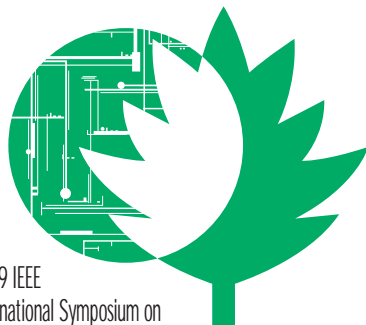


**FINAL PROGRAM**



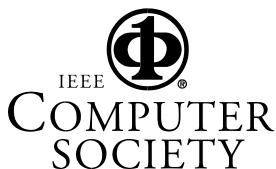
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2009 IEEE  
International Symposium on

**SUSTAINABLE SYSTEMS & TECHNOLOGY**

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**In Cooperation with**  
**2009 IEEE International Symposium on**  
**Technology and Society (ISTAS)**

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**MAY 18 – 20, 2009**  
**TEMPE, AZ**



## **2009 IEEE International Symposium on Sustainable Systems and Technology May 18-20, 2009, Phoenix, AZ**

### **Scope and Format**

The IEEE Computer Society Technical Committee on Electronics and the Environment (TCEE) welcomes you to an old-new conference, the first IEEE International Symposium on Sustainable Systems and Technology (ISSST), formerly known as the International Symposium on Electronics and the Environment (ISEE), which would have been the 17<sup>th</sup> ISEE gathering had we not changed the conference's name in the last year.

Since 1993, experts on information and communication technologies (ICT) have gathered from around the world at the annual ISEE symposium. Originally, the focus was on design for environment and life-cycle management, but increasing interest in sustainability, and the accelerating evolution of technology, made it clear that a conference limited to environmental considerations was inadequate. Accordingly, the title has been expanded to include sustainable systems and technology, and the conference itself co-located with the annual IEEE Society on Social Implications of Technology meeting, the 2009 IEEE International Symposium on Technology and Society (ISTAS). This change is an important augmentation to include the social and cultural dimensions of ICT.

ISSST provides an excellent opportunity for environmental and business professionals, design and manufacturing engineers, researchers, and government decision-makers interested in advancing practical sustainability solutions in the field to learn about leading edge research and initiatives.



Highlights of the 2009 ISSST program include:

- 19 sessions with topics spanning areas from design through energy to end-of-life issues and emerging technologies.
- 2 joint sessions with ISTAS, on emerging technologies as well as ethics.
- Two free tutorial sessions: on life-cycle assessment (LCA) and carbon foot-printing.
- Keynote and luncheon addresses by the President of Arizona State University and the conference co-chairs.

This year's event consists of 72 presentations on a diverse set of topics authored and presented by an international mix of speakers. A student technical paper contest and poster contest is organized to recognize student contributions to the advancement of knowledge on environmental impacts.

The organizers are interested in your views of the conference and the environmental aspects of the industry. Please share your views with the organizers and volunteer your time and effort to make the 2010 conference equally successful.

We hope you find this event professionally and personally useful. It represents a unique opportunity to bring together all parties in the field to communicate progress and challenges to improve the sustainability of the electronics industry and emerging fields. We especially extend a warm welcome to our international participants, and wish them a pleasant stay in the Phoenix area.

#### **Conference Co-Chairs**

Braden Allenby  
Scott Matthews

#### **Program Co-Chairs**

Eric Masanet  
Arpad Horvath



## 2009 IEEE International Symposium on Sustainable Systems and Technology

### Organizing Committee

#### Conference Co-Chairpersons

Braden Allenby, *Arizona State University*  
Scott Matthews, *Carnegie Mellon University*

#### Program Co-Chairpersons

Eric Masanet, *Lawrence Berkeley National Laboratory*  
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#### Finance Chairperson

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#### Poster Session Chairpersons

Jeremy Gregory, *Massachusetts Institute of Technology*  
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#### Student Paper Competition Chairperson

Hilary Nixon, *San Jose State University*

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Andrew Sweatman, *ESHconnect*



## 2009 IEEE International Symposium on Technology and Society

May 18-20, 2009, Phoenix, AZ

Welcome to the 2009 IEEE International Symposium on Technology and Society (ISTAS'09), the annual conference of the IEEE Society on Social Implications of Technology (SSIT). SSIT has about 2000 members worldwide. The scope of the society includes such issues as environmental, health and safety implications of technology; engineering ethics and professional responsibility; history of electrotechnology; technical expertise and public policy; peace technology; and social issues related to energy, information technology and telecommunications. In addition to sponsoring ISTAS, SSIT publishes a quarterly journal, *IEEE Technology and Society Magazine*. Membership in SSIT is open to all IEEE members and student members. Affiliate membership in SSIT is available to persons who are not members of IEEE.

ISTAS'09 is being held concurrently with the IEEE International Symposium on Sustainable Systems and Technology (ISSST), with joint sessions related to an overall conference theme of sustainability. ISTAS '09 brings together participants interested in sharing their research, projects, and ideas about:

- Roles for Expert and Lay Knowledge in Sustainable Development
- Technological Innovation and Sustainability
- Urban Issues in Sustainable Development
- Global Public Policy and Sustainability
- Systems Thinking as an Approach to Sustainable Development
- ICT & Community
- Ethical Considerations in Technology Deployment
- Autonomous Robots



ISTAS '09 is a multi-disciplinary event for engineers, scientists, researchers in the social sciences, arts and humanities, and decision makers in the private and private sectors. This years' registrants come from eighteen U.S. states, one U.S. territory and seven other nations.

We hope you have an intellectually stimulating and enjoyable time at ISTAS and during your stay in the Phoenix area.

Joseph Herkert  
**Conference Chair**

Clinton Andrews  
**Program Chair**



## **2009 IEEE International Symposium on Technology and Society**

### **Conference Chairperson**

Joseph Herkert, *Arizona State University*

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Janet Rochester (ex-officio)



## 2009 IEEE International Symposium on Sustainable Systems and Technology

**Tutorials, May 18, 2009**

### ***Life-cycle Assessment, Policy, and Product Certification***

Life-cycle Assessment (LCA) endeavors to characterize the environmental impacts of a product or service throughout its life cycle, i.e., from the extraction of raw materials through manufacturing, use and disposal. In recent decades, LCA has developed into its own field, with a global community engaged in developing and implementing methodologies, data/software infrastructure, and case studies. LCA is increasingly being used to inform decisions related to environmental technologies and policies, such as carbon footprinting and labeling, national emission inventories, and appliance standards.

This tutorial reviews the main LCA methods and an overview of how it has been used to inform policy and product/service management. Methods to compile life-cycle inventories are the bottom-up process sum method, the top-down economic input-output life-cycle assessment (EIO-LCA) and hybrid methods combining the two approaches. Impact assessment methods are also briefly discussed. Applications covered include early analyses of energy supply systems from the 1970s, packaging studies in the 1990s, and more recent work on information technology and biofuels.

*About the presenters:*

**Eric Williams** is Research Director of the Center for Earth Systems Engineering and Management at Arizona State University (ASU) and Assistant Professor in Civil, Environmental and Sustainable Engineering and the School of Sustainability at ASU. He has been active in LCA since 2002 in areas such as assessing information technology, uncertainty analysis, and more recently, renewable energy.



### ***Carbon Footprinting: Challenges and Opportunities***

Recent initiatives such as low carbon fuel standards, a focus on energy prices, and renewed interest in greenhouse gas emissions has led to considerable interest in “carbon footprinting.” While definitions vary, carbon footprinting (CF) is effectively life-cycle assessment (LCA) of products with a focus on carbon. Despite significant efforts to standardize such calculations (such as standards from the British Standards Institute, the International Standards Organization, and the World Resources Institute/World Business Council on Sustainable Development) significant uncertainty and variability remain in the calculation of footprints, particularly for complicated products with large supplier networks.

Most CF methods suggest separating emissions into Scopes, where Scope 1 is direct emissions from the organization, Scope 2 encompasses emissions from purchased energy by the organization, and Scope 3 are all other emissions.

In this session we will overview major CF initiatives, discuss how they will affect LCA and also corporate efforts. We will discuss how existing tools can be used to help estimate footprints, and also help frame the discussion of how to estimate footprints that are complementary to the developing standards. We will discuss our insights as related to ongoing projects with the California Air Resources Board on carbon labeling for products, and WRI/WBCSD in support of scope 3 protocol development.

*About the presenters:*

**Scott Matthews** is an Associate Professor in Civil and Environmental Engineering at Carnegie Mellon University and also Research Director of the Green Design Institute.

**Christopher Weber** is an Assistant Research Professor in Civil and Environmental Engineering at Carnegie Mellon University with a focus on carbon measurement and management through effective footprinting.



