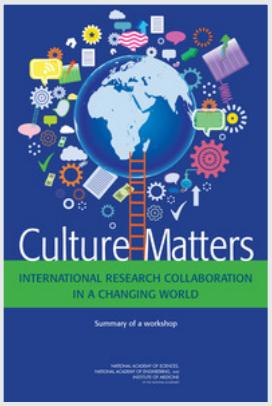

Culture Matters: International Research Collaboration in a Changing World: Summary of a Workshop

DETAILS

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Culture Matters

INTERNATIONAL RESEARCH COLLABORATION IN A CHANGING WORLD

Summary of a Workshop

Susan Sauer Sloan and Joe Alper, Rapporteurs

Planning Committee for the Workshop on Culture Matters:
An Approach to International Research Agreements

Government-University-Industry Research Roundtable

Policy and Global Affairs

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Preface and Acknowledgments

Shortly after hosting an engaging and timely "Workshop on Examining Core Elements of International Research Collaboration" in July 2010, members of an active working group convened by the National Academies and its Government-University-Industry Research Roundtable (GUIRR) agreed that there was more exploration to be done around the notion of culture and research. More specifically, the group, which goes by the moniker "I-Group," began to question aloud how culture and cultural perception factor into, influence, and impact the process by which research agreements are made and negotiated across international boundaries.

Challenges associated with language differences are perhaps most obvious when one thinks about culture; however, many other challenges come in to play as well when negotiating on a global scale. For example: How do differing cultural attitudes toward ownership of ideas and intellectual property (IP) affect cross-cultural partnerships? How is IP enforced? How is project risk assessed through different cultural lenses? Which country's legal framework prevails when or if a project goes awry (beyond budget, timeline, etc.)? What happens when ideas about ethics and the conduct of research fail to align or harmonize across geographic boundaries? How does culture influence the wording/shaping/development of standards? What impact does culture have on a nation's ability to innovate?

Ponder the influence of culture on multi-party, multi-country, possibly multi-disciplinary and/or multi-sector (government, universities, industry, other) partnership arrangements and the questions just keep coming.

This line of inquiry led to the proposal of a second international workshop, this one designed to look very carefully at cultural issues within the context of research and global partnering. A small planning committee was established and worked over several months to lay out a broad framework to address the I-Group's questions. The committee identified and secured internationally recognized experts who could speak to and share insights from their respective areas of expertise.

I-Group members actively engaged with and supported the efforts of the planning committee and must be commended. Members of the I-Group include: Lida Anestidou, National Academies; Giulio Busulini, Embassy of Italy; Susan Butts, Susan B. Butts Consulting; John Carfora, Loyola Marymount University; James Casey, University of North Carolina at Chapel Hill; John Hickman, John Deere & Company; Wayne Johnson, California Institute of Technology; Mary Jordan, U.S. Agency for International Development; Mark Maurice, Air Force Office of Scientific Research; Celia Merzbacher, Semiconductor Research Corporation; Barbara Mittleman, Nodality, Inc.; C. D. Mote, Jr., National Academy of Engineering; Arturo Pizano, Siemens Corporate Research; Marie-Christine Piriou Reames, Georgia Institute of Technology; Andrew Reynolds, U.S. Department of State; Walter Schaffer, National Institutes of Health; Patrick Schlesinger, University of California at Berkeley; Robin Staffin, U.S. Department of Defense; David Stonner, National Science Foundation; and Sandra Titus, U.S. Department of Health and Human Services-Office of Research Integrity.

The follow-on workshop was held July 29-31, 2013, in Washington, DC, and titled "Culture Matters: An Approach to International Research Agreements." The event was the culmination of tremendous effort and the focus of this resultant workshop summary report that bears, by design, the more encompassing title of *Culture Matters: International Research Collaboration in a Changing World*.

Providing assistance to the planning committee were the GUIRR staff members who are listed by name with the planning committee roster on page *v.* This workshop would not have been realized without their steadfast encouragement and able involvement.

We wish to acknowledge and thank the Air Force Office of Scientific Research and the National Institutes of Health Evaluation Set-Aside Program for providing primary support for the workshop and contributing financially to the production of this report. Additional support for this project came from the Office of Naval Research, the U.S. Department of Agriculture, and GUIRR's University-Industry partner organizations.

This summary has been prepared by the rapporteurs as a factual summary of what transpired during the workshop. The planning committee's role was limited to planning and convening the workshop. The statements made in this report do not necessarily represent positions of the planning committee, I-Group, the workshop participants, GUIRR, or the National Academies.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Academies' Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published reports as sound as possible and to ensure that the report meets institutional standards for quality and objectivity.

The review comments and draft manuscript remain confidential to protect the integrity of the process.

We wish to thank the following individuals for their review of this report: Charles Dunlap, CRDF Global; Robert Hardy, Council on Governmental Relations; Elizabeth Heitman, Vanderbilt University Medical Center; Miriam Kelty, Independent Research Professional; and Max Voegler, Deutsche Forschungsgemeinschaft (DFG). Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the content of the report, nor did they see the final draft before its release. Responsibility for the final content of this report rests entirely with the rapporteurs and the institution.

Finally, we do not purport to have raised all the appropriate questions or considered all possible responses and/or approaches; however, this report reflects an earnest attempt to consider, in a careful if cursory way, an important aspect of research globalization, namely the role of culture.

Barbara Mittleman, M.D., *Co-Chair*
Planning Committee
Culture Matters: An Approach to
International Research Agreements

Arturo Pizano, Ph.D., *Co-Chair*
Planning Committee
Culture Matters: An Approach to
International Research Agreements

Acronyms and Abbreviations

AFOSR	Air Force Office of Scientific Research
APA	American Psychological Association
ASEAN	Association of Southeast Asian Nations
CRPD	United Nations Convention on the Rights of Persons with Disabilities
FDP	Federal Demonstration Partnership
GUIRR	Government-University-Industry Research Roundtable
IDPP	Institute on Disability and Public Policy
I-Group	Working Group on International Research Collaborations
IP	intellectual property
IRB	Institutional Review Board
IUPsyS	International Union of Psychological Science
NCI	National Cancer Institute
NGO	Non-Government Organization
NIC	National Intelligence Council
NIH	National Institutes of Health
NRC	National Research Council
REC	Research Ethics Committee
TRIPS	trade-related aspects of intellectual property rights
UIDP	University-Industry Demonstration Partnership
USAID	United States Agency for International Development
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

Contents

Appendices

1

Introduction and Overview

In an increasingly interconnected world, science and technology research often transects international boundaries and involves researchers from multiple nations. This model provides both new opportunities and new challenges. As science and technology capabilities grow around the world, U.S.-based organizations are finding that international collaborations and partnerships provide unique opportunities to enhance research and training. At the same time, enhancing international collaboration requires recognition of differences in culture, legitimate national security needs, and critical needs in education and training (NRC, 2011).

To examine international research collaborations in a systematic way, the Government-University-Industry Research Roundtable (GUIRR) launched a Working Group on International Research Collaboration (I-Group) in 2008. Sponsored by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, GUIRR serves as a forum for dialogue among the top leaders of government and non-government research organizations. GUIRR and two organizational affiliates, the Federal Demonstration Partnership (FDP) and the University-Industry Demonstration Partnership (UIDP), seek to advance relationships between the sectors.

I-Group was formed to examine international research in a systematic, practical way. The goal of the I-Group is to work with stakeholders to develop a more structured approach to international collaborations and help organizations deal with various cultural, administrative, and legal complexities in undertaking them. According to its Statement of Purpose, I-Group "engages in dialogue and discussion to facilitate international collaborations among academic, government, and industrial partners by: (1) identifying policies and operations that enhance our ability to collaborate; (2) identifying barriers to collaboration—policies and operations that could be improved; (3) developing a web-based resource or other compendium of successful strategies and methodologies; and (4) suggesting how barriers might be addressed" (NRC, 2011).

An important means for the I-Group to carry out its work are workshops that will bring together subject matter experts from universities, government, industry and professional organizations in the United States and other nations. The I-Group's intent with the workshop format is to be as inclusive as possible, bringing together the appropriate parties to the table around meaningful discussion and solutions. The National Research Council formed a Planning Committee to organize an initial workshop titled "Examining Core Elements of International Research Collaboration" and held on July 26-27, 2010 in Washington, DC. The goal of this first workshop was to enhance international understanding and diminish barriers to research collaborations. A workshop summary was published and released after this initial workshop (NRC, 2011).

To expand on one of the themes explored in the first workshop, a new Planning Committee was formed to organize a second, follow-on workshop on July 29-31, 2013 in Washington, DC, to address how culture and cultural perception influence and impact the process by which research agreements are made and negotiated across international boundaries. The Planning Committee was assisted by GUIRR staff and volunteers from numerous GUIRR member organizations in arranging this follow-on event.

In this workshop, "Culture Matters: An Approach to International Research Agreements," representatives from around the world and from GUIRR's three constituent sectors—government, university, and industry—gathered to provide input into four specific meeting tracks or domains. The tracks focused on research and agreements affecting or involving:

(1) People/Human Subjects
(2) Environment and Natural Resources
(3) Science, Engineering, and Manufacturing
(4) Agriculture and Animal Issues

The task for the experts involved in each track was to examine the domain under discussion and the role that culture and cultural expectations may have in the forging and implementation of international research agreements. In addition to the domain tracks, the workshop featured a set of six plenary sessions, each of which addressed topics of a cross-cutting nature and that engaged all of the workshop's participants: (1) Designing Projects with Culture in Mind, (2) Conducting Research in Developing Countries, (3) Language, (4) Urbanization, Ecological Sustainability, and Social Resilience, (5) Intellectual Property, and (6) Change and Drivers.

Following the workshop, the rapporteurs prepared this summary, which reports the main themes that emerged from the workshop presentations and discussions. The goal for the workshop and the summary is to serve as an information resource for participants and others interested in international re-

search collaborations. It will also aid the I-Group in setting its future goals, priorities, and activities.

