

2013

### **Environmental Sustainability and the Global Economy**

Environmental sustainability is one of the major challenges facing the global economy in the coming years. Our ability to meet this challenge will depend on the interactions among four main sectors: (a) industry, (b) government, (c) civil society, and (d) science/technology. USC has a growing number of faculty engaged in research and teaching on environmental sustainability in each of those areas. They are located in various units across campus, *inter alia* Marshall, Price, Political Science, Engineering, Annenberg, Sociology, Earth Sciences, and Chemistry. The faculty listed above as “other sponsors” represent a small proportion of a considerably larger set of faculty that our network aims to connect.

#### **Leaders:**

[Paul Adler](#), Marshall School of Business, Management and Organization

[Jim Haw](#), Dornsife College of Letters, Arts and Sciences, Environmental Studies

[Roger Ghanem](#), Viterbi School of Engineering, Civil and Environmental Engineering

### **USC Institute for Free Radical Biology & Medicine**

Free Radical Biology & Medicine (FRBM) is, by nature, an interdisciplinary field. The first free radical researchers were chemists who quickly recognized the importance of one-electron (free radical) oxidation/reduction reactions. Physicists and engineers soon joined in and invented a new technology to directly study free radical species: electron paramagnetic resonance spectroscopy (EPR) or electron spin resonance spectroscopy (ESR). When food chemists recognized that free radical reactions cause a great deal of food spoilage, and that including antioxidants and transition metal chelators, while excluding oxygen, from packaged foods could greatly extend their commercially useful shelf-life, the field really exploded. Since the 1960's biologists have shown that energy production by the mitochondria in all our cells involves a series of free radical reactions, as does the immune system's response to invading microorganisms. Toxicologists and environmental scientists have shown that many herbicides and pesticides employ free radical reaction mechanisms, and pharmacists and pharmacologists have found that the toxic effects of many useful drugs (from acetaminophen to anti-cancer compounds) are caused by free radical 'redox cycling.'

#### **Leaders:**

[Kelvin Davies](#), Davis School of Gerontology, Gerontology

[Enrique Cadenas](#), School of Pharmacy, Molecular Pharmacology

### **Brain Health During Development and Aging in Urban Environments**

The adverse impact of airborne pollutants on cardio-pulmonary health appears to extend to brain aging. Urbanization is likely one of the most important demographic shifts worldwide, which has led to increased exposure to pollutants. This program brings together faculty from Gerontology, the Viterbi School of Engineering, the College of Letters, Arts and Sciences and the Keck School of Medicine to understand the scientific basis for the impacts of pollution on the brain, and to explore the health consequences.

**Leaders:**

[Caleb Finch](#), Davis School of Gerontology, Bio-Gerontology

[J.C. Chen](#), Keck School of Medicine, Environmental Health

**Contemporary Working Group**

This year, as a first step, we have initiated and organized the forthcoming (March and April 2013) Seminar Series: Contemporary Practice and Scholarship in Art. It links the USC Department of Art History and the USC Roski School of Fine Arts. A forum on contemporary practice and scholarship in art, this series will unite students from Dornsife, Roski, and the Visual Studies graduate program to participate as academic peers in dialogue with international figures of excellence from the fields of contemporary art history and curatorial practice.

The Seminar Series is a rare opportunity for intimate exchange with the author of an idea. Indeed, we decided upon this model because it allows for meaningful discussion between the faculty, speakers, and students, and crucially, the students with one another. Likewise, such discussion is predicated upon a reading list suggested by the speaker, and circulated in advance of the event, which means that each participant has a stake in the discussion and comes prepared to meaningfully engage with the situation. The hope, of course, is that this series will generate ideas and subsequent research for faculty and graduate students alike. More immediately, it should foster local dialogues that will exceed this format. In fact, this is precisely where our idea for this longer-term proposal came into play, as we sincerely hope to instantiate and subsequently maintain a sense of community and collegiality.

**Leaders:**

[Suzanne Hudson](#), USC Dornsife College of Letters, Arts and Sciences, Art History

[Rhea Anastas](#), USC Roski School of Fine Arts, M.A. Art and Curatorial Practices in the Public Sphere

**Interdisciplinary Research Cluster on Civics and Social Media**

In a world where traditional forms of citizenship, politics, and civic life are rapidly changing, how can young people become more civic-minded and publicly engaged? How can digital technologies, participatory media, and social networking enable them to do so, and how are definitions of “civic” and “public” co-evolving with these practices, online and offline? These are the central questions that guide our proposal for an interdisciplinary Civics and Social Media (CASM) research.

Scholars from a wide range of disciplines at USC are working to understand youth engagement and social media, but they arrive at the conversation through different theoretical entry points and often with different stakes. The primary goal of the CASM research cluster is to shed light on these disciplinary investments while simultaneously working to break them down, creating interdisciplinary languages through which conversations can be sustained.

