for detection of foreign objects.

3:30-4:30 - Break & Exhibit Inspection
Room: Carmel II-III

Assessing the Thermal Stability of Commercial Lithium-Ion Cells
Kevin White, Quinn Horn and Surendra Singh (Exponent, Inc.)

Abstract: The threat of thermal run-away in lithium-ion cells is a safety concern that can affect cell manufacturers, battery pack designers, device manufacturers and the consumer. Some efforts to further improve the safety and performance of lithium-ion cells have focused on the replacement of the most commonly used LiCoO2 positive electrode material. Those materials in favor with industry and academic researchers include alternate metal oxides, various mixed metal oxides and, most notably, metal phosphate systems. The lithium iron phosphate material, first reported by Padhi et. al in 1996, has gained the confidence of cell manufacturers based on more benign thermal failures relative to thermal failures of the commonly implemented LiCoO2 material and similar layered transition metal oxides.[1,2] Many manufacturers are offering cell designs based on LiFePO4 and consider the reduction in total energy density relative to layered transition metal oxides an acceptable engineering trade-off for a reduction in the severity of thermal failure events.
Assessment and Control of Ignition Risk of HT Induction Motor for Increased Safety Ex ‘e’ as per Indian Standard for Explosive Atmospheres
Bhagirath Ahirwal (Central Institute of Mining and Fuel Research, Dhanbad, IN)
T. K. Chateree (Central Institute of Mining and Fuel Research, Dhanbad, IN)
A. K. Singh (Central Institute of Mining and Fuel Research, Dhanbad, IN)

Abstract: It is very difficult to manage ignition risk by operational procedures to ensure that there has not been a hazard gas release in the area prior to starting the motor or and stator sparking which may occur during running; this procedure may be less appropriate than an automatic interlock. As per Indian Standard rotor cage potential sparking and potential stator winding discharge of induction motor are to be considered for risk assessments of increased safety motor. Risk assessment is done based on construction, operation, protection, and environmental conditions of the motor and ignition risk factor are assigned based on its characteristics. The sum of assigned risk factors should not be more than 5. If it is greater than 5 the motor should be type tested where no incendive sparking should occur during ignition risk assessment test for Ex ‘e’ motor. The paper discusses about the control of ignition risk and assessment of risk factor. The paper also describes the ignition risk assessments test of HT Ex ‘e’ motor as per Indian Standard, conducted successfully first time in India by Central Institute of Mining and Fuel Research Institute, Dhanbad, jointly with Bharat Heavy Electricals Limited, India.

Examination of Fire Damaged Metal Oxide Varistors
Mark Goodson (Goodson Engineering, US)
Lee Green

Abstract: The failures of MOVs are well established causes of fires. Typically during a fire scene examination, the finding of an MOV with hole that has been punched through is considered proof that an MOV has failed. Several versions of UL 1449 have been published in an attempt to minimize fires caused by MOV failures.

Outlined here is research that has been carried out into failure modes of MOVs. More particularly, the research attempts to examine if the cause of an MOV failure is an actual MOV problem or an environmental (transient) problem. Moreover, we look at how MOVs degrade during a fire. The ZnO MOV, due to its high melting point, usually survives a fire, but will have become unsoldered from its leads. When recovered, the investigator will be interested in determining whether or not the MOV has been altered by the fire. Fire debris, such as carbonaceous products, will have some effect on subsequent electrical testing. We demonstrate the effects that post fire ultrasonic cleaning have on an MOVs characteristics. We also show how metallurgical techniques can be used to section an MOV, such that grain structure between failed and non failed portions of the same MOV can be examined.

Finally, we examine fires where MOVs have failed, but in which no failure in the MOV substrate occurred; rather the fire that developed occurred after the MOV degraded, but with the overcurrent causing an arced lead failure. Post fire analysis techniques, to include SEM, EDX, and metallography are described.
Brazilian Regulation on Safety Conformity Assessment for Household and Similar Appliances
Luiz Claudio Araujo (Schonbek Worldwide Lighting, US)

Abstract: As of July 1st 2011, a group of 87 families of household electrical and similar appliances - including industrial equipment - manufactured or imported to Brazil must be certified according to a regulation published by INMETRO. The Act 371, which mandates compulsory certification, was published at the Official Gazette on December 31, 2009. Among household products that must be certified are electric irons, hair driers, vacuum cleaners, food processors, blenders and electric shavers. Among commercial and industrial products are vending machines, stoves, ovens and multifunctional apparatus for commercial kitchens. The purpose of this paper is to provide an overview of the certification process and the current status of the implementation of the new regulation.