1.1 FRAMING THE ISSUES[1]

In her opening remarks **Barbara Mittleman, Vice President for Immunology at Nodality Inc.**, noted the importance of culture in working through the mechanics of international research agreements and the lack of suitable tools for thinking about culture. As a result, the process becomes very impressionistic. One of the goals of the workshop, she said, was to discuss the many cultural issues that need to be considered and addressed in developing international research agreements.

National Academy of Engineering President C. D. Mote, Jr. commented on the number and different types of organizations or groups that each person belongs to and the distinct culture[2] that characterizes each of those groups. Culture, he said, reflects the attitudes, values, goals, and practices of any organization or group. Referring to *Thinking, Fast and Slow* (Kahneman, 2010), Mote described two ways of thinking: slow thinking, which is rational and cognitive, and fast thinking, which is reactive and instinctive. Most people think fast and cannot act rationally, and as a result, organizations and groups of people, such as countries, cannot act entirely rationally. More importantly, fast, reactive thinking is "very much controlled by the culture you come from."

To illustrate one impact of culture, Mote noted the key finding of a National Research Council study that he chaired on the science and technology strategies employed by six countries (NRC, 2010). "The number one issue in terms of whether those countries would achieve their science and technology goals was their culture," he said. "It was not how many engineers were in the workforce. It was not their expenditures on research and development. It wasn't always these socioeconomic indicators that the economists tell us are so important for predicting what your R&D operations are going to do. It was the culture of the country." In particular, he added, what was important was how much a country could align its culture with the goals that it had for science and technology. This result was a complete surprise to everyone on the study committee.

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[1] In this section and other sections summarizing presentations, views and opinions are those of the presenter unless stated otherwise.

[2] Although "culture" can be defined in countless ways, for the purpose of this workshop, the planning committee adopted the following definition: Culture is the learned and shared behavior of a community and is created by perceiving, interpreting, expressing, and responding to the social realities which affect that community. This definition is based on two publications, *Human Organizations* (Useem, 1963) and *Preparing for Peace* (Lederach, 1995).

Culture comes into play in international research agreements because each country involved in a negotiation has its own culture that determines the rules for creating an agreement and how an agreement is carried out in practice. These cultural differences can be as complex as the legal framework under which agreements are formulated or as simple as the meanings attributed to a particular word. For example, in some contexts an American will take "yes" to mean "I agree," while someone from Japan in the same context might take it to mean "I understand," two entirely different meanings.

The essential ingredient for a successful international research agreement is trust, Mote stated. "Trust is the most important issue because things will never go exactly as they are written down and you have to trust the other person that you're going to work together to make this partnership work," he explained. "No agreement should be signed or even contemplated until you have a level of trust, because it will be a bad experience otherwise." Trust, he added, is rooted in culture, yet it is almost unheard of in the United States to consider culture when it comes to developing international research agreements.

1.2 GLOBAL TRENDS 2030: ALTERNATIVE WORLDS

Presenter: Mathew Burrows, Counselor with the National Intelligence Council in the Office of the Director of National Intelligence

To provide additional context for the workshop, **Mathew Burrows**, discussed the highlights of the most recent *Global Trends 2030* report issued in December 2012 (NIC, 2012). This publicly available report, issued every four years by the U.S. Office of the Director of National Intelligence, is intended to stimulate thinking about the rapid and vast geopolitical changes characterizing the world today and possible global trajectories over the next 15 years. Like the previous *Global Trends* reports, the report does not seek to predict the future, explained Burrows, but instead provides a framework for thinking about possible futures and their implications. He noted that this report is used by the "thinking slow" part of government.

The main thesis in the *Global Trends 2030* report is that we are at a critical junction in human history that could lead to widely contrasting futures, and as a result, the future is not set in stone but is malleable. The report identified four megatrends that are already ongoing and will influence the future under any imagined scenario, and six game-changers, which are important trends that currently have no clear outcome. The most important megatrend, said Burrows, is individual empowerment arising from the fact that the majority of people in the world are joining the middle class, that the gender gap for education and health is shrinking, and that the widespread use of new communications and manufacturing technologies is continuing unabated. While this mega-

trend is overwhelmingly positive, it does have a less appealing side, since individual empowerment is also empowering crime and harm by individuals and small groups at a level that was once reserved for nations.

The second megatrend is the diffusion of power that results from changing global demographics and the rise of the non-state state. This megatrend will result in power shifting to networks and coalitions in a multi-polar world. The third megatrend, demography, refers to the aging of the world's population. The fourth megatrend involves the nexus between food, water and energy and the demand for scarce resources as the world's population continues to increase, even without considering the impacts of global climate change.

Of the six potential game-changers, Burrows noted the potential importance of a gap in governance capabilities. It is unclear, he said, if governments and institutions—both domestically and internationally—will be able to adapt fast enough to harness change instead of being overwhelmed by it. He also highlighted the potential impact of new technologies on the world's ability to boost economic productivity and solve the problems caused by a growing world population, rapid urbanization, and climate change. While the outlook for technology's impact is largely positive, there are potential negative impacts that arise as technology reduces the need for human employees in various industries. "I think more importantly the message here is that technology is just not going to be the savior for all these problems that we talked about without governments stepping in and helping the process," said Burrows.

In his final comments, Burrows briefly discussed four potential "alternative world" scenarios. In the most plausible worst-case scenario, the risks of interstate conflicts increase as the world's economy stalls, triggered by the United States and Europe turning inward and losing interest in sustaining their global leadership. In this bleak future, which Burrows considers unlikely, all players on the world stage do poorly. At the opposite end of the spectrum, the most plausible best-case scenario occurs as high-level cooperation between the United States, Europe, and China actually increases and a technological revolution helps both emerging and developed economies to benefit substantially. Another alternative world, the genie-out-of-the-bottle scenario, is a world of extremes, with inequalities dominating within many countries, while in the non-state alternative world, non-state actors—nongovernmental organizations (NGOs), multinational businesses, academic institutions, and wealthy individuals—as well as sub-national units such as megacities flourish and take the lead in confronting global challenges. The result is an uneven, patchwork world in which some global problems get solved when networks manage to coalesce and some cooperation occurs across state and non-state divides. Security threats pose an increasing challenge as access to lethal and disruptive technologies expands, enabling individuals and small groups to perpetuate violence

and disruption on a large scale. This world is more stable and socially cohesive than in the "genie-out-of-the-bottle world" (NIC, 2012).

In the open discussion that followed his presentation, Burrows noted that when the *Global Trends 2030* report was presented in countries around the world, one common comment was that while the liberal, fair order that the United States established after the Second World War has largely benefitted the world, the United States does not always seem interested in other countries rising as fast as might be possible. Having said that, he added that there is a real growing interest in democracy, even in China. "It may be a different kind of democracy than we would have, but certainly those kinds of values are widely shared. There is no alternative order out there," said Burrows. In response to a question about the importance of the United States remaining engaged with the rest of the world, Burrows said that this was a point that everybody outside of the United States talked about, with the Chinese being one of the most emphatic about it. "You can look at this as a transition period," said Burrows, one in which economic power is changing but in which only the United States has the ability to manage this transition in terms of getting coalitions together to deal with the world's major problems.

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2

Designing Projects with Culture in Mind

When developing the agenda for this session, the Planning Committee had two questions in mind:

- How might one design international research projects while being cognizant of cultural distinctions, mannerisms and sensitivities?
- What cultural and ethical issues should be taken into consideration when first setting out to design a research project that involves international participants?

Two speakers addressed these questions in a session moderated by Susan Sauer Sloan, GUIRR Director. Frederick Leong, Professor of Psychology and Psychiatry and Director of the Consortium for Multicultural Psychology Research at Michigan State University, discussed how to move toward culturally responsible conduct of international research. Edward Trimble, Director of the Center for Global Health at the National Cancer Institute, spoke about why culture matters in cancer research.

2.1 CONDUCTING INTERNATIONAL RESEARCH IN A CULTURALLY RESPONSIBLE MANNER

Presenter: Frederick Leong, Professor of Psychology and Psychiatry and Director of the Consortium for Multicultural Psychology Research at Michigan State University

Out of the 164 cited definitions of culture defined in a 1952 book on the subject (Kluckhohn, 1952), **Frederick Leong** explained the two that convey what many anthropologists would say are central: that culture is an abstraction from behavior and that it is very complex. Regarding the responsible conduct of research in the international arena, Leong began with this central idea and made the assumption that humans are cultural beings and that the scientific

community functions as a culture that can be studied from a psychological perspective. He emphasized the importance in such studies of being aware of the problem of ethnocentrism—the natural tendency of using one's own culture as a standard for evaluating others—and to consider the advantages and disadvantages of the universalist and culture-specific approaches to research.

Leong then noted that while the American Psychological Association (APA) has a code of ethics that contains guidelines regarding research, these guidelines do not specifically address international and cross-cultural research. For example, the APA code of ethics has specific standards and guidelines regarding informed consent, but the guidelines say nothing about what to do when there are cross-cultural encounters with people who have different communication styles and expectations. Leong made the point that "there are limitations to our ethical codes. The behavioral specificity of these ethical codes ignores a range of ethical challenges when cross-cultural international research is conducted by American psychologists in other countries."

He commented, too, that ethical codes are not created in vacuums but are contextualized and reflect the culture of the country in which these codes are developed. "We know very little about the cultural conflicts and ethical dilemmas that occur when culture-specific ethical codes are transported across cultures in international psychological research," said Leong. "More likely than not, these codes lack the flexibility to deal with the complexities of the different cultural contexts. A behaviorally-based ethical system is not likely to be responsive to these cross-cultural conflicts that are often subtle and invisible to many American psychologists," he added.

Leong then listed some of the ethical challenges in international research (Leong, 2011):

- How do we reconcile Institutional Review Board (IRB)[1] requirements of written consent with research societies that possess no written language?
- How do we reconcile one society's values concerning bribery with another society's cultural expectations that gifts will be offered when seeking access to samples?
- What constitutes excessive or inappropriate financial inducement in developing countries, where poverty rates are high?

[1]In the United States, ethical reviews of human subjects research are conducted by institutional review boards (IRBs). However, in many other countries the ethical review of human subjects research is conducted by a review board that is not housed within the research institution. Therefore, the term research ethics committee (REC) is more widely used internationally. Both IRBs and RECs serve the same function.