**2009 IEEE International Symposium on  
Sustainable Systems and Technology**  
**in cooperation with**  
**2009 IEEE International Symposium on  
Technology and Society**

**Keynote presentation, May 18, 2009**

***The Engineering Challenges of Sustainability***  
**Michael Crow, President, Arizona State University**

Michael Crow became the sixteenth president of Arizona State University in 2002. He is guiding the transformation of ASU into one of the nation's leading public metropolitan research universities, an institution combining academic excellence, inclusiveness to a broad demographic, and maximum societal impact. During his tenure ASU has established major interdisciplinary research initiatives such as the Biodesign Institute, the Global Institute of Sustainability (GIOS), and more than a dozen new interdisciplinary schools, and witnessed an unprecedented research infrastructure expansion and doubling of research expenditures.

He was previously executive vice provost of Columbia University, where he oversaw Columbia's research enterprise and technology transfer operations. A fellow of the National Academy of Public Administration and member of the Council on Foreign Relations, he is the author of books and articles analyzing research organizations and science and technology policy. Crow received his Ph.D. in Public Administration (Science and Technology Policy) from the Maxwell School of Citizenship and Public Affairs, Syracuse University, in 1985.



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# PROGRAM AT-A-GLANCE

Time	ISSST Track 1: Products, Systems, and Services Location: Joshua Tree	ISSST Track 2: Tools and Methods Location: Capistrano	ISSST Track 3: Special Topics and Critical Perspectives Location: Palm F	Special Sessions Location: Cavetto	ISTAS Location: Augustine
<b>Monday, May 18, 2009</b>					
7:00am-8:00am	Breakfast (Break stations in courtyard)				
8:00am-9:30am	Free ISSST Tutorial Session Introduction to Life-Cycle Assessment				Special Open Meeting IEEE Society on Social Implications of Technology Board of Governors
9:30am-10:00am	Refreshment Break (Break stations in courtyard)				
10:00am - 11:30am	Free ISSST Tutorial Session Carbon Footprinting: Challenges and Opportunities				Special Open Meeting IEEE Society on Social Implications of Technology Board of Governors
11:30am-1:00pm	Lunch on your own				
1:00pm-2:00pm	Keynote Speaker - Michael Crow, President, Arizona State University: "The Engineering Challenge of Sustainability" (Location: Palm AD)				
2:00pm-2:15pm	Refreshment Break (Break stations in courtyard)				
<b>Registration</b>					



# PROGRAM AT-A-GLANCE

Time	ISSST Track 1: Products, Systems, and Services Location: Joshua Tree	ISSST Track 2: Tools and Methods Location: Capistrano	ISSST Track 3: Special Topics and Critical Perspectives Location: Palm F	Special Sessions Location: Cavetto	ISTAS Location: Augustine
<b>Monday, May 18, 2009</b>					
2:15pm-2:45pm	Energy Systems: Trends and Innovations <i>Energy and Civilization: A History of Energy Production and Consumption in a Global Cultural, Technological and Economic Context</i> Carolyn S. Matlock, Eric Williams, and Braden R. Allenby	Applications of Life-Cycle Assessment <i>Energy Consumption in the Production of High-Efficiency Light-Emitting Diodes</i> Deanna H. Matthews, H. Scott Matthews, Pauline Jesuaito, and Christopher L. Weber	Nanotechnology <i>A Life-Cycle Energy Analysis of Single Wall Carbon Nanotubes Produced Through Laser Vaporization</i> Matthew J. Ganter, Thomas P. Seager, Christopher M. Schausman, Brian J. Landi, and Rynne P. Raffaele	Joint ISSST/ISTAS Session on Emerging Technologies <i>Serious games, sustainable civilizations, and trading zones</i> Mike Gorman	ISTAS Roles for Expert and Lay Knowledge in Sustainable Development <i>Managing highly uncertain risks: Unused pharmaceuticals, climate change, and nuclear waste</i> David Hassenzahl, Robert Goble, Ilene Ruhoy
2:45pm-3:15pm	<i>Environmental Comparison of Energy Scavenging Technologies for Self-Sufficient Micro System Applications</i> Stephan Benecke, Nils F. Nissen and Herbert Reich	<i>Comparative Life Cycle Assessment (LCA) of overhead and underground medium voltage power distribution</i> Sarah Bumby, Ekaterina Druzhhina, Rebe Ferakl, Danae Werthmann, Roland Geyer, and Jack Sahl	<i>Single Wall Carbon Nanotubes for Conductive Wiring</i> Christopher M. Schausman, Jack Alvaeraga, Matthew J. Ganter, Thomas P. Seager, Brian J. Landi, and Rynne P. Raffaele	<i>The Challenge of Emerging Technologies</i> Brad Allenby	<i>Technology discourse and sustainability: Fraught with Disconnects</i> Peter Weisner, William Tonti
3:15pm-3:45pm	<i>Making Power Adapters Smarter and Greener</i> Paul A. Panepinto	<i>Embedded Temporal Difference in Life Cycle Assessment: Case Study on VW Golf/A4 Car</i> Chris Yuan, Rachel Simon, Natalie Mady, and David Dornfeld	<i>Environmental Assessment of Manufacturing with Carbon Nanotubes</i> Lindsay Dahben and Jacqueline Isaacs	<i>Are smarter buildings better buildings?</i> Clinton Andrews	<i>Stakeholder assessment for the introduction of sustainable energy and environmental technologies in Japan</i> Mashiro Matsura, Tatsujiro Suzuki, Hideaki Shroyama
3:45pm-4:15pm	<i>Carbon Footprinting Upstream Supply Chain for Electronics Manufacturing and Computer Services</i> Y. Amy Huang, Christopher L. Weber and H. Scott Matthews	<i>Carbon Footprinting Upstream Supply Chain for Electronics Manufacturing and Computer Services</i> Y. Amy Huang, Christopher L. Weber and H. Scott Matthews	<i>Nanotechnology Environmental, Health, and Safety Issues: Brief Literature Review Since 2000</i> Zeynep D. Ok, James C. Bemeyn, and Jacqueline A. Isaacs		<i>Potential of the corporate web site to generate trust in environmentally risky firms</i> Nuria Hurtado-Torres, Maria Bermudez-Eco, Juan Alberto Aragon-Correa, Eulogio Cordon-Pozo
4:15pm-6:15pm	<b>Poster Session and Reception (Location: Palm ABDE)</b>				
<b>Registration</b>					





# PROGRAM AT-A-GLANCE

Time	Registration	ISSST Track 1: Products, Systems, and Services Location: Joshua Tree	ISSST Track 2: Tools and Methods Location: Capistrano	ISSST Track 3: Special Topics and Critical Perspectives Location: Palm F	Special Sessions Location: Cavetto	ISTAS Location: Augustine
6:30-7:45am	Committee Meeting IEEE President's Sustainability Initiative					
7:00am-8:00am	<b>Breakfast (Break stations in courtyard)</b>					
8:00am-8:30am	<b>Materials and Sustainability</b>	<b>Risk and Uncertainty Assessment</b>	<b>Policy, Regulation, and Standards</b>	<b>ISSST Special Session on Thermodynamics and Sustainability</b>	<b>ISSST Special Session on Thermodynamics and Sustainability</b>	<b>ISTAS ICT &amp; Community</b>
	Comparative Life Cycle Assessment of Insulating Concrete Forms with Traditional Residential Wall Sections Neelhi Rajagopalan, Melissa Blec, and Anyi Landis	Uncertainty and Variability in Accounting for Grid Electricity in Life Cycle Assessment Christopher Weber, Constantine Samaras and Paulina Jaramillo	Power Management for Networked Computers: A Review of Incentive Programs J. Michael Walker	Preliminary Thoughts on the Application of Thermodynamics to the Development of Sustainability Criteria Timothy G. Gutowski, Susan P. Seuktic, and Bhawik R. Bakshi	Going green: Videoconferencing as part of everyday life Susan O'Donnell	
8:30am-9:00am	Excellent Product Stewardship and Sustainable Use of Plastics Addresses in the Electronics Industry Susan Landry, Steve Scherrer, and Joel Tenney	Modeling the Risks to Complex Industrial Networks Due to Loss of Natural Capital Vikas Khatma and Bhawik Bakshi	Ineffective Environmental Laws in Regulating Electronic Manufacturing Pollution: Examining Water Pollution Disputes in Taiwan Wenting Tu and Yujung Lee	Understanding the Implications of a Thermo-Economic Perspective on Sustainability Thomas Seager	The growing role of e-learning on sustainable growth: Applications to management education Owen Hall, Jr., Phil Brown	
9:00am-9:30am	Supply Chain to Supply Cycle: Mining Plastics from Electronics to Close the Loop Michael Biddle, Brian Rise, and Chris Slijkhuys	Strategies to Address Risks of Platinum Scarcity for Supply Chain Downstream Firms Elsa Alonso, Frank Field, Rich Roth and Randolph Kirchain	Methodology and Utilization of Simplified Eco-assessments for Policy Making Lutz Stobbe, Nils F. Nissen, Karsten Schischke, and Herbert Reichl	Framework for Thermodynamic Constraints on Sustainability Eric Williams	From "localized" to "networked": A transformation in community structures William Towne	
9:30am-10:00am	California's Green Chemistry Initiative Bob Boughton	End-of-life LCA allocation methods: open loop recycling impacts on robustness of material selection decisions Anna L. Nicholson, Elsa A. Olivetti, Jeremy R. Gregory, Frank R. Field, and Randolph E. Kirchain	IT Products: Going Beyond Green-Can High Performance and Sustainability Co-Exist? Claire Hobby, N. Eyckel, Emma Sjogren, and Wendy Williams	Lifetime Energy Consumption as a Sustainability Metric for Information Technologies David Lettieri, Christopher R. Hammenam, Van P. Carey, and Ansh Shah	Location and interactive services: Not only at your fingertips but under your skin Rodney Jo, Katina Michael, MG Michael	
10:00am-10:30am	<b>Refreshment Break (Break stations in courtyard)</b>					