**Leaders:**

[Henry Jenkins](#), USC Annenberg School for Communication & Journalism, Communication and Journalism

[Kjerstin Thorson](#), USC Annenberg School for Communication & Journalism, Communication and Journalism

[Mike Ananny](#), USC Annenberg School for Communication & Journalism, Communication and Journalism  
[Holly Willis](#), USC School of Cinematic Arts, Cinema

### **Center for Technology and Innovation in Pediatrics**

There currently exists a great need for novel medical devices designed specifically for children, as well as the adaptation and validation of existing adult devices for children. Children differ from adults anatomically and developmentally in numerous ways. The FDA has estimated that the development of pediatric medical devices lags behind that of adult devices by 5 to 10 years. This collaboration aims to unite programs, institutes, faculty, and students at USC and CHLA, along with industry and venture capital partners, in a topic-focused, interdisciplinary, systems-oriented manner, to create the USC/CHLA Center for Technology and Innovation in Pediatrics (CTIP). CTIP will raise the impact of our individual and collective work in pediatric device development to a national level of recognition and influence, and will allow future external funding applications to become more competitive.

#### **Leaders:**

[Yaniv Bar-Cohen](#), CHLA/Keck School of Medicine, Department of Pediatrics  
[Jessica Rousset](#), CHLA, Office of Technology Transfer  
[Brian Benson](#), CHLA, Business Development Officer

### **Immigrant Health Initiative**

Without deliberate educational efforts, immigrants to the US quickly decrease their healthy habits as they adapt to American living and consequently the mainstream disease patterns. Given the sheer number of immigrants in this country and their alarmingly increasing rates of obesity, hypertension, mental illness, heart disease, and many other negative health outcomes, it is imperative to stop and reverse these disturbing trends. This collaboration strives to assemble a multidisciplinary team at USC in a new public health approach to develop strategies to help immigrants maintain their largely healthy advantage. This project will form a critical mass at USC to address these challenges through networking across disciplines, mentoring students and junior faculty, exploring research topics, and ultimately develop a grant proposal for a Transdisciplinary Research Center for Public Health at USC. Information on the current initiative can be found at the [Immigrant Health Initiative](#) webpage.

#### **Leaders:**

[Lihua Liu](#), Keck School of Medicine, Preventive Medicine  
[Dowell Myers](#), School of Policy, Planning, and Development  
[Iris Chi](#), Social Work of Social Work

### **USC Health Systems Improvement Collaborative**

The complex challenges facing health care are very visible at the University and throughout Southern California. USC's 2011 *Strategic Vision* notes that "Health issues affect people across the globe and the sweep of global health challenges are vast, reaching across law, business, communications, bioengineering, international relations, stem-cell research, pharmacy and other areas."<sup>3</sup> These issues are particularly acute in Los Angeles where immigration and inequality strain the public health care resources, malnutrition produces diseases and conditions rarely seen in developed countries, and social tensions make delivering compassionate and culturally sensitive care a difficult task. As the *Strategic Vision* observes, "One of the markers of our age is the rising importance of cities as centers

where the global and local are interwoven. Nowhere is this truer than in Los Angeles. . . . In Los Angeles, one can see tomorrow's challenges and promises today: healthcare, immigration, grassroots action and cooperatives, malnutrition, social tensions, the effects of inequality, community outreach, engineering challenges, new forms of commerce, and conflicts of rights and responsibilities."

**Leaders:**

[Najmedin Meshkati](#), Viterbi School of Engineering, Astani Department of Civil Engineering & Epstein Department Industrial and Systems Engineering

[Alexander M. Capron](#), Keck School of Medicine and Gould School of Law

**Center for Biodiversity & Ecology**

Biodiversity describes both the richness and the variation in all forms of life, from genes to organisms to ecosystems, in both the present and the geologic past. Diverse systems are generally viewed as robust, ecologically healthy, resource rich and economically productive, and relatively resistant to perturbations associated with human impacts or global change. The disciplinary reach of biodiversity is broad, cutting across human health and economics (e.g. ecosystem services), geology, geochemistry and earth system history (the rock record reflects biodiversity responses to regional and global perturbations); molecular, ecological and system studies in marine and terrestrial realms, and more broadly, societal well-being. This transdisciplinary nature is reflected in existing and new research funding opportunities in the basic and medical sciences that build on biodiversity research.