- Who monitors the potential abuse of participants in developing countries in order to advance careers of psychologists from more developed countries?
- How do we deal with the myth of uniformity that assumes that equal treatment is always fair treatment given the differential research infrastructures present in different countries?

There are potential solutions to address the limitations of national ethical codes and guidance that can be provided for culturally responsible conduct of international research. One solution that Leong recommends is adopting the Universal Declaration of Ethical Principles for Psychologists and the APA's Resolution on Culture and Gender Awareness in International Psychology. The Universal Declaration was developed by the International Union of Psychological Science (IUPsyS) and the International Association of Applied Psychology and it establishes a framework based on four principles (IUPsyS, 2008): (1) respect for the dignity of all human beings, (2) competent caring for the well-being of others, (3) integrity, and (4) professional and scientific responsibility to society. The APA's Resolution (APA, 2004) is based on the fact that 60 percent of the world's psychologists now live outside of the United States and that they have generated perspectives, methods, and practices that correspond to the needs of the people in their societies. The Resolution calls for more research on the role that cultural ideologies have in the experience of women and men across and within countries on the basis of gender identity, sexual orientation, ethnicity, class, age, disabilities, and religion. It also advocates for more collaborative research partnerships with colleagues from diverse cultures and countries that can lead to mutually beneficial dialogues and learning opportunities. Finally, the Resolution encourages psychologists to gain an understanding of the experiences of individuals in diverse cultures and their points of view, to value a pluralistic world view, and to become aware of and understand how systems of power hierarchies may influence the privileges, advantages, and rewards that usually accrue by virtue of placement and power (APA, 2004).

There are also emerging solutions, said Leong, that he believes are promising. One such solution is the International Competencies for Scientists and Practitioners, which derives from the APA's Resolution and defines and measures international competencies as an extension of the multicultural competencies movement in minority mental health services. This movement was launched over three decades ago by the APA's counseling division when it developed a position paper on the topic of cross-cultural competencies as they relate to more culturally competent diagnostic services for minorities (Sue, 1982). That model contains three conditions that Leong said are valuable for international competencies: awareness of how a counselor's own cultural background may bias or skew his or her perception of the client's experiences

and problems that arise from the client's different cultural background; knowledge about other cultures; and skills that a counselor can acquire to work effectively with culturally different clients.

From this model for cross-cultural competencies, Leong and his colleagues created a model for developing international competencies in psychology that he believes can provide a conceptual framework for guiding the increasing internationalization of psychology. Leong's model proposes that the development of international or cross-cultural competencies in psychology should begin with a multicultural mindset that includes a deep understanding of the contextual basis of human behavior and that requires a cross-cultural and comparative perspective (Leong, 2000). The opposite stance, explained Leong, is ethnocentrism, "where we assume that our culture's way of thinking, feeling, and behaving is the best and correct one regardless of context." He added that ethnocentrism is a common and natural human tendency and therefore requires mindful efforts to overcome.

One aspect of this model is that the psychologist uses cross-cultural knowledge, skills, and abilities related to differential contexts in order to accommodate the significant differences that would otherwise limit or hinder the relevance and effectiveness of his or her international activities. In the development of international competencies for research and practice, an evidence-based approach that uses empirically-based cross-cultural theoretical models is important. Leong briefly reviewed a few such studies to illustrate the importance of acquiring knowledge regarding cultural values to guide ethical research practices. The utility of these models is in explaining how conflicting values can create ethical problems when conducting cross-cultural research.

In his book *The Interpretation of Cultures*, anthropologist Clifford Geertz made an important distinction between thick versus thin descriptions of cultures (Geertz, 1977), and Leong subscribes to the view that international competencies consisting of thick descriptions of culture and an understanding of the deep structure of cultural values and beliefs will be the way forward toward the culturally responsible conduct of international research. He ended his presentation by issuing a call to action for the APA Committee on International Relations in Psychology to begin to assess and evaluate the nature and extent of ethical problems in conducting cross-cultural research among its members while guided by the Resolution on Culture and Gender Awareness in International Psychology and the Universal Declaration of Ethical Principles (Leong & Lyons, 2011 and APA, 2004). To respond to that call, Leong also commented that there is a need to launch a program of research aimed at identifying the key international competencies of awareness, knowledge, and skills in research and practice in order to meet the challenges of the increasing internationalization of our scientific enterprise.

2.2 WHY CULTURE MATTERS IN CANCER RESEARCH

Presenter: Edward Trimble, Director of the Center for Global Health at the National Cancer Institute (NCI)

Edward Trimble indicated that he had recently counted 15 bilateral international research agreements that he is working on or developing to tackle the growing incidence of cancer outside of the United States. He noted that more than 60 percent of the world's cancers occur in the developing world, with that percentage slated to rise to upwards of 70 percent over the next two decades. As a result of the pressing need that arises from the preponderance of cancer occurring in those nations least able to afford the burden of treating and caring for their citizens who develop cancer, Trimble said, "we need to understand the differences in how cancer arises and the response to treatment across different countries and different patient populations. We need to share expertise, we need to build capacity for research, and we need to develop new ways to prevent, to diagnose, to treat, and to palliate cancer as soon as possible. So we need to overcome any differences related to red tape or culture as quickly as possible to get this done." And while there has been tremendous awareness of the prevalence of infectious diseases in the less developed world, that same awareness has not been the case concerning non-communicable diseases such as cancer.

Trimble said one important aspect of culture related to cancer is its influence at the personal, family, and community levels, at the level of local health systems and health care providers, and at the national level as it relates to support for research and for engaging in research with investigators from the developed world. At the individual, family, and community levels, there needs to be a community understanding of the need for health research and the structure of health research, explained Trimble. One advantage that American researchers have in this realm is that the United States is itself multicultural and the cancer research community has learned how to interact with community leaders. "In many cases, we bring that awareness when we do research in partnership with colleagues outside of the U.S.," said Trimble.

One area where improvement is needed, he said, is learning how to explain the risks and benefits associated with research to individuals. "It drives me crazy when I have to talk to my own patients and give them a 20-page, single spaced informed consent form," he said. To him, this represents a failure to bridge the legal culture with the culture of the individual and the health care provider who would "much prefer to have a two-page document in bold, 16-point type." Also needed, said Trimble, is a health care community that puts a premium on research. "Clearly, we need to make sure that doctors and nurses and other members of the healthcare team understand the importance of re-

search and understand how to do it. This needs to be part of the medical culture," he said. It has to start with the institutional leadership's support for research in a way that engages all of the communities—each with its own culture—that must be involved for research to have its biggest impact, Trimble explained.

In the same way that psychologists have ethical frameworks, so too does the international research community. These frameworks, which can have both national and international scope, are largely in sync with one another. What does vary, said Trimble, is the amount of paperwork needed to satisfy the different frameworks and the timeliness of the review process. In some cases, he said, the time from submission of a research proposal to its approval by a national review board takes so long that the scientific question that was to be addressed by the research is no longer important. This is also a U.S. problem, Trimble admitted, and the National Cancer Institute has revamped its own processes to make sure that it can start trials quickly. He cited France as an example of a country that has refined its processes to speed clinical trial approvals. "France has managed to change the culture to emphasize the importance of timely review. They are not overlooking patient protection but making sure that the science proceeds in a timely way," said Trimble.

Trimble noted the potential value of the Bamako Call to Action for Research in Health, which was issued in 2008 (WHO, 2008). This document, issued by ministries of health, science and technology, education, foreign affairs, and international cooperation from 53 countries, urged nations to mobilize all relevant sectors of society to work together to find needed solutions to the world's important health care issues. The Call to Action also recommended that governments and international development agencies allocate specific resources to health research priorities. The culture change needed to realize these goals is still underway, said Trimble.

As an example of what happens when the local culture does not support these goals, he cited the clinical trials crisis in India. In 2013, the Indian government rolled out new clinical trials regulations that were intended to provide greater protection to clinical trial participants. While many of the regulations were reasonable, a few less thoroughly developed regulations caused clinical trials in India to come to a halt: a requirement that compensation be paid to patients who were not fully cured during the trial, a ban on the use of placebos in clinical trials, and a requirement to pay all medical costs for a patient who sustained injury or illness during a clinical trial without regard to whether said injury or illness was related to the clinical trial (Pais, 2013). "There was not adequate support from elsewhere in society to say that clinical research is critical and needs to continue," said Trimble.

In his closing remarks, Trimble listed a few examples of research collaborations in cancer where there has been a significant amount of effort put into

figuring out how to bridge nations and cultures. The International Cancer Genome Consortium is one such example, and it is designed to identify genetic and epigenetic changes in 50 different tumor types of clinical importance across the planet. This consortium involves laboratories in 14 countries. The NCI has also started an international rare disease research consortium in conjunction with Canada and the European Union, and multinational clinical trials in breast cancer have been going for over 20 years. The NCI has also created a large clinical trials network that, while based primarily in the United States and Canada, also involves investigators and patients in South Africa, Peru, China, Japan, and Korea. Trimble additionally cited the strong culture of partnership that NCI has established in the United States among industry and academia, including the development of model agreements for collaborations across government, industry, and academia.

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3

Conducting Research in Developing Countries

This session was designed to explore three specific questions:

- What issues, cultural and otherwise, arise when researchers from developing and developed countries collaborate?
- What are the unique governance and regulatory challenges that influence research in developing countries?
- What are the ethical principles to consider when engaging in cross-cultural research collaborations?

Two speakers addressed these questions in a session moderated by **Patrick Schlesinger, Assistant Vice Chancellor at the University of California, Berkeley**. **Benjamin Caballero, Professor of International Health in the Bloomberg School of Public Health and Professor of Pediatrics in the School of Medicine at Johns Hopkins University**, discussed how to move from paternalism to partnership in research collaborations involving investigators in developing countries. **Ames Dhai, Director and Head of the Steve Biko Centre for Bioethics at the University of the Witwatersrand**, spoke about the role of ethics in making decisions regarding research collaborations in developing countries of varying economic status.