# PROGRAM AT-A-GLANCE

Time	Registration	ISSST Track 1: Products, Systems, and Services Location: Joshua Tree	ISSST Track 2: Tools and Methods Location: Capistrano	ISSST Track 3: Special Topics and Critical Perspectives Location: Palm F	Special Sessions Location: Cavetto	ISTAS Location: Augustine
10:30am-11:00am	<b>Green Design and Manufacturing</b>	<b>Sustainability Tools and Metrics I</b>	<b>Electronics Product Stewardship: International Perspectives</b>	<b>ISTAS Technological Innovation and Sustainability</b>	<b>ISTAS Urban Issues in Sustainable Development Roundtable</b>	
	Bringing Forth Sustainability Innovation in the Electronic Industry: The Case of Lead-Free Solders Masaru Yairme	Eco-LCA - A tool for quantifying the role of ecological resources in LCA Shweta Singh and Bhawik Bakshi	Implementing IPR under the European WEEE directive - experiences in Germany Susanne Reiter, Peering Camerel and Wolf-Peter Schill	Sustainable disasters: The impact of natural disaster on vulnerable populations, the role of technology and its implications for community sustainability Charles Schartung	Examining urban sustainability issues from the perspectives of urban design, planning process, and systems thinking Clinton Andrews, Emily Talen, Ashwani Vaish	
11:00am-11:30am	Elementary analysis of mobile phones for optimizing end-of-life scenarios Kaue Takahashi, Masayuki Tsuda, Jiro Nakamura, Kazumi Otake, Masaki Tsuruoka, Yasunari Matsuno and Yoshihiro Adachi	Is Economic Value an Effective Proxy for Embodied Energy and Environmental Impact in Material Systems? Jeremy Gregory, Susan Fredholm and Randolph Kirchain	Implementing Electronics Stewardship: A U.S. Federal Agency's Perspective Mark Saljel	Contending sustainability agreements and the future world Ken Zimmerman	Implications of population growth and access to water, food, and energy for disease and conflict among nations Luis Kun, Clinton Andrews, Robert Matthews, Rahul Tongia, Stephen Unger	
11:30am-12:00pm	Lead-free soldering of telecommunication network infrastructure products Bo Eriksson and Richard Trankeil	Integration of Reliability and Environmental Aspects in Early Design Stages of Mechatronics Andreas Mitterdorf, Sebastian Deyer, Jürgen Gausemeier, Nils F. Nissen, Herbert Reichl	Developments and Evaluation of Existing Policies and Regulations for E-waste in India Amit Jain	Pro-active contributions of technology to more sustainable developments in our global society: Recent issues, trends and opportunities Mauricio Traversi		
12:00pm-12:30pm	Schematic Characterization of Human Health Impact of Toxic Chemicals for Sustainable Design and Manufacturing Chris Yuan and David Dornfeld	Quantifying Mitigation Potential of Climate Action Plans for American Cities Michael Blackhurst, H. Scott Matthews and Chris T. Hendrickson	Case study of a Suzhou pilot project on the suitable treatment technology for scrap computers in China Jinhui Li, Huabo Duan, and Wenyi Yuan	Community wireless networks: Emerging wireless for digital inclusion Abdelnasser Abdelal, Hesham Ali		
12:30pm-2:00pm	<b>Lunch (Provided) (Location: Palm AD) Speakers - Brad Allenby, Arizona State University, and Clint Andrews, Rutgers University: "Update on the IEEE President's Sustainability Initiative" Presentation of Awards</b>					





## PROGRAM AT-A-GLANCE

Time	ISSST Track 1: Products, Systems, and Services Location: Joshua Tree	ISSST Track 2: Tools and Methods Location: Capistrano	ISSST Track 3: Special Topics and Critical Perspectives Location: Palm F	Special Sessions Location: Cavetto	ISTAS Location: Augustine
<b>Tuesday May 19, 2009</b>					
	<b>Renewable Energy Systems</b>	<b>IT Systems and Sustainability</b>	<b>Transportation and Logistics</b>	<b>ISSST Special Session on Education</b>	<b>ISTAS Ethical Considerations in Technology Deployment</b>
2:15pm-2:45pm	Increased Penetration of Wind Generated Electricity using Real Time Pricing & Demand Side Management Paddy Firm, Colin Fitzpatrick and Martin Leahy	Automated Synthesis of Sustainable Data Centers Tom Christian, Yuan Chen, Rocky Shih, Rakesh Sharma, Christopher Hoover, Manish Marwah, Amit Shah, and Daniel Grnath	Assessing Sustainability Impacts of Route Guidance System under Cooperative Vehicle Infrastructure Environment Byungkyu (Brian) Park and Jooyoung Lee	Experimental Teaching Strategies for Ethical Reasoning Skills Relevant to Sustainability Thomas P. Seager and Evan Seelinger	Considering sustainability through ethical approaches and their practical application Denise Oram
2:45pm-3:15pm	Public Institution Fast Tracking Solar Panel Array Implementation Cynthia Orndoff and Joe Shepard	Developing an Overall CO2 Footprint for Semiconductor Products Tim Higgs, Michael Cullen, Marissa Yao, and Scott Stewart	Life Cycle Assessment of Traditional Retail and E-commerce Logistics for Electronic Products Amy Nagengast, Rachael Nealer, Chris Hendrickson, Paulina Jaramillo, H. Scott Matthews, and Christopher Weber	Reverse Engineering as an Educational Tool for Sustainability Luisa Dempere	Social Implications of automobile collision avoidance systems Scott Miller
3:15pm-3:45pm	Effect of Agricultural Practices on Biotech's Environmental Footprints Xiaobo Xue and Amy E. Landis	Development of a Green Scorecard to Identify Research Projects for Eco-Efficient Print Engines Fritz Ebner, Shu Chang, John Knapp, Victoria Deyoung, and Wendli Latko	Exploring the Tradeoffs of Daily Commute Choice Christopher Haro	Sustainable Engineering Vertically-Integrated Project Scheme in Undergraduate Engineering Education Troy O. McBride, Kurt DeGoede, and Jean Fullerton	Nuclear power and prima facie duties towards future people Benham Taabi
3:45pm-4:15pm	Land Use and Geospatial Aspects in Life Cycle Assessment of Renewable Energy Thomas P. Seager, Shelle A. Miller and J. Kohn	Social Impact Assessment of Multipurpose ICT Service by Using GSF Masayuki Tsuda, Kazuo Takahashi, Masayuki Nakamura, Jiro Nakamura, Haruna Furuta and Norihiro Itsubo	Selection of Lightweighting Strategies for Use Across an Automaker's Vehicle Fleet Trisha Montalbo, Theresa M. Lee, Richard Roth, and Randall E. Kirchain	Research and Education in Green Materials: A Multi-disciplinary Program to Bridge the Gaps Julie M. Schoenung, Oradele A. Ogunseitan, and David A. Eastmond	Privacy and ethical issues in location-based tracking systems Jessa Wang Lying, Michael Loui
4:15pm-4:45pm		Deaf Survey of Electronic Recyclers – Results and Analysis Puneet Shrivastava, Scott O'Connell, and Mike Watson	Emission Inventory Assessment for a Container Vessel Fangfang Wang, Han P. Bao, and Thomas Kiernan	Personalized Education Brad Allenby	The legal ramifications of microchipping people in the United States of America: A state legislative comparison Angelo Figlietti, Katina Michael, IMG Michael