Lithium and Lithium Ion Transportation Overview
Charlie Monohan (Panasonic)

Abstract: Not Available

Some “basics”, save the trauma for when it really counts
Lars Mellander (Testing-Compliance, US)

Abstract: This is an interactive and very applicable presentation to the needs of virtually any company with any level of compliance and global market access need. The basis of the information is how any company needs to prepare and cover the critical details that will help avoid minor to serious issues on a small or truly global scale project. The presentation covers numerous details in regard to compliance at the development stage of a product and what should be considered to untimely save companies a great deal of cost, time and effort. The presentation can later be used by a company as a checklist of questions to ask, matters to consider and the best path to compliance and market access when developing a product. I heavily stress the correct use of the CB scheme and how to best create a global CB report that is solid, contains only the critical information needed and can truly be used as an invaluable tool. The presentation also stresses the vital need to consider global implications in the earliest stages of the process, considerations of what certifications critical components really have, limiting the critical component list to only what is truly needed and how this critical component list will be viewed for market access in the most difficult markets, China, Taiwan and others. I then expand these basics to particular markets and global trends and their coming changes.
Electrical Shock and the Electric Powered Vehicles - An Introduction
Jan Swart (Exponent Inc., US)

Abstract: In today's world, the risk of injury occurring in households and in the workplace from electrification is minimal given the maturity of these installations and the inherent risks are accepted as a reasonable tradeoff with the conveniences that electrification brings. In contrast, electrification in vehicle powertrains is in its infancy and yet they are becoming more and more common. It is not generally understood that there is also risk of electrical injury from both the electrified vehicles and the supporting infrastructure. Potentially at risk from these new electrical hazards are drivers, charge station operators, repair shop workers, electrical workers and first responders. This paper discusses body impedance models and electrical injury thresholds specifically as they relate to the operation of the electric vehicle powertrain and the supporting electrical infrastructure.

Mandatory requirements for commercializing electrical products in Argentina
Silvia Díaz Monnier (National Institute of Industrial Technology, AR)
Andrea Méndez (National Institute of Industrial Technology, AR)

Abstract: In the last years, Argentina has established mandatory requirements for different products. The process, normative and standards vary for each case. The presentation will describe how to put an electrical product into Argentinean market, with special attention in the S-mark and the medical products.

For non medical products a certification process is required. It will explain which products are included in the mandatory requirements, the three systems of certification, and the market surveillance process for each system of certification.

For commercialize a medical product, the product shall be listed in ANMAT. Before the listing the manufacturer or importer should make the registration for that kind of product with ANMAT. The presentation will explain the process required for manufacturer/importer registration, the product listing and the systems for classification of products.

There are some special products that have other compliance requirements. The presentation will explain which products are involved, the normative, the technical requirement and the enforcement authority for each case.

Finally, the presentation will describe some Argentinean requirements like the plug, some marking and ratings.
WORKSHOP: Human-Centered Systems Engineering
George Samaras (Samaras & Associates, Inc., US)