3.1 UNIVERSITY PERSPECTIVES ON INTERNATIONAL RESEARCH AGREEMENTS

Presenter: Benjamin Caballero, Professor of International Health in the Bloomberg School of Public Health and Professor of Pediatrics in the School of Medicine at Johns Hopkins University

Speaking from his perspective as a pediatrician conducting research on childhood obesity in developing countries, **Benjamin Caballero** took the posi-

tion that "in many cases, we are in a pre-cultural stage." By this he meant that in many countries, the main challenges relate to ethical and regulatory issues regarding the use of humans as experimental subjects. "Culture and language barriers are not a main concern if experiments are conducted without consent or with fake consent." In most developing countries, a lack of resources and expertise results in weak regulatory frameworks and an increasing reliance on private sector support that does not necessarily follow the same academic framework that most researchers from the developed world are accustomed to following.

Caballero noted that the history of research collaborations between developed and developing countries is not an illustrious one, with very few exceptions. In the early 20th century, most research collaborations with developing countries were designed to address a U.S. need, such as studying diseases affecting the productivity of U.S. companies or performing studies that were deemed too risky for U.S. subjects. In some cases, U.S. investigators took advantage of the ethical vulnerabilities arising from a lack of experienced independent review boards and the fact that low-income populations are more susceptible to financial incentives to participate in a research study. The assessment of risk is subjective for people living in a high-risk environment; risks that would be unacceptable in American culture would be routine for those living in developing countries. In addition, said Caballero, low literacy may impede truly independent informed consent procedures.

The U.S. Public Health Service Sexually Transmitted Disease Inoculation Study, conducted in Guatemala from 1946-1948, is one of the most egregious examples of a project that took advantage of these factors (CDC, 2010). This study, approved by the National Institutes of Health (NIH), the U.S. Surgeon General, the Pan American Health Organization, and Guatemala's Ministry of Health, involved inoculating healthy people and sex workers with syphilis to study transmission of the disease. More recently, a major pharmaceutical company was charged with falsifying parental authorizations so that infants could participate in a vaccine trial in which fourteen babies died, while another was accused of bribing subjects to participate in clinical trials in order to speed up enrollment. "This problem continues in many countries," said Caballero. "It is what I characterized as a pre-cultural problem—we don't bridge the barriers, we circumvent the barriers of culture and language."

In his view, there are five principles of collaboration that need to be addressed. The first and most important is that any study designed to be conducted in a developing country has to be relevant for the local population, local scientists, and for the national Ministry of Health. "It cannot be just for convenience, cost, or expediency," said Caballero. Second, any collaboration needs to share risks, either by using a combined population or a protocol designed to minimize risk. The third principle is that there must be a regulatory framework

that is acceptable internationally and that holds to the tenets of the many declarations, such as the Helsinki and Belmont Declarations, that state that there are ethical principles in conducting experiments on humans that go beyond culture. The last two principles hold that there should be strong local ethical expertise and there should be unbiased funding that is driven by the size of the study and not by the operations or convenience.

Some of these principles, said Caballero, have been implemented by NIH as well as by various non-governmental organizations and foundations. "There is general progress," he said, "and while we are still learning how to do it better, there is deliberate and strong intention to do it right." Doing it right also means that the majority of research funds should be controlled by local institutions and local principal investigators and that research protocols are approved by local, independent, internationally registered research ethics committees (RECs). In his experience, many countries lack RECs, and so creating an independent, reliable REC is often the first task in establishing a collaborative research effort in a developing nation. This is a long process that involves recruitment, training, certification by an international organization, and demonstrating expertise that must be reevaluated by NIH every two years

Research projects must also include capacity building in research bioethics. "It's not just waiting until the developing country somehow acquires a generation of people who are savvy on ethical issues." Toward that end, the NIH Office of Global Health is funding eight centers of excellence in developing countries and these centers include ethical capacity building as part of their mission.

In his final remarks, Caballero summarized the key conditions that are needed to establish an effective research collaboration with a strong ethical foundation. To start, there needs to be political and social support for science in the partner country and there should be defined strategic goals for research. The best collaborations take place with strong, reliable counterpart organizations that have basic accountability principles in place. Also, there needs to be the potential for capacity building and two-way learning opportunities. "Eventually, with time, there will be a true partnership in which we both contribute something original to improve the research and improve the quality of life of everyone involved," said Caballero.

3.2 USING ETHICS IN DECISION MAKING

Presenter: Ames Dhai, Director and Head of the Steve Biko Centre for Bioethics at the University of the Witwatersrand

In thinking about the differences between wealthy and poor developing nations, it is important to understand the context and ask why a wealthy coun-

try remains less developed, said **Ames Dhai**. "Is there a culture of lack of responsibility?" asked Dhai. "Is there adequate political will within these countries to ensure progress and development?" The bottom line, she said, is that there is no one-size-fits-all solution, but that ethics can support decision-making across cultural and wealth/poverty divides. She also noted that the huge gaps between the haves and the have-nots cannot be fully understood through the over-simplified division of the world into the global rich and the global poor. "In fact, the reality is that 20 percent of the largest fortunes in the world are in the so-called poor countries, and even within these countries we find dramatic and drastic health differences that are closely linked to social disadvantage, not cultural divide," she said. "I think it is also important to remember that it is the power differentials between and amongst classes in these countries and the influence over the state that are at the root cause of poverty. Again, it is not culture, but it is class differences and the power differentials."

Addressing the subject of governance, Dhai said that it is often absent in developing countries, and when it is present the standards differ markedly across countries. In addition, even when governance and regulatory frameworks do exist, implementing them is a problem given the general lack of financial support for such initiatives. She raised the possibility of creating a global minimum standard for regulatory activities that both parties in a research collaboration would have to meet before a project could begin and that both parties can sustain throughout the project.

Dhai commented on Caballero's idea of helping developing nations create research ethics committees by noting that these are often created from a Western philosophical perspective. "Very little consideration is given to local philosophies and local cultures," said Dhai, and when there are differences in what a local ethics committee decides compared to the decisions made by its developed country collaborators, these decisions are often looked upon negatively, a phenomenon she called ethical imperialism. When her institution finds itself in such a situation, where its decision making is questioned, she requests a conference call with the partner institution to see how the two partners can develop a combined decision making process. "Some respect this request, and others don't want to talk to us," she said.

Ethical issues do not end with a project's approval, said Dhai; it is important to look at what happens after the project is reviewed and approved. Her institution uses both passive and active post-approval monitoring. Passive monitoring involves reviewing reports from the sponsor's monitoring agents and data from safety monitoring boards, while active monitoring involves site visits. There have been instances, she said, where active monitoring identified problems that required fixing before enrollment could continue.

For Dhai, one of the dominant ethical principles that must be part of any collaboration is justice or fairness, both in terms of how the burdens and bene-

fits of research are distributed among the collaborators and how decision making occurs. South Africa uses the principle of justice to assist health research priority setting activities by considering the burden of disease in the country and the cost-effectiveness of the interventions being planned. An important part of justice, she added, is social responsibility, and the challenge for corporate partners is to engage with stakeholders from both the developed and developing world and to understand how corporate social responsibility is structured in the context of a specific developing nation. "The priority for most in the developing world is to secure a livelihood, and therefore demands for improvements in labor conditions or for socially responsibility products of research are often of secondary concern," said Dhai. She wondered if industry, which is increasingly global in the way it runs human clinical trials, has different standards for social responsibility that it holds its partners to in the developing and developed parts of the world.

She also noted the importance of looking at trust and trustworthiness when creating collaborations. "Trust is so essential to all relationships," Dhai said. "There is no single variable that so thoroughly influences interpersonal and group behavior." As a result, she believes that trust should be considered a public good that is essential for maintaining cooperation in society. The first characteristic of trust is that it involves at least two actors, one who trusts and one who is trusted. A second characteristic is that the trusting actor willingly makes him or herself vulnerable to the trusted actor in circumstances in which the trusted actor could actually benefit from taking advantage of the trusting actor. Finally, the trusting actor must make himself or herself vulnerable in the belief or expectation that the trusted actor will behave in a trustworthy way that does not exploit the trusting actor's vulnerability.

Trustworthiness, which is characterized by ability, benevolence, openness, and integrity, is also critical, and Dhai said that when trust and trustworthiness are well matched the result is an interdependence between the trusting and trusted actors. "Most enterprises and initiatives are very successful when there is a high level of interdependence," she said. But in most developing countries there is a culture of mistrust and suspicion, especially in collaborative contexts, which she believes is not surprising given that the history of international research is paired with a history of exploitation of developing countries. On the other hand, developing countries are plagued by corruption, inefficiencies, and mismanagement, making it difficult for developed world sponsors to trust that money will be put into creating capacity and actually doing research.

Dhai ended her presentation by discussing Lawrence Gostin's recently published framework for creating a transformative agenda for global health justice (Gostin, 2013). The most important aspects of this framework for research are transparency, accountability, and enforcement. "We need active citizen participation to ensure transparency, collaboration, accountability, and

better resource mobilization for socially responsive research in the developing world," said Dhai. "There has got to be increased stakeholder accountability and education initiatives to ensure a well-informed civil society to strengthen political accountability. We cannot confuse political accountability with culture. It is dangerous to do so."

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4

Language

This session was designed to explore two broad questions:

- How does the diversity of languages impact collaborative research?
- How has the globalization of scientific research affected the language(s) used for collaboration?

In a session moderated by **Mary Jordan, Senior Technical Advisor for Public-Private Partnerships in the Office of HIV/AIDS at the U.S. Agency for International Development**, **Derrick Cogburn, Associate Professor in the School of International Service and Executive Director of the Center for Research on Collaboratories and Technology Enhanced Learning Communities (COTELCO)/ Institute on Disability and Public Policy (IDPP) at American University**, spoke about lessons learned from a multi-year, multi-institutional collaborative cyber-learning program. **Scott Montgomery, Affiliate Faculty Member, Henry M. Jackson School of International Studies, University of Washington**, discussed the challenge that language differences present when communicating science.