## PROGRAM AT-A-GLANCE



# PROGRAM AT-A-GLANCE

Wednesday, May 20, 2009					
Time	ISSST Track 1: Products, Systems, and Services Location: Joshua Tree	ISSST Track 2: Tools and Methods Location: Capistrano	ISSST Track 3: Special Topics and Critical Perspectives Location: Palm F	Special Sessions Location: Cavetto	ISTAS Location: Augustine
<b>Breakfast (Break stations in courtyard)</b>					
7:00am-8:00am					
<b>Registration</b>					
8:00am-8:30am	<b>Green IT</b> Creating a Sustainable IT Ecosystem: Enabling Next-Generation Urban Infrastructures Brian Watson, Ratinesh Sharma, Susan Charles, Anup Shah, Chandrakant Patel, Manish Marwah, Christopher Hoover, Thomas	<b>Sustainability Tools and Metrics II</b> Water Efficiency Management in Datacenters: Metrics and Methodology Ratinesh Sharma, Anup Shah, Cullen Bash, Tom Christian and Chandrakant Patel	<b>Emerging Issues in Electronics Recycling</b> End-of-Life Challenges of Printed Electronics Manika Keskinen and Jani Valkama	<b>Joint ISSST/ISTAS Session on Ethics</b> Macroeconomics in Engineering: The Case of Climate Change Joseph R. Herkert	<b>ISTAS Systems Thinking as an Approach to Sustainable Development</b> Decision making for social sustainability: A life-cycle assessment approach Margot Hutchins, John Gierke, John Sutcliffe
8:30am-9:00am	<b>A New Look at Design for EOL - Game Changing Outcomes of the Close the Loop Study</b> Wayne Riller and P. Brody-Heine	<b>End-of-Life Analysis of Analog CATV Converters</b> John Carrell, Hong-Chao Zhang, Hua Li, and Chengcheng Fan	<b>Microbiological recovering of metals from printed circuit boards by Acidithiobacillus ferrooxidans</b> Bai Jianfeng, Wang Jinqiwei, Xu Jinqiu, Zhou Mingyuan, Guan Jie, and Zhang Chenglong	<b>Sustainability as preserving intergenerational equity: the acceptable course of action in nuclear power</b> Benham Taebi	<b>The systems approach to human problems: How humanitarian engineering can help</b> Matthew Burnham
9:00am-9:30am	<b>Reducing the Greenhouse Gas Emissions of Commercial Print with Digital Technologies</b> Royston Selman, Chris Preist and Scott Caronico	<b>Assessment of Supply Chain Carbon Mitigation Potentials</b> Eric Mesnard, Greg Homan, Rich Brown, Kidas Jan Krainer, and Ernst Worell	<b>Review and Prospects of Recycling Methods for Waste Printed Circuit Boards</b> Jingfei Yu, Eric Williams, and Meiting Ju	<b>Macroeconomic and Social Issues in Emerging Technologies and the Military</b> Carolyn Matlack	<b>On analytical tools to advance resolving urgency gaps for complex learning societies: A prerequisite for sustainable development?</b> Walter Zessner
9:30am-10:00am		<b>Technological-Ecological Networks for Sustainable Process Design</b> Robert Urban and Bhavik Bakshi	<b>E-Scrap Recycling Designing for the Environment</b> Tomas Pietho	<b>The Ethics of Emerging Technologies: Real Time Macroeconomic Assessment</b> Brad Allenby	<b>Seven barriers to a sustainable future</b> Jeff Robbins
10:00am-10:15am	<b>Refreshment Break (Break stations in courtyard)</b>				



# PROGRAM AT-A-GLANCE

Wednesday, May 20, 2009					
Time	ISSST Track 1: Products, Systems, and Services Location: Joshua Tree	ISSST Track 2: Tools and Methods Location: Capistrano	ISSST Track 3: Special Topics and Critical Perspectives Location: Palm F	Special Sessions Location: Cavetto	ISTAS Location: Augustine
<b>Registration</b>					
10:15am-10:45am	<b>Regional Aspects of Product Systems</b> Environmental lifecycle impacts and benefits of secondhand CRT TVs exported from Japan to the Philippines Aya Yoshida, Tomohiro Tasaki, and Atsushi Terazono	<b>End of Life Systems Analysis</b> Modeling the Impact of Product Portfolios on the Economic and Environmental Performance of Recycling Systems Jeffrey B. Dairman, Elsa A. Olivetti, Susan A. Fredholm, Jeremy R. Gregory, and Randolph E. Kirchain			
10:45am-11:15am	<b>A study on remanufacturing businesses in Japan</b> Mitsutaka Matsumoto and Koh Naito	<b>Supply and Demand in the Material Recovery System for Cathode Ray Tube Glass</b> Jeremy Gregory, Marie-Claude Nadeau and Randolph Kirchain			
11:15am-11:45am	<b>Assessing the management of small waste electrical and electronic equipment through substance flow analysis - The example of gold in Germany and the USA</b> Perrine Chancelier, Barbara K. Reck, T.E. Graedel and Susanne Rother	<b>Using RFID signalling to close the loop on second hand Computers</b> Eanna Cronin, Pat Sweeney, Stewart Hickey, and Colin Fitzpatrick			
11:45-12:15pm	<b>Environmental Overhead of Labor (EOL) Embodied in Trade: The Case of 2002 China-US Trade</b> Ming Xu, Eric Williams and Braden Allenby				
12:30pm-1:00pm	<b>Closing Session (Palm AD)</b>				
1:00pm-3:00pm	<b>Committee Meeting (Location: Sand Lotus)</b> ECE TIG Roadmap Meeting				



## MONDAY, MAY 18, 2009

**7:00am-8:00am**

### **Continental Breakfast**

Location: Courtyard break stations

**8:00am-11:30am**

### **Special Open Meeting: IEEE Society on Social Implications of Technology Board of Governors**

Location: Augustine

### **FREE TUTORIALS**

**8:00-9:30am**

### **Introduction to Life-Cycle Assessment**

Location: Joshua Tree

Life Cycle Assessment (LCA) endeavors to characterize the environmental impacts of a product or service throughout its life cycle, i.e. from the extraction of raw materials through manufacturing, use and disposal. In recent decades, LCA has developed into its own field, with a global community engaged in developing and implementing methodologies, data/software infrastructure, and case studies. LCA is increasingly being used to inform decisions related to environmental technologies and policies, such as carbon footprinting and labeling, national emission inventories, and appliance standards.

This tutorial reviews the main LCA methods and an overview of how it has been used to inform policy and product/service management. Methods to compile life cycle inventories are the bottom-up process sum method, the top-down economic input output economic life cycle assessment (EIO/LCA) and hybrid methods combining the two approaches. Impact assessment methods are also briefly discussed. Applications covered include early analyses of energy supply systems from the 1970's, to packaging studies in the 1990's to more recent work on information technology and bio-fuels.

Speaker: Eric Williams, *Arizona State University*

**9:30-10:00am**

### **Refreshment Break**

Location: Courtyard break stations

**10:00-11:30am**

### **Carbon Footprinting: Challenges and Opportunities**

Location: Joshua Tree

Recent initiatives such as low carbon fuel standards, a focus on energy prices, and renewed interest in greenhouse gas emissions has led to considerable interest in "carbon footprinting." While definitions vary, carbon footprinting (CF) is effectively life cycle assessment (LCA) of products with a focus on carbon emissions. Despite significant efforts to standardize such calculations (such as standards from the British Standards Institute, the International Standards Organization, and the World Resources Institute/World Business Council on Sustainable Development) significant uncertainty and variability remain in the calculation of footprints, particularly for complicated products with large supplier networks.

Most CF methods suggest separating emissions into Scopes, where Scope 1 encompasses direct emissions from the organization, Scope 2 encompasses emissions from purchased energy by the organization, and Scope 3 encompasses all other emissions.

In this session we will overview major CF initiatives, discuss how they will effect life cycle assessment and also corporate efforts. We will discuss how existing tools can be used to help estimate footprints, and also help frame the discussion of how to estimate footprints that are complementary to the developing standards. We will discuss our insights as related to ongoing projects with the California Air Resources Board on carbon labeling for products, and WRI/WBCSD in support of scope 3 protocol development.