**Leaders:**

[Sergey Nuzhdin](#), Dornsife College of Letters, Arts and Sciences, Molecular and Computational Biology

[Roberta Marinelli](#), Wrigley Institute for Environmental Studies

[Paul Marjoram](#), Keck School of Medicine of USC, Preventive Medicine

**Plasticity and Repair in Neurodegenerative Disorders**

The adult brain possesses a tremendous capacity for change in response to its environment through processes termed experience-dependent neuroplasticity. Recently this has been demonstrated to occur in neurological disorders including Parkinson's disease, Alzheimer's disease, multiple sclerosis, schizophrenia and bipolar disease as well as traumatic brain injury. Understanding the molecular underpinnings of neuroplasticity in the aging and diseased brain could provide a new innovative direction and novel insights towards the identification of new therapeutic targets for treating neurological disorders. This collaboration seeks to foster collaborative research among investigators interested in neuroplasticity. The goals of this initiative are to better understand the underlying molecular mechanisms of neurodegenerative disorders, and to carryout translational studies that include both applications of basic research findings to the clinic, as well as using clinical observations to better design studies within the lab.

**Leaders:**

[Giselle Petzinger](#), Keck School of Medicine, Department of Neurology

[Michael Jakowec](#), Keck School of Medicine, Department of Neurology

[John Walsh](#), Davis School of Gerontology, Bio-Gerontology/Striatal Synaptic Research

[Beth Fisher](#), Ostrow School of Dentistry, Department of Biokinesiology

[Live Presentation: April 9, 2012](#)

### **USC STEM Education Pipeline Consortium**

We live in an era with unprecedented changes due to advances in technology. These forces of technological advances are transforming the role of science, technology, engineering and mathematics (STEM) in society. With outsourcing and off-shoring of engineering and science jobs, there is a growing concern about the level of interest among young students choosing STEM fields as college majors and eventual careers. The urgent need in STEM workforces calls for a comprehensive and collaborative pipeline effort in STEM education that begins in K-12 and extends into college and university education, resulting in a fully prepared STEM workforce. The specific aims of this consortium are to engage in collaborative research to advance the STEM pipeline through strategic planning and leveraging USC's diverse expertise in STEM education.

#### **Leaders:**

[Gisele Ragusa](#), Rossier School of Education/Viterbi School of Engineering

[John Slaughter](#), Rossier School of Education/Viterbi School of Engineering

[Other Participating Faculty](#)

### **Southern California Empirical Legal Studies (SCELS)**

Many scholars and students at the intersection of law and social science share an interest in legal institutions and empirical methodologies. Our goal in founding Southern California Empirical Legal Studies (SCELS) is to organize this fragmented group of scholars—housed across disciplines and schools—into a cohesive cluster of active intellectuals conducting empirical research about law and legal institutions. SCELS' focus will mirror the intellectual agenda that has emerged in important national organizations and funders, such as the National Science Foundation and the American Academy of Political and Social Science, both of which prioritize *evidence-based* studies when supporting research on legal institutions.<sup>1</sup> Moreover, SCELS will position its members to participate and take advantage of interdisciplinary conferences and journals that also focus explicitly on empirical research in the law, including the Conference on Empirical Legal Studies (a conference hosted each year by a different university, including by USC in 2009) and the *Journal of Empirical Legal Studies* (published by Cornell University). Finally, as we note below, our group will fit well with—and advance—the interests of academic units and centers currently active in and around USC.

#### **Leaders:**

[Nancy Staudt](#), USC Gould School of Law/Price School of Public Policy

[John Barnes](#), USC Dornsife College of Letters, Arts and Sciences, Political Science

[Daniel Klerman](#), USC Gould School of Law, Law and History

### **Game Theory and Human Behavior**

Addressing problems of global interest such as energy, healthcare, financial markets and security necessarily involve understanding and influencing the behavior of multiple parties with differing agendas. Our effort to create a campus-wide collaborative environment for Game Theory and Human Behavior promises to fuse the mathematics and formal approaches of the former with the wealth of social science insights of the latter to create new and necessary approaches for 21st century issues. The National Academy of Engineering has identified several Grand Challenge areas including preventing nuclear terror,

advancing personalized learning, securing cyberspace and renewing urban infrastructure. All involve multiple decision-makers in game-theoretic and human behavior settings, thus requiring the fusion of mathematical, engineering and social sciences to make significant progress in addressing these challenges.