4.1 UNDERSTANDING THE GLOBAL, REGIONAL, AND NATIONAL DYNAMICS OF INTERDISCIPLINARY RESEARCH

Presenter: Derrick Cogburn, Associate Professor in the School of International Service and Executive Director of COTELCO/IDPP at American University

In 2006, the United Nations General Assembly adopted the Convention on the Rights of Persons with Disabilities (CRPD), an international human rights treaty intended to protect the rights and dignity of persons with disabilities. **Derrick Cogburn** explained that the CRPD represented a global shift in how the world looks at persons with disabilities from a medical model to a social justice, rights-based model. Much of the CRPD's legal framework is based on the U.S. Americans with Disabilities Act, and it spells out provisions for accessibility, education, and participation in public life. Given that Southeast Asia has one of

the highest levels of disability in the world, the 10-nation Association of Southeast Asian Nations (ASEAN) is taking a concerted effort to address the provisions of the CRPD and create an environment where persons with disabilities can have a seat at the table when policy issues related to disability are being discussed. As part of this effort, Cogburn and colleagues have developed a virtual institute on disability and public policy—the Institute on Disability and Public Policy (IDPP)—that aims to train persons with disabilities in Southeast Asia to be able to represent themselves in the policy arena. IDPP was launched in April 2011 with four universities and two outreach partners. Today, IDPP has 14 university partners, two in the United States and 12 from ASEAN countries.

IDPP has four components: a master's degree and continuing education program, an outreach program, capacity building, and collaborative research. The vehicle for each of these components is what Cogburn calls cyber-learning, which grew out of the National Science Foundation's work in creating collaboratories. One of the great challenges in creating this cyber-learning environment is accommodating the diversity of languages, including sign languages, spoken by citizens of the ASEAN countries. Another big challenge has been dealing with the different cultural practices of the member nations, particularly with regard to the agreements that needed to be put in place to bring universities into the IDPP as partners that can adhere to a basic set of principles while also operating in their own cultural context.

With that as background, Cogburn spent the rest of his presentation discussing some of the lessons learned from the experience of creating the IDPP. As he had already mentioned, there were many language-specific issues to resolve, though this was made easier by the fact that ASEAN has adopted English as its working language. So while imposing English as the working language for IDPP might seem to be a case of cultural imperialism, Cogburn said that taking any other approach would have created an immediate impasse. "Luckily, ASEAN adopted this policy of using English as its working language, so that serves as a vehicle for us to support ASEAN by having our instruction in English," said Cogburn. IDPP is still trying to resolve this issue for the deaf community. "American Sign Language is not the *lingua franca* of the global deaf community so this is a challenge for us," he explained.

An important language-specific issue for this project, he noted, is deciding on disability-inclusive language that reflects the sensitivities of the disability community with its multiple cultures. The CRPD addresses this issue by focusing on person-first or person-specific language. "Rather than talking about a blind person, which puts the focus on their disability, you talk about a person who is blind," Cogburn explained. Another language-specific issue he and his colleagues encountered as they were developing the IDPP was silence. "How do you interpret silence?" he asked. "If you send an email and you get no re-

sponse, did they not get it? Did they not like the idea? Or is it that they don't want to tell you 'no'?"

More global issues that IDPP has had to deal with arise from the fact that the ASEAN countries range from wealthy Singapore to poor Laos, and that each country has its own national priorities and strategies and its own cultural constraints. The resulting issues can be as mundane as whether contractors to IDPP will demand payment in cash for services rendered versus working on a contract and coordinating the differing academic year schedules. He noted in closing that an indirect benefit of the fact that so many academic, political and business leaders in Southeast Asia received their academic training in the United States is that many universities in the region are starting to harmonize their academic calendars with the U.S. calendar.

In response to a question from a workshop participant, Cogburn noted that the IDPP system is not the only model for multinational cyber-education. However, this model has allowed students from Vietnam, the Philippines, Singapore, and Cambodia to participate in a virtual degree program and learn from faculty from throughout the region and the rest of the world.

4.2 LANGUAGE CHALLENGES IN COMMUNICATING SCIENCE

Presenter: Scott Montgomery, Affiliate Faculty Member, Henry M. Jackson School of International Studies, University of Washington

Over the past generation, science has undergone a remarkable globalization, said **Scott Montgomery**. Between 1995 and 2009, scientific output by countries outside of the United States and Europe, as measured by science, technology, engineering, and mathematics papers, has risen dramatically (National Science Board, 2012). In particular, output from countries such as Turkey, Iran, Mexico, Argentina, and Brazil has increased more than 50 percent. "These countries are helping science to finally leave a few dozen westernized wealthy countries," said Montgomery. "It really is a new era, one that is very exciting and full of challenges of various types."

One trend that has accompanied the globalization of science is the increasing adoption of English as the *lingua franca* of science, which Montgomery said signals the end of an atypical era in the history of science in which there was no *lingua franca* (see Figure 4-1). From even before 1000 BCE, Aramaic and Babylonian were the *lingua francas* of science. Eventually, Greek took over that role, followed by Sanskrit, Chinese, Arabic, and Latin, and for many of these, their role as a common language of science outlived the civilizations that gave birth to those languages. The dominance of English as the language of science emerged over recent decades with the physical and life sciences, and it is still unclear what form the eventual language landscape will take. "History is our

only piece of evidence so far, but it suggests that English is just beginning its dominance, and it has not completed this at all," said Montgomery.

The rapid geographic expansion of science and growth of international collaborations is contributing to the adoption of English as the *lingua franca* of science. It is important to keep in mind that English language skills occur over a wide range of levels. Montgomery noted that past *lingua franca* transitions, such as the one occurring now, have taken over a century for the relevant language to become a basic skill for scholarly communities. Among the factors that will determine the speed with which this transition occurs will be how English is taught and how teachers are trained in various countries. Another confounding factor is that there is no one form of English spoken across the globe. Linguists point out that in addition to North American English and British English there are South American English, West African English, Caribbean English, East African English, Hong Kong English, Indian English, Indian/Pakistani English and Bangladeshi English. There are also developing forms of English, including Japanese English and Chinese English. "So if you bring people together, they may all speak English but the question is, which one?" said Montgomery.

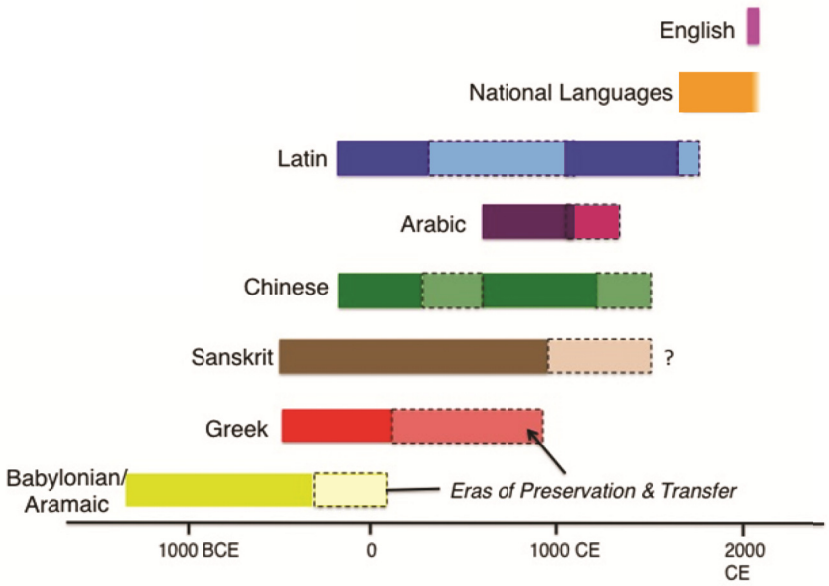

FIGURE 4-1 *Lingua franca* of science throughout history.
SOURCE: Montgomery Slide 5.

The language challenges can be quite substantial, he continued, even in such seemingly mundane areas as honorific titles and dealing with females in male-dominated societies. Although it is natural to presume that anyone who can speak English can also read and write it, linguists have shown that these are three different skills, with writing being the most challenging of all. Not only are reading, speaking, and writing separate skills, but scientific, legal, and economic discourses are very different, with their own vocabularies and pronunciations. Research protocols and intellectual property, for example, may differ among nations in ways that are not always obvious. The result, said Montgomery, is that native English speakers have a responsibility to speak and write clearly, or as Albert Einstein said, "as simple as possible but no simpler."

In his final remarks, Montgomery noted that good work and ideas need to flow from developing countries to the rest of the world but that publication is not always the professional incentive that it is here in the United States. It behooves the scientific community in the U.S. to play a mentoring role in terms of getting research results from their colleagues who come from countries where English is not the native language into the literature. "It is partly our duty to help them achieve a global audience at a time when science is globalizing, to expand their opportunities as well."

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5

Urbanization, Ecological Sustainability, and Social Resilience

This session explored three questions:

- What is urbanization?
- Which principles should be considered when developing a collaborative research environment?
- How does one consider the cultural aspects of cities when conducting research?

Three speakers gave presentations in this session, which was moderated by **John Carfora, Associate Provost for Research Advancement and Compliance at Loyola Marymount University**. **Eric Strauss, President's Professor of Biology and Executive Director of the Center for Urban Resilience at Loyola Marymount University**, discussed the role that healthy cities can play in international research collaborations. **Osman Ahmed, Head of Global Research and Innovation at Siemens Building Technologies Inc.**, described an open innovation platform for sustainable cities that is producing a paradigm shift in international collaboration. **Jurij Paraszczak, Director of IBM Research Industry Solutions and Leader of the Research Smarter Cities Program at IBM**, spoke about the use of analytics as applied to cities to gain information about culture.