Speakers: H. Scott Matthews and Chris Weber, *Carnegie Mellon University*; Eric Masanet, *Lawrence Berkeley National Laboratory*

### **KEYNOTE ADDRESS**

**1:00-2:00pm**

### **Michael Crow, President, Arizona State University: "The Engineering Challenge of Sustainability"**

Location: Palm AD

**2:00-2:15pm**

### **Refreshment Break**

Location: Courtyard break stations



## TECHNICAL SESSIONS

**2:15pm-4:15pm**

### **ISSST TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES**

#### **Energy Systems: Trends and Innovations**

Location: Joshua Tree

#### **Energy and Civilization: A History of Energy Production and Consumption in a Global Cultural, Technological and Economic Context**

Carolyn S. Mattick, Eric Williams, and Braden R Allenby, *Arizona State University*

#### **Environmental Comparison of Energy Scavenging Technologies for Self-Sufficient Micro System Applications**

Stephan Benecke, *Technische Universität Berlin*; Nils Nissen, *Fraunhofer IZM*; Herbert Reichl, *Technische Universität Berlin*

#### **Making Power Adapters Smarter and Greener**

Paul A. Panepinto, *Green Plug, Inc.*

**2:15pm-4:15pm**

### **ISSST TRACK 2: TOOLS AND METHODS Applications of Life-Cycle Assessment**

Location: Capistrano

#### **Energy Consumption in the Production of High-Brightness Light-Emitting Diodes**

Deanna H. Matthews, H. Scott Matthews, Paulina Jaramillo, and Christopher L. Weber, *Carnegie Mellon University*

#### **Comparative Life Cycle Assessment (LCA) of overhead and underground medium voltage power distribution**

Sarah Bumby, Ekaterina Druzhinina, Rebe Feraldi, Danae Werthmann, and Roland Geyer, *University of California, Santa Barbara*; Jack Sahl, *Southern California Edison*

#### **Embedded Temporal Difference in Life Cycle Assessment: Case Study on VW Golf A4 Car**

Chris Yuan, Rachel Simon, Natalie Mady, and David Dornfeld, *University of California, Berkeley*

#### **Carbon Footprinting Upstream Supply Chain for Electronics Manufacturing and Computer Services**

Y. Anny Huang, Christopher L. Weber, and H. Scott Matthews, *Carnegie Mellon University*

**2:15pm-4:15pm**

### **ISSST TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES Nanotechnology**

Location: Palm F

#### **A Life-Cycle Energy Analysis of Single Wall Carbon Nanotubes Produced Through Laser Vaporization**

Matthew J. Ganter, Thomas P. Seager, Christopher M. Schauerman, Brian J. Landi, and Ryne P. Raffaele, *Rochester Institute of Technology*

#### **Single Wall Carbon Nanotubes for Conductive Wiring**

Christopher M. Schauerman, Jack Alvarenga, Matthew J. Ganter, Thomas P. Seager, Brian J. Landi, and Ryne P. Raffaele, *Rochester Institute of Technology*

#### **Environmental Assessment of Manufacturing with Carbon Nanotubes**

Lindsay Dahlben and Jacqueline Isaacs, *Northeastern University*



### **Nanotechnology Environmental, Health, and Safety Issues: Brief Literature Review Since 2000**

Zeynep D. Ok, James C. Benneyan, and Jacqueline A. Isaacs, *Northeastern University*

**2:15pm-4:15pm**

### **ISSST AND ISTAS SPECIAL AND JOINT SESSIONS**

#### **Joint ISSST/ISTAS Session on Emerging Technologies**

Location: Cavetto

#### **Serious Games, Sustainable Civilizations, and Trading Zones**

Michael E. Gorman, *University of Virginia*

#### **The Challenge of Emerging Technologies**

Braden Allenby, *Arizona State University*

#### **Are Smarter Buildings Better Buildings?**

Clinton Andrews, *Rutgers University*

**2:15pm-4:15pm**

### **ISTAS: SESSION I Roles for Expert and Lay Knowledge in Sustainable Development**

Location: Augustine

#### **Managing highly uncertain risks: Unused pharmaceuticals, climate change, and nuclear waste**

David Hassenzahl, Ilene Ruhoy, *University of Nevada, Las Vegas*

Robert Goble, *Clark University*

#### **Technology discourses and sustainability: Fraught with Disconnects**

Peter Wiesner, *IEEE*

William Tonti, *IBM Corporation*

### **Stakeholder assessment for the introduction of sustainable energy and environmental technologies in Japan**

Mashiro Matsuura, Tatsujiro Suzuki, Hideaki Shiroyama, *University of Tokyo*

### **Potential of the corporate web site to generate trust in environmentally risky firms**

Nuria Hurtado-Torres, Maria Bermudez-Edo, Juan Alberto Aragon-Correa, Eulogio Cordon-Pozo, *University of Granada*

**4:15pm-6:15pm**

### **POSTER SESSION AND RECEPTION**

Location: Palm ABDE

#### **A Life-Cycle Energy Analysis of Single Wall Carbon Nanotubes Produced Through Laser Vaporization**

Matthew J. Ganter, Thomas P. Seager, Christopher M. Schauerman, Brian J. Landi, and Ryne P. Raffaele, *Rochester Institute of Technology*

#### **A Method to Reuse Fiber-Reinforced Waste from E-waste as Filler for Polymeric Composite**

Huabo Duan, Weifeng Jia and Jinhui Li, *Tsinghua University*

#### **China's circular economy strategy and its impact on regional industrial metabolism: a case study in Suzhou city**

MO Hongpin and WEN Zongguo, *Tsinghua University*

#### **Cobalt-Free Batteries: a New Frontier for Advanced Battery Recycling**

Kyle Kotaich and Steven E. Sloop, *OnTo Technology LLC*

#### **Comparative Life Cycle Assessment (LCA) of overhead and underground medium voltage power distribution**

Sarah Bumby, Ekaterina Druzhinina, Rebe Feraldi, Danae Werthmann, and Roland Geyer, *University of California, Santa Barbara*; Jack Sahl, *Southern California Edison*



### **Comparative Life Cycle Assessment of Insulating Concrete Forms with Traditional Residential Wall Sections**

Neethi Rajagopalan, Melissa Bilec, and Amy Landis, *University of Pittsburgh*

### **Eco-LCA : A tool for quantifying the role of ecological resources in LCA**

Shweta Singh and Bhavik Bakshi, *The Ohio State University*

### **Effect of Agricultural Practices on Biofuels' Environmental Footprints**

Xiaobo Xue and Amy E. Landis, *University of Pittsburgh*

### **Energy and CO2 Flow Networks of the Electronics Industry Sector in South Korea**

Junbeum Kim and Brad Allenby, *Arizona State University*

### **Environmental Assessment of Manufacturing with Carbon Nanotubes**

Lindsay Dahlben and Jacqueline Isaacs, *Northeastern University*

### **Environmental Comparison of Energy Scavenging Technologies for Self-Sufficient Micro System Applications**

Stephan Benecke, *Technische Universität Berlin*; Nils Nissen, *Fraunhofer IZM*

### **Environmental Overhead of Labor (EOL) Embodied in Trade: The Case of 2002 China-U.S. Trade**

Ming Xu, Eric Williams, and Braden Allenby, *Arizona State University*

### **Flow of personal computers in developing countries: Peru Case study**

Ramzy F. Kahhat and Eric D. Williams, *Arizona State University*

### **Hybrid Life Cycle Assessment of Energy Use in Laptop Computer Manufacturing**

Liqui Deng, Eric Williams, and Callie Babbitt, *Arizona State University*

### **Hybrid Life Cycle Energy Assessment of Commercial LED Lamps**

Matthew Eckelman, *Yale University*

### **Industrial Energy and CO2 Flow Network Analysis in South Korea from 1975 to 2000**

Jinhyuk Lim, *University of Suwon*; Junbeum Kim, *Arizona State University*; Hun Kang, *University of Suwon*

### **Knowledge Discovery and Data Mining for Enhanced Sustainability of Physical Ecosystems**

Manish Marwah, Ratnesh Sharma, Cullen Bash, and Chandrakant Patel, *HP Labs*; Naren Ramakrishnan, *Virginia Polytechnic Institute and State University*

### **Life Cycle Water Consumption of Low-Carbon Transportation Fuels**

Christopher B Harto, Robert J. Meyers, and Eric D. Williams, *Arizona State University*

### **Materials Flow Analysis and Dynamic Life-cycle Assessment of Lightweight Automotive Materials in the U.S. Passenger Vehicle Fleet**

Lynette Cheah, *Massachusetts Institute of Technology*

### **Mitigating the uncertainties in life cycle assessment of photovoltaic cells**

Pei Zhai and Eric Williams, *Arizona State University*

### **Modeling and Case Study of the Regional E-waste Reverse Logistics System**

MOU Peng, XIANG Dong, and DUAN Guanghong, *Tsinghua University*

### **Modeling Approaches for Nanomanufacturing Risk Assessment**

Zeynep D. Ok, James C. Benneyan, and Jacqueline A. Isaacs, *Northeastern University*