Abstract: Products, processes, and services exist solely because their uses by humans have real or perceived value (utilitarian or esthetic). This is the fundamental justification and rationale for human-centered development, which provides the greatest long-term return-on-investment, lowest "total cost of ownership", and the highest probability of safety and effectiveness. Systems Engineering (SE) is a structured, systematic approach to the conceptualization, design, development, deployment, and replacement of products, processes, and services. Classical SE, in existence since the early 1900s, is one of the oldest agile methods. We will discuss the fundamental state space, lifecycle, technical, and management activities, in the context of micro-ergonomics (tools for individuals) and macro-ergonomics (tools for organizations). Quality is about identifying and satisficing ALL the stakeholders' evolving and frequently conflicting needs, wants, and desires (NWDs). Requirements (design inputs) are a subset of NWDs selected for fulfillment. Modern human factors engineering can contribute at all levels of SE. The concept of human-centered system complexity (from physical and behavioral to social and cultural considerations) will be presented, followed by a discussion of the relevant metrology. Human-centered SE presents a rather large set of factors for experimental verification and validation studies. Experimental design approaches, historically used by engineers, are very inefficient given large numbers of factors. We will discuss the fundamental principles of experimental designs and the modern approach (statistical design of experiments or DOE) useful for product, process, and/or service verification and validation studies. DOE will be visually presented using its underlying, simple geometric structure. Please bring your laptop; lectures and workbook will be on a CD.

Time: 8:00-9:00
Room: Newport II

TAC Meeting - ITE

Time: 8:00-9:00
Room: Carmel I

TAC Meeting - Forensics

Time: 8:00-9:00
Room: Laguna

TAC Meeting – General
Ivan VanDeWege (PSES TAC VP, Case Forensics)

Time: 9:00-10:00
Room: Newport I

WORKSHOP: Human-Centered Systems Engineering - CONTINUED
George Samaras (Samaras & Associates, Inc., US)
**Reporting Requirements for Lasers and Laser-Containing Products**
Anne Venetta Richard (Alcatel-Lucent, US)

**Abstract:** This presentation outlines the compliance requirements and standards for lasers and laser-containing products for Alcatel-Lucent, a leader in the telecommunications industry. The presentation also provides insights and experiences from Alcatel-Lucent's merging of different historical approaches to laser reporting and federal and regulatory compliance.

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**Tying the electrical event to the equipment problem**
Peter Perkins (P.E. Perkins PE, US)

**Abstract:** Electrical fault events happen every day in the power grid. When these events impact equipment that is significantly important to the operation of a business it is time to investigate the downstream cascade and tie the final failure to the initial event in order to establish responsibility and liability. This forensic paper examines the specifics resulting from a shorting on the primary side of the distribution transformer which lead to intermittent failure in a server system and subsequent loss of data integrity. The study is interesting because it focuses the larger fault issue and how it works down to the equipment level. Some of the basic issues are well understood and covered in the literature which will be reviewed.

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**Product Safety Requirements - When your Product Becomes Part of the Building**
Bob Griffin (IBM Corporation, US)

**Abstract:** Designing and developing products today can be quite straightforward with the ever narrowing scope of product safety standards however increasingly, companies are more often providing ‘solutions’ to customer needs rather than a simple product. This very often complicates the application of a simple product standard to possible incorporate many other safety aspects beyond the basic product standard. This might include the need to address specific building codes, life safety codes, plumbing, fire safety, ingress protection. The list or needs can be very consequential and may often involve the need for local architectural support or building codes experts to ensure both customer needs and local law and regulations. This presentation will work through a number of examples of where these intersecting standards can create problems or provide solutions.

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**10:00-10:30 - Break & Exhibit Inspection**
Room: Carmel II-III

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**WORKSHOP: Human-Centered Systems Engineering - CONTINUED**
George Samaras (Samaras & Associates, Inc., US)
Recap of the International Laser Safety Conference 2011
Steve Stegner (Microsoft Corporation, US)
Gary Tornquist (Microsoft Corp., US)

Abstract: The 2011 International Laser Safety Conference (ILSC) was a comprehensive four-day conference covering all aspects of laser safety practice and hazard control. Scientific sessions addressed developments in regulatory, mandatory and voluntary safety standards for laser products and for laser use. The Practical Applications Seminars (PAS) complemented the Scientific Sessions by exploring everyday scenarios that the LSO (Laser Safety Officer) and MLSO (Medical Laser Safety Officer) may encounter. The ILSC expanded this year's PAS to include the medical community. Laser safety experts from all over the world met and discussed their current research, ongoing safety programs, trends in laser use and misuse, as well as proposed updates to optical safety standards. This presentation reviews the highpoints of the conference at a level accessible to working compliance engineers and other without deep laser expertise.