5.1 FROM SUSTAINABILITY TO RESILIENCE: REIMAGINING THE ROLE OF THE HEALTHY CITY IN INTERNATIONAL RESEARCH COLLABORATIONS

Presenter: Eric Strauss, President's Professor of Biology and Executive Director of the Center for Urban Resilience at Loyola Marymount University

The field of urban ecology is a rather new one, said **Eric Strauss**. Urban ecology is an emerging and interdisciplinary science that uses the tools of the natural and physical sciences together with those of the social sciences to study

cities and understand resiliency. Cities make up three percent of the world's land mass but are home to about half of the world's population. Urbanization, he noted, is a dominant demographic trend and the most important component of land transformation processes. Urban areas have some of the largest populations of underrepresented people (i.e., race, ethnicity, economic status) and as a result "present an extraordinary opportunity to re-envision how we teach science, how we engage stakeholders, and how we reimagine the boundaries of how we conduct our research," said Strauss.

Urbanization offers many opportunities for studying new phenomena, Strauss explained. For example, urbanization in the United States has brought with it an amazing transformation in terms of what Americans can eat without fear of succumbing to food poisoning. "In developing nations, food poisoning is a serious problem," said Strauss. He added, though, that "we have traded ease and access to cheap, safe food for long-term challenges associated with behavioral diseases related to this kind of food consumption." The easy access to cheap, high-calorie food and the kind of clustering in the way those in the cities live is a new phenomenon for humans, he noted. "In many ways our government systems, our organizations for instruction, and our organizations for engaging stakeholders, are not prepared for these kinds of clusters," Strauss said.

The largest and fastest growing megacities in the world are now in developing nations, and as much as 30 percent of the population in those cities is living in abject poverty. Strauss believes that technology and international outreach can create transformative opportunities for researchers in the sciences and extraordinary opportunities for communities to gain resilience. Historically, ecology with regard to human activity has focused on the idea of sustainability, or stabilizing the currently disruptive relationship between human culture, the earth's most complex ecosystem, and the living world. But given that systems are incredibly dynamic, what is needed—and where urban ecology is starting to focus—is resiliency in the face of those dynamics.

In its early days, urban ecology operated on the principle that cities are an imposition on nature, but today urban ecologists are thinking more about the functional consequences of heterogeneity found in cities. "Cities are much more diverse than we had anticipated, and some of the rules that we thought we would find in cities using a model of imposition do not fit," said Strauss. For example, the number of birds living in cities is higher than the number that live outside of cities, though diversity is higher outside of cities. As another example, urban rivers do not behave the way ecologists predicted based on an imposition model.

Today, there are four guiding principles for urban ecology: (1) cities are open, multi-scale systems with a wide range and size of habitats in a mosaic; (2) they are heterogeneous ecosystem composites that are patchy in terms of

microclimates, hydrology, and economics; (3) cities are complex adaptive systems with biophysical and social legacies as feedback; and (4) cities are functional socio-ecological systems that can be framed in terms of ecosystem services and environmental justice. Taken together, these four principles sensitize the relationship of science to the people that science serves, which Strauss said is a significant change in that it means that science has to show a direct human benefit if the goal is to advocate for the environment. "If you are asking people in the city of Washington, DC to plant 100,000 trees, those are funds that could be used to hire teachers or hire fireman, so you better be able to justify the value of those trees," he said.

Ecologists, said Strauss, have always been measuring biological diversity, and arguably the life sciences are about understanding diversity on different scales. "I would argue that we are framing it differently in the context of urban ecology," he stated. "We are measuring diversity as it relates to the services that we require from healthy urban ecosystems." These ecosystem services, he explained, provide resilience to urban dwellers as stakeholders, where resilient systems are those that are able to absorb shock—in this case global environmental change—and be able to continue in their function. Strauss noted that the National Science Foundation recognized this shift in its 2007 decadal plan for its long-term ecological research stations around the country. This plan calls for all funded projects to bring together the natural and social sciences to better understand resilience. "Ecologists have traditionally studied biotic structure and function," he said. We are gaining a better understanding of the interaction between ecosystems services and human outcomes, and how changes in human behavior can modify our impact on those structures.

He cited a study his group has been conducting on feral cats in Los Angeles. There are some million feral cats in Los Angeles and they are major predators of birds. His group has shown that when coyotes move into an area they kill some, though not many, cats, but the effect is that cats change their behavior. "If you are a cat, a coyote is a terrorist," he said. "You don't often die, but you are afraid all the time." As a result, cats do not hunt as efficiently, bird populations rebound and suppress insect populations, and insecticide use drops. "Ultimately, coyotes are an ecosystem service," said Strauss.

Strauss concluded his remarks by noting that in the United States, urban ecology falls in the domain of the Ecological Society of America, but there is a new organization forming in Europe called the Society for Urban Ecology. Its mission is to foster and develop new knowledge of urban ecology worldwide and it is doing this by strengthening contacts and dialogues among the wider international community.

5.2 AN OPEN INNOVATION PLATFORM FOR SUSTAINABLE CITIES

Presenter: Osman Ahmed, Head of Global Research and Innovation at Siemens Building Technologies Inc.

There are four elements to a sustainable city, **Osman Ahmed** explained to the workshop participants: recycle everything, reduce consumption, increase efficiency, and learn from nature. The key to creating those four elements is making sure that the necessary investments are affordable. He laid out the principles of the open innovation model that Siemens uses. An open innovation model has no boundaries for research and development, which means that intellectual property can be licensed in from, or out to, any entity—an individual, a company, a university—as a means of establishing an innovation-accelerating environment. An open innovation model uses collaborative funding and it changes the commercialization paradigm from research and develop to connect and develop. It is a model that can span the globe and that creates a good environment for collaboration.

As an example, Ahmed discussed a Siemens project with the government of Abu Dhabi in the United Arab Emirates. This ongoing project, which also involves the government-owned Masdar Institute, is creating a living laboratory that uses an entire city, known as Masdar City, to implement and test ideas, developed elsewhere, linked to the living laboratory. The goal of this project is to accelerate the commercialization of intellectual property related to power grid technology in a way that benefits the government, academia, and Siemens and that ends with development of a carbon-neutral city of 50,000 people. He noted that economic pressure and the local political climate have slowed this project considerably.

Given the scope of this project, it should come as no surprise that the focus of the strategic partnership was multifaceted and involved a large number of stakeholders. Focusing on one aspect of the project, developing new building technologies, Ahmed explained that there are four primary stakeholders. Siemens Building Technologies, together with its partners, provides investment, technology and resources, and commercializes innovative products. Masdar Institute and its partners conduct research and test prototypes, and by doing so, the institute becomes a premier research institute for green building technologies. Masdar City and its partners invest in the technology infrastructure and act as the innovation hub. If this approach works, Abu Dhabi shifts its economy from one based on construction to one based on innovation.

Ahmed noted that one of the lessons that he has learned from this and smaller projects he has been involved with in China, Europe, and North America is that technology partners need to drop the attitude of “my way or the

highway" and "not invented here" in order to make an innovative collaborative model work. Intellectual property issues can be contentious, he added, given the different conventions that exist in the world. European companies assume that if they fund research, the intellectual property belongs to them, while that is not the assumption in the United States. It is also important to fully understand the governance structures and transparency of those structures for partner governments.

"From the very beginning you have to understand that this is a partnership, like a marriage," said Ahmed. "If you don't focus on the partnership, it won't succeed." For the Masdar project, the partners broke the project into definable sections, or quadrants, and each partner identified five places in each quadrant that it could compromise and five things that it expected from its partners. That exercise served as the beginning of the discussion that enabled the project to move forward.

Besides compromise, this type of project requires continued commitment from the leadership of all the stakeholders. "Continuity of that commitment is perhaps more important than the commitment itself," said Ahmed, particularly since leadership is bound to change over the course of such a long project. In closing, he noted the importance of keeping a long-term perspective when engaging in a collaborative innovation model. "If you want to have something quick, if you need to have a quick return on investment, then that will be an impediment to developing this whole collaborative innovation model."

5.3 CULTURE THROUGH THE NUMBERS: ANALYTICS APPLIED TO CITIES

Presenter: Jurij Paraszczak, Director of IBM Research Industry Solutions and Leader of the Research Smarter Cities Program at IBM

Cities waste an enormous amount of resources, in large part because they lack an organizational structure that lets them see across the entire city, said **Jurij Paraszczak**. They lack the ability to examine the data they collect from many sources, find patterns in the data, and then use those patterns to make predictions that can enable them to operate more efficiently. He noted that in his work, he and his colleagues have yet to consider the cultural aspects of cities because there are so many easier problems to solve right now that they have not yet been able to tackle these more difficult issues and how they relate to efficiency.

One important component of a city is its infrastructure. The objective in terms of efficiency is to find, predict, replace and repair this infrastructure with maximum yield, and to deliver infrastructure-related services—electricity, water, and transportation, for example—with maximum efficiency. Doing so re-

quires managing supply so that it optimally matches demand, and that requires understanding what the city's residents want and how they want it delivered.

In the past, cities and their consultants would look at individual problems and attempt to solve them one at a time, but today the approach is to see how these problems interact and use analytics and predictive models to develop a more integrated view of a city. One surprising lesson that Paraszczak and his colleagues have learned is that while cities have numerous problems to solve, the issue that city officials pick as their worst problem is not being able to communicate with their residents.

As an example of the type of information that analytics can provide, Paraszczak briefly discussed a project his team worked on in Minneapolis. To start, they conducted some 150 interviews with city employees in numerous agencies and learned that the best predictor of future events in the city are permits, whether they are for building, construction, liquor licenses, events, or other activities. Unfortunately, employees in one agency were unaware of permits being issued by their colleagues in other agencies, and the result was often confusion and inefficiency. For example, one agency might issue a permit for a festival while another agency could issue a permit for construction that would impact traffic trying to reach that festival. Mapping these different permits, using software that IBM now sells, can allow cities to better coordinate and plan activities and enable them to make decisions that increase efficiency.

During the ensuing discussion, Strauss noted that large-scale analytics can reveal patterns that are very small-scale, impacting specific neighborhoods or communities within a city. These very local issues can then be dealt with more efficiently using targeted educational programs. "You can use large-scale data but create interventions to work at the neighborhood scale," said Strauss.