### **Product End-of-Life Management Networks**

Vered Doctori Blass and Roland Geyer, *University of California, Santa Barbara*



### **Solar Assist Basking Facility Design for Blind or Elder People**

Fang-Lin Chao, Yu-Ming Tseng, and Hung-Chi Chu, *Chaoyang University of Technology*

### **Sustainability Analysis of Atomic Layer Deposition for Microelectronics Manufacturing**

Chris Yuan and David Dornfeld, *University of California, Berkeley*

### **Sustainability Implications of Residential Swimming Pools in the Phoenix Metro Area, Arizona**

Nigel Forrest and Eric Williams, *Arizona State University*

### **Teaching Green Topics to Chemical Engineers: Innovation in the Process Design Curriculum**

Julie Schoenung, *University of California, Davis*

### **The importance of Personal Computers in developing countries: Case study of Peru**

Ramzy F. Kahhat and Eric D. Williams, *Arizona State University*

### **Theoretical efficiency and asymptotic cost of grid-connected photovoltaic systems**

Yan Yang and Eric Williams, *Arizona State University*

### **Trends in the lifespan evolution of personal computers and implications for life cycle assessment studies: a case study of the U.S. higher education sector**

Callie W. Babbitt, Ramzy Kahhat, and Eric Williams, *Arizona State University*

### **Waste Electrical and Electronic Equipment Recycling in China: Practices and Strategies**

Jinglei Yu, *Nankai University*; Eric Williams, *Arizona State University*; Meiting Ju, *Nankai University*

## **TUESDAY, MAY 19, 2009**

**6:30am-7:45am**

### **Closed Committee Meeting: IEEE President's Sustainability Initiative**

Location: Joshua Tree

**7:00am-8:00am**

### **Continental Breakfast**

Location: Courtyard break stations

## **TECHNICAL SESSIONS**

**8:00am-10:00am**

### **ISSST TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES Materials and Sustainability**

Location: Joshua Tree

### **Comparative Life Cycle Assessment of Insulating Concrete Forms with Traditional Residential Wall Sections**

Neethi Rajagopalan, Melissa Bilec, and Amy Landis, *University of Pittsburgh*

### **Excellent Product Stewardship and Sustainable Use of Plastics Additives in the Electronics Industry**

Susan Landry, *Albemarle Corporation*; Steve Scherrer, *Chemtura Corporation*; Joel Tenney, *ICL Industrial Products*

### **Supply Chain to Supply Cycle: Mining Plastics from Electronics to Close the Loop**

Michael Biddle, Brian Riise, and Chris Slijkhuis, *MBA Polymers*

### **California's Green Chemistry Initiative**

Bob Boughton, *California Department of Toxic Substances Control*



**8:00am-10:00am**

### **ISSST TRACK 2: TOOLS AND METHODS Risk and Uncertainty Assessment**

Location: Capistrano

### **Uncertainty and Variability in Accounting for Grid Electricity in Life Cycle Assessment**

Christopher Weber, Constantine Samaras, and Paulina Jaramillo, *Carnegie Mellon University*

### **Modeling the Risks to Complex Industrial Networks Due to Loss of Natural Capital**

Vikas Khanna and Bhavik Bakshi, *The Ohio State University*

### **Strategies to Address Risks of Platinum Scarcity for Supply Chain Downstream Firms**

Elisa Alonso, Frank R. Field, Rich Roth, and Randolph E. Kirchain, *Massachusetts Institute of Technology*

### **End-of-life LCA allocation methods: open loop recycling impacts on robustness of material selection decisions**

Anna L. Nicholson, Elsa A. Olivetti, Jeremy R. Gregory, Frank R. Field, and Randolph E. Kirchain, *Massachusetts Institute of Technology*

**8:00am-10:00am**

### **ISSST TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES Policy, Regulation, and Standards**

Location: Palm F

### **Power Management for Networked Computers: A Review of Incentive Programs**

J. Michael Walker, *Beacon Consultants Network Inc.*

### **Ineffective Environmental Laws in Regulating Electronic Manufacturing Pollution: Examining Water Pollution Disputes in Taiwan**

Wenling Tu, *Shih-Hsin University*; Yujung Lee, *Taiwan Environmental Action Network*

### **Methodology and Utilization of Simplified Eco-assessments for Policy Making**

Lutz Stobbe, Nils F. Nissen, Karsten Schischke, and Herbert Reichl, *Fraunhofer IZM*

### **IT Products. Going Beyond Green-Can High Performance and Sustainability Co-Exist?**

Clare Hobby, N. Rydell, Emma Sjogren, and Wendy Williams, *TCO Development*

**8:00am-10:00am**

### **ISSST AND ISTAS SPECIAL AND JOINT SESSIONS**

### **ISSST Special Session on Thermodynamics and Sustainability**

Location: Cavetto

### **Preliminary Thoughts on the Application of Thermodynamics to the Development of Sustainability Criteria**

Timothy G. Gutowski, *Massachusetts Institute of Technology*; Dusan P. Sekulic, *University of Kentucky*; Bhavik R. Bakshi, *The Ohio State University*

### **Understanding the Implications of a Thermo-Economic Perspective on Sustainability**

Thomas P. Seager, *Rochester Institute of Technology*

### **Framework for Thermodynamic Constraints on Sustainability**

Eric D. Williams, *Arizona State University*





**Lifetime Exergy Consumption as a Sustainability Metric for Information Technologies**

David J. Lettieri, Christopher R. Hannemann, and Van P. Carey, *University of California, Berkeley*; Amip J. Shah, *HP Labs*

**8:00am-10:00am**

**ISTAS: SESSION II  
ICT & Community**

Location: Augustine

**Going green: Videoconferencing as part of everyday life**

Susan O'Donnell, *National Research Council of Canada*

**The growing role of e-learning on sustainable growth: Applications to management education**

Owen Hall, Jr., *Pepperdine University*  
Phil Brown, *Diversified Energy Corporation*

**From "localized" to "networked:" A transformation in community structures**

William Towne, *Lafayette College*

**Location and interactive services: Not only at your fingertips but under your skin**

Rodney Ip, Katina Michael, MG Michael, *University of Wollongong*

**10:00-10:30am**

**Refreshment Break**

Location: Courtyard break stations

**TECHNICAL SESSIONS**

**10:30am-12:30pm**

**ISSST TRACK 1:  
PRODUCTS, SYSTEMS,  
AND SERVICES**

**Green Design and Manufacturing**

Location: Joshua Tree

**Bringing Forth Sustainability Innovation in the Electronic Industry: The Case of Lead-Free Solders**

Masaru Yarime, *University of Tokyo*

**Elementary analysis of mobile phones for optimizing end-of-life scenarios**

Kaue Takahashi, Masayuki Tsuda, and Jiro Nakamura, *NTT Energy and Environment Systems Laboratories*; Kazumi Otabe and Masaaki Tsuruoka, *Tsuruoka Co., Ltd.*; Yasunari Matsuno and Yoshihiro Adachi, *University of Tokyo*

**Lead-free soldering of telecommunication network infrastructure products**

Bo Eriksson and Richard Trankell, *Ericsson AB*

**Schematic Characterization of Human Health Impact of Toxic Chemicals for Sustainable Design and Manufacturing**

Chris Yuan and David Dornfeld, *University of California, Berkeley*

**10:30am-12:30pm**

**ISSST TRACK 2:  
TOOLS AND METHODS  
Sustainability Tools and Metrics I**

Location: Capistrano

**Eco-LCA: A tool for quantifying the role of ecological resources in LCA**

Shweta Singh and Bhavik Bakshi, *The Ohio State University*



**Is Economic Value an Effective Proxy for Embodied Energy and Environmental Impact in Material Systems?**

Jeremy Gregory, Susan Fredholm, and Randolph Kirchain, *Massachusetts Institute of Technology*

**Integration of Reliability and Environmental Aspects in Early Design Stages of Mechatronics**

Andreas Middendorf, *Technische Universität Berlin*; Sebastian Deyter, *Heinz Nixdorf Institute*; Jürgen Gausemeier, *University of Paderborn*; Nils Nissen, *Fraunhofer IZM*; Herbert Reichl, *Technische Universität Berlin*

**Quantifying Mitigation Potential of Climate Action Plans for American Cities**

Michael Blackhurst, H Scott Matthews and Chris T. Hendrickson, *Carnegie Mellon University*