HOT TOPIC DISCUSSION - 100W on USB?
The USB 3.0 specification under development allows up to 100W of power delivery over a some types of new USB cables after negotiation between source and host. Join a group discussion of the compatibility, certification and potential safety issues emerging from this hot topic.

IEC 61010-1 3rd Ed: 2010-06
Grant Schmidbauer (Nemko USA, Inc., US)


RoHS Recast: Short Timeline for Compliance With the New RoHS Directive (2011/65/EU)
James Calder (Intertek - Health and Environment, CA)

Abstract: Changes within the new Restriction of Hazardous Substances (ROHS) Directive will have significant impact on all electronic products that are currently covered under the existing ROHS Directive while expanding the scope of covered products in a transitional timetable.

This presentation will cover the following aspects of the new law’s impact to electronics:

- Overview of Regulation and requirements - Scope - Timeline - New CE mark requirements for RoHS-2 - Harmonized standards - IEC/CENELEC - Industry practices - Enforcement methodologies - Alignment with other substance programs

The increased enforcement powers for this law create a need for all areas of an electronic company to become properly educated in its impact. This presentation/program will provide sufficient content and discussion to allow companies to make strategic decisions for compliance and product protection.
Impact of VoIP services on the Level of Head Exposure to Radiation from 3G Smartphones
Hayat Abdulla (Universidad Simon Bolivar, VE)
Renny Badra (Universidad Simon Bolivar, VE)

Abstract: The maximum level of emissions from cellular devices, as characterized by their Specific Absorption Rate (SAR), is tightly enforced by regional and national regulatory agencies. As a result of this effort, it is safe to state that the use of cellular phones does not pose significant risks to users, as many studies have certified. However, the result of some other research efforts have hinted at a the existence of a correlation between prolonged use of cell phones and certain forms of brain tumors. Although overwhelming evidence points at the fact that this should not be a reason for general public health concern, there are indications that some specific population groups such as children and very heavy adult users may be at an increased risk of developing some form of brain disease as a consequence of cell phone emissions.

On the other hand, while maximum levels of EM energy generated by cellular devices are carefully monitored, little attention has been paid to average levels of radiation, which are equally related to the primary effect of non-ionizing emissions, that is, heat induced from dissipation. The study presented here follows a line of research that looks at the average (as well as other statistics) of head SAR from a system perspective, that is, considering the cellular device not as an isolated piece of equipment but as a part of a rather complex cellular network.

Results indicate that, as a general rule, VoIP connections always bring in an increase in some of the statistics of the level of emissions absorbed by the head of voice users, as compared to circuit-switched connections. Moreover, under a set of typical conditions, such increase in average radiation levels may be as high as 60%. As a result, a number of recommendations aimed at mitigating the increase in radio emissions associated to the use of VoIP instead of conventional voice services are readily drawn from this study.

Safety Considerations for Wireless Base Station Equipment
Don Gies (Alcatel-Lucent, US)

Abstract: This paper gives a brief overview and history of safety certification of wireless telecommunications base station equipment, and describes some of the particular techniques used to evaluate the safety of the radio transmitting sub-assemblies.
Product Safety Guidelines for Prototype and Limited Use Commercial Devices
Jack Burns (Dell Corporation, US)

Abstract: Designing a product to meet a specified level of safety can be an expensive and complicated task. Sophisticated analysis techniques exist and are widely used to protect the public in the nuclear, aerospace, and aircraft industries with good success. Lower value consumer products generally follow well-defined safety standards that theoretically force a sufficiently high level of safety without the expense of exhaustive analysis. For products used in a workplace, safety standards fall under the aegis of national labor or worker safety requirements which have focused their attention on eliminating the most obvious hazards in the most dangerous industries. Unfortunately, to the designer of prototype and limited use commercial devices, it is not always obvious what level of safety is desired nor which standards apply. Too often, the design engineer is not trained in safety and has no understanding of the relative level of safety required - nor how to achieve it. One approach for this situation is to go back to the basics of product safety.

This presentation reviews the requirements, basic techniques, standards, and regulations and establishes an appropriate set of product design safety guidelines for prototypes and limited use commercial devices based on frequency of use, potential hazard level, user skill level, and use environment.