6

Intellectual Property

Intellectual property can be among the most contentious issues that must be addressed when putting together an international collaboration, but it is one that nonetheless must be solved for such collaborations to move forward with the necessary trust between collaborators. This session explores several important questions regarding intellectual property, including:

- How does trade policy influence intellectual property rights globally?
- What are the different types of intellectual property and how is each type protected?
- How do differing cultural attitudes toward ownership of ideas and intellectual property affect cross-cultural partnerships?
- How is intellectual property protected in a researcher's home country, and how do different enforcement mechanisms influence collaboration?

Three speakers addressed these questions in a session moderated by **James Casey, Interim Director of Pre-Award Services at the University of North Carolina at Chapel Hill**. **Julissa Reynoso, U.S. Ambassador to the Oriental Republic of Uruguay**, discussed the challenges of developing intellectual property rights protections that meet international standards. **Robert Stoll, Partner at Drinker Biddle & Reath LLP**, spoke about intellectual property developments around the world and **Daniel Satinsky, Vice President for Business Development at Foresight Science & Technology**, described the effect of culture on the actual practice of intellectual property law and participation in the marketplace.

6.1 PROTECTING INTELLECTUAL PROPERTY

Presenter: Julissa Reynoso, U.S. Ambassador to the Oriental Republic of Uruguay

As the global economy becomes more inclusive, interconnected, and interdependent, entities of all types, ranging from individuals to companies to nation-

al governments, will become increasingly reliant for their prosperity and effectiveness on the intellectual property that they create, said **Julissa Reynoso**. "Intellectual property is as never before the engine of economic prosperity, making the subsequent protection of that property via international negotiated standards and enforcement more important than ever," said Ambassador Reynoso.

For decades, the United States has played a key role in the development of these rules and regulations and still considers the protection of intellectual property to be a top priority in its international relations with other governments, said Ambassador Reynoso. In the post-World War II era, the regulation and enforcement of international intellectual property rights was tasked to an agency within the United Nations known as the World Intellectual Property Organization (WIPO). Despite WIPO's establishment in 1967, decades would pass until Congress decided to make intellectual property rights a focus of U.S. foreign policy.

In 1988, the Office of the U.S. Trade Representative was officially granted the responsibility of identifying countries that did not offer fair and equitable market access to the U.S. Weak or nonexistent regulations on intellectual property rights in foreign nations would be considered barriers to trade in the eyes of U.S. agencies, with those governments subject to penalties and U.S. sanctions. The U.S. Trade Representative has since been required to publish an annual report categorizing all countries in the world based on the effectiveness of their intellectual property rights regulation and enforcement, known as the "Special 301 Report."

Uruguay, noted Ambassador Reynoso, has played an important role in the global development of intellectual property rights. Among the principal accords reached during the so-called Uruguay Round of negotiations that led to the creation of the World Trade Organization (WTO) was an agreement on trade-related aspects of intellectual property rights (TRIPS). This agreement was the first successful introduction of enforceable intellectual property rights law in the international system.

Perhaps because of its modern infrastructure, busy ports, educated population, strong democracy, relative lack of corruption, and large middle class, Uruguay is considered an excellent destination for international and U.S. business investment. Immediately following World War II, the United States made a concerted effort to strengthen its relationship with Uruguay by signing multiple treaties related to security cooperation and scientific partnerships. "Over the latter half of the 20th century, Uruguay remained a strategic ally of the United States as well as strong contributor to the international community in many aspects," said Ambassador Reynoso.

However, when the TRIPS agreement was enacted, Uruguay was among the countries considered to have the most notable deficiencies in the spheres of intellectual property rights protection and regulation. During a 5-year grace

period established by the WTO to allow developing nations to conform to the TRIPS requirements, the Uruguayan government worked diligently to pass legislation to govern trademarks and patents. Despite some progress from 1998 to 1999, Uruguay was placed on the so-called Watch List that the U.S. Trade Representative developed in 1999 as a result of continuing noncompliance with TRIPS requirements and governing trade law among other issues. Uruguay was downgraded further to a Priority Watch List, an even harsher category, in 2001 and 2002 as necessary implementing legislation continued to be delayed in the Uruguayan Congress. At around the same time, Uruguay also confronted a serious economic crisis that affected most of South America, when neighboring Argentina defaulted on its international debt obligations and collapsed into a severe financial crisis.

Prompted by this economic crisis, Uruguay moved to diversify its trade and investment partners beyond its neighbors and worked hard to integrate itself more fully into the new international trade system. As a result, the country finally passed the necessary legislation to overhaul its outdated laws regarding intellectual property rights. With a modern intellectual property rights framework in place, the American scientific community began lobbying U.S. authorities to open discussions aimed at easing collaborations between the two nations. By 2006, Uruguay was removed from the Watch List—one of the few countries in Latin America to ever do so—and in 2008 the U.S./Uruguay Science and Technology Agreement was signed, completing a 5-year run of diplomatic breakthroughs that produced a bilateral investment treaty and a trade investment framework agreement.

As a result of these and subsequent agreements, Uruguay has engaged in numerous collaborations with U.S. research institutions and government science agencies that Reynoso characterized as producing landmark achievements in cooperation with the Uruguayan education and research communities. These collaborations have strengthened Uruguay's innovation capacities and promoted research advances across a wide array of areas. All of these developments, said Ambassador Reynoso, were made possible by Uruguay's decision to comply with international standards that not only protect other nations' intellectual property rights but its rights, too.

Protection of intellectual property rights will remain a key to sustaining global economic integration and prosperity, said Ambassador Reynoso. Today, however, U.S. companies lose billions of dollars annually because of theft of intellectual property rights, and networks engaging in the trade of pirated goods have never been more profitable. In addition, the rise of the Internet as an engine of economic growth is bringing with it a new set of challenges related to the protection of intellectual property rights that are just now being studied and addressed. "The WTO has a new challenge, which is how to keep up with the evolving world in which we live," said Ambassador Reynoso. The WTO is

engaging in this and other issues, such as the right of developing nations to produce generic versions of life-saving drugs, to ensure that proper protections exist that provide a balance between development of new technologies and protections for private owners and private entities that have a stake in these new technologies and new sciences.

Ambassador Reynoso noted in response to a question that, while Uruguay does not have a significant indigenous population, other countries in South America do. It is important, she said, to ensure that the cultural norms of these populations and the rules that they feel are important in their communities are adequately supported, respected, and protected while at the same time ensuring that these populations understand that the basic rules of intellectual property rights also have to be enforced for the entire country to be in compliance with international standards. "That has been the balance that a lot of these countries have to deal with in Latin America," she said.

6.2 INTELLECTUAL PROPERTY DEVELOPMENT ACROSS THE GLOBE

Presenter: Robert Stoll, Partner at Drinker Biddle & Reath LLP

For **Robert Stoll**, a former Commissioner of the U.S. Patent and Trademark Office and U.S. representative to WIPO, cultural issues have played a critical role in every treaty he has negotiated and every bilateral agreement he has helped develop. Cultural tension is problematic, he said, because people from different cultures are not listening to one another. One problem he sees frequently in his current role advising universities and companies on matters of intellectual property rights is the culture of publication that dominates U.S. universities. In most countries in the world, patent rights are lost once a discovery is revealed in any public forum, such as a publication or a lecture. This issue can be particularly relevant in international collaborations where some collaborators may be more aware than others of patent issues, particularly because there are many forms of intellectual property about which most researchers know very little.

Briefly, Stoll explained how patents, trademarks, and copyrights differ. Patents are the reduction to practice of a concept. Trademarks represent the source of a good, and they can range from a name to a design feature. Copyrights represent an expression—they do not protect an underlying issue, but merely the expression of that issue. He also noted that when it comes to negotiating agreements related to any of these forms of intellectual property, trust between potential partners is critical. It is also essential when it comes to negotiating agreements between countries to find ways to ensure that both sides benefit from an agreement and that neither side feels inferior. Stoll found that a key to establishing trust and equal footing was to convince his negotiating

counterparts that their country needs to protect its intellectual property just as much as the United States does and that entrepreneurial money goes to those countries that protect their intellectual property.

Protecting traditional knowledge and local biodiversity are complex problems that have risen to prominence in intellectual property circles, said Stoll. He believes that there need to be mechanisms in place to compensate countries for traditional knowledge that becomes useful on a broader scale or when an indigenous plant or animal yields genetic information that leads to the discovery of a new drug. These are complicated matters, but Stoll believes that it is critical for the United States to take a leading role in discussing these issues.

Culture is also important on the U.S. side of negotiations, Stoll noted. Contrary to popular belief, American pharmaceutical companies are not against letting developing nations produce generic versions of life saving drugs for their citizens. Their key concern is that these drugs are not reaching their intended users but instead find their way into the so-called gray market, in which generic drugs produced for use in developing nations end up being sold in the United States. Stoll concluded his remarks by noting that the best way for U.S. universities and companies to realize all of the benefits of their intellectual property is to use their abilities to help their collaborators grow their own understanding and capabilities.

Stoll noted in the ensuing discussion that WIPO is a good source for models, templates, and recommended practices that can be used to structure agreements concerning intellectual property rights. Not only are these models based on successful examples of collaboration, but they have the imprimatur of being agreed to by all of WIPO's member states.

6.3 CULTURE AND PERSONALITY IN GLOBAL BUSINESS

Presenter: Daniel Satinsky, Vice President for Business Development at Foresight Science & Technology

While the formal regulation of intellectual property rights is well-established in international law, culture colors the actual practice of intellectual property law and participation in the marketplace, said **Daniel Satinsky**. As an example, he discussed his experiences working with individual scientists and institutions in Russia. Until recently, he said, there was no way to determine who owned the intellectual property that was developed in Russian universities. Russia has since passed the equivalent of the U.S. Bayh-Dole Act[1] and, as a

[1]The Bayh-Dole Act, also known as the Patent and Trademark Law Amendments Act, gives universities, not-for-profits, and small businesses the rights to intellectual property generated using federal funding (in most cases). This Act was intended to increase the commercialization of inventions resulting from federally funded research.

result, it is now possible to sort out that question with some due diligence; but it remains an important issue to address when contemplating collaboration with a Russian scientist or institution.