**10:30am-12:30pm**

**ISSST TRACK 3:  
SPECIAL TOPICS  
AND CRITICAL  
PERSPECTIVES**

**Electronics Product Stewardship: International Perspectives**

Location: Palm F

**Implementing IPR under the European WEEE directive - experiences in Germany**

Susanne Rotter and Perrine Chancerel, *University of Technology Berlin*; Wolf-Peter Schill, *DIW Berlin, German Institute for Economic Research*,

**Implementing Electronics Stewardship: A U.S. Federal Agency's Perspective**

Mark Sajbel, *U.S. Department of Agriculture*

**Developments and Evaluation of Existing Policies and Regulations for E-waste in India**

Amit Jain, *IRG Systems South Asia Pvt. Ltd., India*

**Case study of a Suzhou pilot project on the suitable treatment technology for scrap computers in China**

Jinhui Li, Huabo Duan, and Wenyi Yuan, *Tsinghua University*

**10:30am-12:30pm**

**ISSST AND ISTAS  
SPECIAL AND JOINT  
SESSIONS  
ISTAS Technological Innovation and Sustainability**

Location: Cavetto

**Sustainable disasters: The impact of natural disaster on vulnerable populations, the role of technology and its implications for community sustainability**

Charles Schartung, *University of Louisville*

**Contending sustainability agencies and the future world**

Ken Zimmerman, *Oregon Public Utility Commission*

**Pro-active contributions of technology to more sustainable developments in our global society: Recent issues, trends and opportunities**

Maurizio Traversi, *TRAITS Consulting s.a.s.*

**Community wireless networks: Emerging wireless for digital inclusion**

Abdelnasser Abdelaal, Hesham Ali, *University of Nebraska at Omaha*



10:30am-11:30am

**ISTAS: SESSION IIIA**  
**ISTAS Urban Issues in Sustainable Development Roundtable**  
Location: Augustine

**Examining urban sustainability issues from the perspectives of urban design, planning process, and systems thinking**

Clinton Andrews, *Rutgers University*  
Emily Talen, *Arizona State University*  
Ashwani Vasisth, *California State University Northridge*

11:30am-12:30pm

**ISTAS: SESSION IIIB**  
**Global Public Policy and Sustainability Roundtable**  
Location: Augustine

**Implications of population growth and access to water, food, and energy for disease and conflict among nations**

Luis Kun, *National Defense University*  
Clinton Andrews, *Rutgers University*  
Robert Matthews, *University of Hawaii*  
Rahul Tongia, *Carnegie Mellon University*  
Stephen Unger, *Columbia University*

**LUNCHEON ADDRESS AND AWARDS PRESENTATION**

**12:30-2:00PM**  
**Brad Allenby, Arizona State University, and Clint Andrews, Rutgers University: "Update on the IEEE President's Sustainability Initiative"**

Location: Palm AD

## TECHNICAL SESSIONS

2:15pm-4:45pm

**ISSST TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES**  
**Renewable Energy Systems**

Location: Joshua Tree

**Increased Penetration of Wind Generated Electricity using Real time Pricing & Demand Side Management**

Paddy Finn, Colin Fitzpatrick, and Martin Leahy, *University of Limerick*

**Public Institution Fast Tracking Solar Panel Array Implementation**

Cynthia Orndoff and Joe Shepherd, *Florida Gulf Coast University*

**Effect of Agricultural Practices on Biofuels' Environmental Footprints**

Xiaobo Xue and Amy E. Landis, *University of Pittsburgh*

**Land Use and Geospatial Aspects in Life Cycle Assessment of Renewable Energy**

Thomas P. Seager, *Rochester Institute of Technology*,  
Shelle A. Miller and J. Kohn, *Clemson University*

2:15pm-4:45pm

**ISSST TRACK 2: TOOLS AND METHODS**  
**IT Systems and Sustainability**

Location: Capistrano

**Automated Synthesis of Sustainable Data Centers**

Tom Christian, Yuan Chen, Rocky Shih, Ratnesh Sharma, Christopher Hoover, Manish Marwah, Amip Shah, and Daniel Gmach, *HP Labs*

**Developing an Overall CO2 Footprint for Semiconductor Products**

Tim Higgs, Michael Cullen, Marissa Yao, and Scott Stewart, *Intel Corporation*



**Development of a Green Scorecard to Identify Research Projects for Eco-Efficient Print Engines**

Fritz Ebner, Shu Chang, John Knapp, Victoria Deyoung, and Wendi Latko, *Xerox Corporation*

**Social Impact Assessment of Multipurpose ICT Service by Using GSF**

Masayuki Tsuda, Kazue Takahashi, Masayuki Nakamura, and Jiro Nakamura, *NTT Corporation*; Haruna Furuta and Norihiro Itsubo, *Musashi Institute of Technology*

**Dell Survey of Electronic Recyclers – Results and Analysis**

Puneet Shrivastava, Scott O'Connell, Mike Watson, *Dell Inc.*

2:15pm-4:45pm

**ISSST TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES**  
**Transportation and Logistics**

Location: Palm F

**Assessing Sustainability Impacts of Route Guidance System under Cooperative Vehicle Infrastructure Environment**

Byungkyu (Brian) Park and Joyoung Lee, *University of Virginia*

**Life Cycle Assessment of Traditional Retail and E-commerce Logistics for Electronic Products**

Amy Nagengast, Rachael Nealer, Chris Hendrickson, Paulina Jaramillo, H. Scott Matthews, and Christopher Weber, *Carnegie Mellon University*

**Exploring the Tradeoffs of Daily Commute Choice**

Christopher Harto, *Arizona State University*

**Selection of Lightweighting Strategies for Use Across an Automaker's Vehicle Fleet**

Trisha Montalbo, Theresa M. Lee, Richard Roth, and Randolph E. Kirchain, *Massachusetts Institute of Technology*

**Emission Inventory Assessment for a Container Vessel**

Fangfang(Emily) Wang and Han P. Bao, *Old Dominion University*; Thomas Kiernan, *Maersk*

2:15pm-4:45pm

**ISSST AND ISTAS SPECIAL AND JOINT SESSIONS**  
**ISSST Special Session on Education**

Location: Cavetto

**Experiential Teaching Strategies for Ethical Reasoning Skills Relevant to Sustainability**

Thomas P. Seager and Evan Selinger, *Rochester Institute of Technology*

**Reverse Engineering as an Educational Tool for Sustainability**

Luisa Dempere, *University of Florida*

**Sustainable Engineering Vertically-Integrated Project Scheme in Undergraduate Engineering Education**

Troy O. McBride, Kurt DeGoede, and Jean Fullerton, *Elizabethtown College*

**Research and Education in Green Materials: A Multi-disciplinary Program to Bridge the Gaps**

Julie Schoenung, *University of California, Davis*; Oladele Ogunseitan, *University of California, Irvine*; David Eastmond, *University of California, Riverside*

**Personalized Education**

Braden Allenby, *Arizona State University*





2:15pm-4:45pm

**ISTAS: SESSION IV  
Ethical Considerations in Technology  
Deployment**

Location: Augustine

**Considering sustainability through  
ethical approaches and their practical  
application**

Denise Oram, *Glyndwr University*

**Social implications of automobile  
collision avoidance systems**

Scott Miller, *University of Victoria*

**Nuclear power and prima facie  
duties towards future people**

Benham Taebi, *Delft University of Technology*

**Privacy and ethical issues in location-based tracking systems**

Jessa Wang Liying, Michael Loui, *University of Illinois at Urbana-Champaign*

**The legal ramifications of microchipping people in the United States of America: A state legislative comparison**

Angelo Friggieri, Katina Michael, MG Michael, *University of Wollongong*

**WEDNESDAY, MAY 20,  
2009**

7:00am-8:00am

**Continental Breakfast**

Location: Courtyard break stations

**TECHNICAL  
SESSIONS**

8:00am-10:00am

**ISSST TRACK 1:  
PRODUCTS, SYSTEMS,  
AND SERVICES**

**Green IT**

Location: Joshua Tree

**Creating a Sustainable IT Ecosystem:  
Enabling Next-Generation Urban  
Infrastructures**

Brian J. Watson, Ratnesh K. Sharma, Susan K. Charles, Amip J. Shah, Chandrakant D. Patel, Manish Marwah, Christopher E. Hoover, Thomas W. Christian, and Cullen E. Bash, *HP Labs*

**A New Look at Design for EOL: Game  
Changing Outcomes of the Close the  
Loop Study**

Wayne Rifer, *Green Electronics Council*; P. Brody-Heine, *Eco Stewardship Strategies*

**Reducing the Greenhouse Gas  
Emissions of Commercial Print with  
Digital Technologies**

Scott Canonico, Royston Sellman, and Chris Preist, *HP Labs*

8:00am-10:00am

**ISSST TRACK 2:  
TOOLS AND METHODS**  
**Sustainability Tools and Metrics II**

Location: Capistrano

**Water Efficiency Management in  
Datacenters: Metrics and Methodology**

Ratnesh Sharma, Amip Shah, Cullen Bash, Tom Christian, Chandrakant Patel, *HP Labs*