**Leaders:**

[Tambe, Milind](#), USC Computer Science & Industrial and Systems Engineering

[John, Richard](#), USC Dornsife College of Letters, Arts and Sciences, Psychology

**[USC Institute for Integrative Health Research](#)**

Established in 2012, the USC Institute for Integrative Health (IIH) brings together dedicated USC faculty from multiple schools and diverse disciplines and is devoted to help foster research, education, and delivery of care in integrative health using a health and wellness model. Integrative Health—the health and wellness of the whole person: body, mind, and spirit—represents an approach to healing that moves beyond a strictly biomedical approach to physical wellness, emphasizing a broader concept of health that incorporates biological, psychological, spiritual, cultural and environmental influences on overall well-being. Our mission is to promote the health and wellness of individuals and communities, within the paradigm of integrative health, and is based on three core pillars: 1) innovative research, 2) leading-edge health education and 3) compassionate holistic clinical care. In October 2012, USC joined the national [Consortium of Academic Health Centers for Integrative Medicine](#), joining ranks with the more than 50 leading academic health centers that offer programs in integrative medicine at their institutions.

**Leaders:**

[Marc Weigensberg](#), Keck School of Medicine of USC, Pediatrics/County Hospital

[Jim Burklo](#), Office of Religious Life

[Debu Tripathy](#), Keck School of Medicine, Oncology

[Yogi Matharu](#), Ostrow School of Dentistry, Division of Biokinesiology and Physical Therapy

[Quintilia Avila](#), Project Manager, Institute for Integrative Health

**[Center for Interactive Media Technologies in Healthcare \(CIMTH\)](#)**

The mission of the Center for Interactive Media Technologies in Healthcare (CIMTH) is to encourage and facilitate interactions, research collaborations, development activities and educational training for faculty and students from the entire USC community around the potential which exists to advance the science and technology that uses wireless interactive media technologies for healthcare to “Empower Healthy Behavior” in those aging and in patient populations with chronic diseases and disabilities. Although not an exhaustive list, USC faculty who have committed to participate in this initiative have focused on the following chronic diseases and disabilities: pediatric obesity, cerebral palsy, osteoarthritis, cerebral vascular accident/stroke, spinal cord injury, aging-related balance and gait disorders, Parkinson’s disease, Alzheimer’s disease, and traumatic brain injury. Prior studies have shown the positive effects of social interactions, diet and exercise on general health status of individuals with chronic disabilities and diseases. This proposal is an expansion and outgrowth of ongoing research at USC supported by NIDRR (Optimizing Participation Through Technology Rehabilitation Engineering Research Center (OPTT-RERC; C. Winstein, Director and P. Requejo, Co-Director; <http://www.isi.edu/research/lerc/>) and brainstorming sessions, sponsored by the [Alfred E. Mann Institute \(AMI\)](#) for Biomedical Engineering., The initial focus of these earlier discussions were related to the creation of “clinic ready” monitoring

platforms for point-of-care- monitoring technologies for the management of individuals with age-related mobility impairments including cerebral vascular accident/stroke, spinal cord injury, aging-related balance and gait disorders, Parkinson's disease, and traumatic brain injuries.

**Leaders:**

[Carolee Winstein](#), Herman Ostrow School of Dentistry of USC, Division Biokinesiology and Physical Therapy

[Jonathan Lasch](#), USC Viterbi School of Engineering, Biomedical Engineering

[Cesar Blanco](#), Herman Ostrow School of Dentistry of USC, Division Biokinesiology and Physical Therapy

[Marientina Gotsis](#), USC School of Cinematic Arts

**Center for Drug Discovery and Development**

Housed at the School of Pharmacy, the USC Center for Drug Discovery and Development assembles a diverse group of scientists from throughout the university with expertise in all aspects of the design and synthesis of potential pharmacological breakthroughs. The Center benefits from a team of pharmacologists, toxicologists, and pharmaceutical and regulatory scientists skilled at expediting evaluation of a wide range of therapeutics to bring new innovations more quickly to patients who need them, while assuring safety and effectiveness.

**Leaders:**

[Stan Louie](#), USC School of Pharmacy, Division Clinical Pharmacy and Pharmaceutical Economics & Policy Faculty

[Clay Wong](#), USC School of Pharmacy, Division of Division Clinical Pharmacy and Pharmaceutical Economics & Policy Faculty

[Nicos Petasis](#), USC Dornsife College of Letters, Arts and Science, Department of Chemistry

[Mark Humayun](#), Keck School of Medicine, Department of Ophthalmology and USC Viterbi School of Engineering, Department of Biomedical Engineering

**Emergent Cities**

The simultaneous urban drift and need to support this shift in population, the widespread adoption of mobile devices and smaller, faster, cheaper embedded technologies all contribute to the definition and evolution of urbanism and what it means to live in cities now, and in the future. Emergent Cities, a collaborative group that includes faculty from the School of Architecture, Roski School of Fine Arts, School of Cinematic Arts, and others, contributes cross-disciplinary research to a global conversation about the creative, cultural and technological evolution of contemporary cities.

**Leaders:**

[Rochelle Steiner](#), Roski School of Fine Arts

[Scott Fisher](#), USC School of Cinematic Arts

Stefano de Martino, USC School of Architecture