**End-of-Life Analysis of Analog CATV  
Converters**

John Carrell, Hong-Chao Zhang, Hua Li, and Chengcheng Fan, *Texas Tech University*

**Assessment of Supply Chain Energy  
Efficiency Potentials: A U.S. Case  
Study**

Eric Masanet, Greg Homan, and Rich Brown, *Lawrence Berkeley National Laboratory*; Klaas Jan Kramer, *KJKramer Consulting*; Ernst Worrell, *Ecofys BV*

**Technological-Ecological Networks  
for Sustainable Process Design**

Robert Urban and Bhavik Bakshi, *The Ohio State University*

8:00am-10:00am

**ISSST TRACK 3:  
SPECIAL TOPICS  
AND CRITICAL  
PERSPECTIVES**

**Emerging Issues in Electronics  
Recycling**

Location: Palm F

**End-of-Life Challenges of Printed  
Electronics**

Marika Keskinen and Jani Valkama, *Tampere University of Technology*

**Microbiological recovering of metals  
from printed circuit boards by  
*Acidithiobacillus ferrooxidans***

Bai Jianfeng, Wang Jingwei, Xu Jinqiu, Zhou Mingyuan, Guan Jie, and Zhang Chenglong, *Shanghai Second Polytechnic University*

**Review and Prospects of Recycling  
Methods for Waste Printed Circuit  
Boards**

Jinglei Yu, *Nankai University*; Eric Williams, *Arizona State University*; Meiting Ju, *Nankai University*

**E-Scrap Recycling Designing for the  
Environment**

Tomas R. Prieto-Baumann, *Amexca LLC. & U.A.B.C.*

8:00am-10:00am

**ISSST AND ISTAS  
SPECIAL AND JOINT  
SESSIONS**

**Joint ISSST/ISTAS Session on Ethics**

Location: Cavetto

**Macroethics in Engineering: The  
Case of Climate Change**

Joseph Herkert, *Arizona State University*

**Macroethical and Social Issues in  
Emerging Technologies and the  
Military**

Carolyn Mattick, *Arizona State University*

**The Ethics of Emerging Technologies:  
Real Time Macroethical Assessment**

Braden Allenby, *Arizona State University*

8:00am-10:00am

**ISTAS: SESSION V**  
**Systems Thinking as an Approach to  
Sustainable Development**

Location: Augustine

**Decision making for social sustain-  
ability: A life-cycle assessment  
approach**

Margot Hutchins, John Gierke, John Sutherland, *Michigan Technological University*

**The 'systems approach' to human  
problems: How humanitarian engi-  
neering can help**

Matthew Burnham, *University of Virginia*

**On analytical tools to advance  
resolving ingenuity gaps for complex  
learning societies: A prerequisite for  
sustainable development?**

Walter Zessner, *George Brown College, Emeritus*

**Seven barriers to a sustainable  
future**

Jeff Robbins, *Rutgers University*



**10:00-10:15am**

**Refreshment Break**

Location: Courtyard break stations

**TECHNICAL SESSIONS**

**10:15am-12:15pm**

**ISSST TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES Regional Aspects of Product Systems**

Location: Joshua Tree

**Environmental life-cycle impacts and benefits of secondhand CRT TV exported from Japan to the Philippines**

Aya Yoshida, Tomohiro Tasaki, and Atsushi Terazono, *National Institute for Environmental Studies, Japan*

**A study on remanufacturing businesses in Japan**

Mitsutaka Matsumoto and Koh Naito, *National Institute of Advanced Industrial Science and Technology (AIST), Japan*

**Assessing the management of small Waste Electrical and Electronic Equipment through Substance Flow Analysis - The example of gold in Germany and the USA**

Perrine Chancerel and Vera Susanne Rotter, *Berlin University of Technology*

**Environmental Overhead of Labor (EOL) Embodied in Trade: The Case of 2002 China-U.S. Trade**

Ming Xu, Eric Williams, and Braden Allenby, *Arizona State University*

**10:15am-12:15pm**

**ISSST TRACK 2: TOOLS AND METHODS End of Life Systems Analysis**

Location: Capistrano

**Modeling the Impact of Product Portfolio on the Economic and Environmental Performance of Recycling Systems**

Jeffrey B. Dahmus, Elsa A. Olivetti, Susan A. Fredholm, Jeremy R. Gregory, and Randolph E. Kirchain, *Massachusetts Institute of Technology*

**Supply and Demand in the Material Recovery System for Cathode Ray Tube Glass**

Jeremy Gregory, Marie-Claude Nadeau, and Randolph Kirchain, *Massachusetts Institute of Technology*

**Developing RFID signalling to close the loop on second hand computers**

Eanna Cronin, Pat Sweeney, Stewart Hickey, and Colin Fitzpatrick, *University of Limerick*

**10:15am-12:15pm**

**ISSST AND ISTAS SPECIAL AND JOINT SESSIONS ISTAS Autonomous Robots Panel**

Location: Cavetto

**How sustainable is a society that employs autonomous robots?**

Keith Miller, *University of Illinois at Springfield*; Ronald Arkin, *Georgia Institute of Technology*; John Canning, *Naval Surface Warfare Center*; Peter Asaro, *Rutgers University*; Noel Sharkey, *University of Sheffield*; Rob Sparrow, *Monash University*

**12:30pm-1:00pm**

**CLOSING SESSION**

Location: Palm AD

**1:00pm-3:00pm**

**Closed Committee Meeting: ECE TIG Roadmap Meeting**

Location: Sand Lotus



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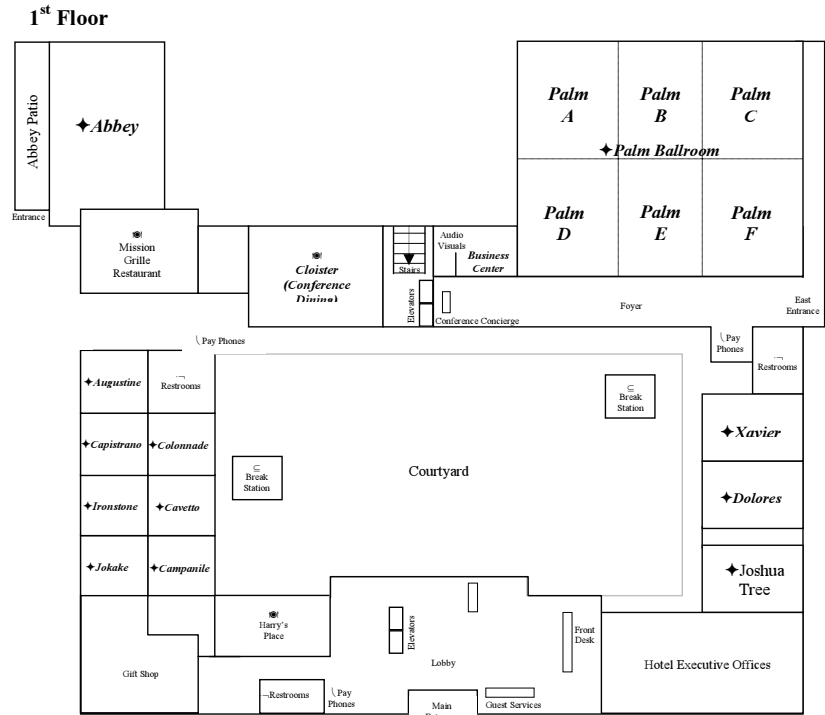


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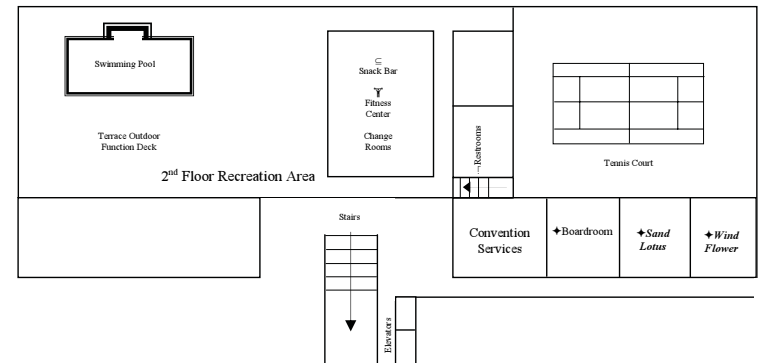
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## Tempe Mission Palms Hotel Floorplan



**2<sup>nd</sup> Floor**





## NOTES



## NOTES