From a historical perspective, the older generation of Russian scientists has the attitude that the use of science for practical matters is beneath them—those who disagreed with this outlook largely fled the country for the United States. Today, Satinsky explained, there is a new generation of scientists who are trying to sort out this issue for themselves, both in terms of legislation and how they relate to an international market for their research. Historical experience also leads to suspicion on the part of Russian researchers that the United States wants to collaborate in order to steal Russia's science. Edward Snowden's 2013 revelations about the National Security Agency's information collection practices have increased the level of suspicion and mistrust toward American researchers.

On the other hand, Russian researchers do trust the intellectual property rights systems of other countries more than that of their own country. Satinsky said that many Russian scientists have told him that they keep their best work to themselves out of fear that someone will steal it despite getting patent protection. "There is not a level of trust of the internal patent system, so the best partner is a foreign partner because the foreign partner will obey the law," he explained. In that respect, Satinsky agreed with Stoll that it is in everyone's best interest that collaborating nations see the value in enforcing their intellectual property laws. He noted that one of his company's clients, a Russian software outsourcing firm, was trying to work with Western clients and despite impeccable qualifications was not having much success. The problem was that Western companies feared that their software would be stolen in Russia. In this case, the company had to demonstrate that while formal protection of intellectual property might be lax in Russia, its internal culture would enforce an informal protection of intellectual property. The company recognized that even one instance of software being stolen would be enough to put them out of business due to a lack of trust. Satinsky explained that the value an organization places on the protection of intellectual property directly correlates to the informal protection of intellectual property that said organization will provide. In some instances, the informal protection of intellectual property provides the necessary level of trust that the formal, legal protections do not provide.

One challenge to developing international collaborations that Satinsky has experienced arises from differing perceptions of value. It is important, he said, to establish an objective value for any technology and for all parties to the agreement to truly understand all of the parameters that go into determining value. "It is important to understand where a technology fits in a chain of value that the technology is creating," said Satinsky. The value of a piece of technology increases as it becomes more developed and ready for market. The amount

of work necessary to transition a technology from the laboratory to the market is often overlooked when a scientist estimates the value of a piece of technology. Understanding about how value changes as a technology gets closer to market is growing among scientists outside of the United States, but the difference between perceived and actual value continues to be a challenge, given that value depends on culture as much as economics. Because international technology markets are not fully developed yet, it can be difficult, for example, to understand what royalty rates are appropriate for a given technology. Again, trust is an important factor when negotiating such details. "Everybody's interests have to be represented," Satinsky said in closing his remarks.

7

Change and Drivers

In the workshop's final plenary session moderated by **Lida Anestidou, Senior Program Officer at the National Academies, Robert Bertram, Director of the Office of Agricultural Research Policy in Technology at the U.S. Agency for International Development**, addressed the following questions:

- What is an example of an area where international research collaborations are changing?
- Which cultural issues have been reasonably well addressed?
- Which aspects of culture require additional attention?
- What motivates people to get together to do research?

7.1 CULTURE IN DEVELOPMENT RESEARCH

Presenter: Robert Bertram, Director of the Office of Agricultural Research Policy in Technology at the U.S. Agency for International Development

A major challenge facing the world is to feed the almost one billion people who suffer from chronic hunger and to do so in the face of a rising global population that is expected to reach nine billion by 2050. To meet this demand, food production will have to increase by 70 percent. President Obama's Feed the Future Initiative aims to foster the developments that are needed to enable that large of an increase in food production, particularly in the developing world. This initiative, explained **Robert Bertram** is led by the U.S. Agency for International Development (USAID) and it involves the State Department, the U.S. Department of Agriculture, the Millennium Challenge Corporation, and other U.S. agencies, but he noted that while USAID is the lead U.S. agency, the initiative is in fact country-led. "We focus very much on country ownership, which means if our partner countries don't think it's worth investing in, we probably shouldn't think it is worth investing in either."

While characterizing this country-led focus as an important advance in international development aid, Bertram acknowledged that it comes with its own set of challenges, many of which are cultural and communications related. "There are plenty of countries that are committed to food security improvements that are not very committed to talking to their civil societies or their private sector, for example," he explained. USAID's approach is to develop technologies and policies that reflect those country priorities, but to also engage civil society and the private sector in as nonthreatening a way as possible. This approach received a major boost when President Obama hosted leaders from Africa and the G8 at Camp David in 2012 and convinced them to institutionalize the policy changes that governments could make to unleash private investment in African agriculture.

Feed the Future, Bertram explained, takes what USAID calls a value chain approach centered around farmers and households. In this model, the farmer is both a consumer of research and supplies and a producer that sends crops, livestock, and forage into the market. This approach also acknowledges that small landholders will continue to play an important if not dominant role in agriculture in Africa and Asia for the foreseeable future. "Our focus is to empower the small holders," said Bertram. He added that this value chain forces researchers to understand some of the social and cultural factors that come into play when trying to get new technology adopted and to include research on post-harvest and market factors when planning a project for a specific country or region.

Considering all of these factors when creating a research initiative can lead to some innovative ways of working with communities to improve what they already know how to do, noted Bertram. In Mali, for example, researchers showed communities that if they put metal roofs on their already existing grain storage bins and used a tarp to keep the grain clean, they could double the value of that grain in the market just by keeping it dry and free from pests.

Regarding culture, it is important to understand the difference between farm practices that are passed on from generation to generation as part of a local culture and those that are passed along because they make agronomic or economic sense. Years ago, Bertram said, when Americans went overseas to help develop agriculture, they would find people who were intercropping corns and beans and bananas and other crops. The conclusion was that this was just an outmoded practice that was a hold-over of what anthropologists would call cultural practices, i.e., people did it just because their grandparents did it. It turns out, though, that this kind of intercropping in many environments can actually lead to both better management and higher productivity of the land. "We had this period where we were coming to grips with a system that is a different paradigm than our own," said Bertram. "Our technical advisors now accept the fact that things such as intercropping are relevant."

This type of mind shift is important, said Bertram, because it enables the application of technology to the farming practices of the small holder to increase production today, while the next generation of technologies and farming practices are developed and introduced to produce the bigger increases in food production that will be needed to double global food production over the next three to four decades. What will be needed is what Bertram called sustainable intensification, approaches that reflect local knowledge and practices while improving efficiency through technological advances that fit into local production systems and feed into local markets. The way he envisions this happening is that researchers will develop a large number of new technologies that will be tested in various communities. The most promising interventions will stabilize into a dominant innovation design that then interacts with the local cultures and markets to produce the kind of larger changes that will meet future food demands.

Conservation and environmental preservation also work into this model, and what is needed here is a fine-grained anthropological and ethnographic analysis to understand factors such as patronage networks, power and authority relationships, the ways in which market systems are linked to governance, and the whole issue of tenure, access to, and ownership of land and resources. "By and large, we think of land as a private good, but in most cases in the developing world the issue isn't about ownership as it is about access to the land and tenure," said Bertram. "When tenure is addressed, really great things can happen." Tenure in this context refers to the rights associated with the trees and their products (Fortman, 1985). In many cases tree tenure is distinct from land rights and/or land ownership.

As an example, Bertram noted that in Niger, Senegal, Mali, and Burkina Faso, a change in tree tenure that moved away from the colonial system to one that recognized local authority over trees triggered a massive replanting of trees that transformed over six million acres of land that had been decimated by drought in the 1980s. Livestock and crop production have risen markedly in this region, as has biomass production, carbon sequestration, and biodiversity. "There were some improved technologies at work here, too, but it all traces back to the change in culture going back to tree tenure," said Bertram. One unexpected result of this positive change was that as the land's fertility returned, men tried to take the land back from women. "There was work through the existing authority structures in the villages to protect women's assets and their rights to that land," he added.

Gender is an important cultural issue that cuts across USAID's programs, and one of the most important factors for success has been to improve the role of women as economic actors and leaders in communities. Women play such an important role in these programs that USAID has developed a Women's Empowerment in Agriculture Index that looks at household decision making; ac-

cess to capital, credit, and land; having an adequate income to feed the family; access to leadership roles in the community; and the division of labor time between men and women. Bertram said that when scores on this index increase, productivity increases. "We know that in some cases, women are actually better recipients of agricultural information. They are more likely to follow practices and more likely to follow through and get better results," he explained.

USAID also believes that women need to play a more prominent role in research as well as in the field and it has several programs aimed at getting women, as well as men, into U.S. research laboratories. Bertram believes this is one of the most important investments that the agency has made because these individuals go back to their home countries and become leaders. They also learn about the culture of research in the United States, which is much more democratic and less hierarchical than in most parts of the world, and then take those cultural lessons back to their home institutions.

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8

Breakout Session Reports and Concluding Remarks

Twice during the workshop, the participants were divided into four breakout groups, with each group assigned to one of the four tracks that focus on research and agreements affecting the areas listed below. Each group was assigned a rapporteur, also listed below, who moderated the discussion and summarized the group's comments:

1. People/Human Subjects – **Barbara Mittleman, Vice President for Immunology at Nodality Inc.**
2. Environment and Natural Resources – **John Carfora, Associate Provost for Research Advancement and Compliance at Loyola Marymount University**
3. Science, Engineering, and Manufacturing – **Richard Selby, Director of Engineering at Northrop Grumman Aerospace Systems**
4. Agriculture and Animal Issues – **John Hickman, Director of Global University Relations at John Deere**

The task for the participants involved in each track was to examine the domain under discussion and the role that culture and cultural expectations may have in the forging and implementation of international research agreements. To structure the discussions, the working groups were given a set of questions (see Appendix B). Prior to the final two plenary sessions, the rapporteur from each of the four breakout groups each presented a 10-minute synopsis of the results of those examinations. This section also includes the concluding remarks which were presented at the end of the workshop.

8.1 PEOPLE/HUMAN SUBJECTS TRACK

Barbara Mittleman reported that the working group examining the people/human subjects track had a far-reaching discussion thanks to the wide range of expertise in the group, including two social scientists who had the vocabulary and theoretical background about culture to provide a good framework for these discussions. The group talked about the fact that any collaboration will comprise one or several cultures in a manner that is highly context-dependent and fluid.

Two definitions of culture—that it is the manmade part of the environment and that it is software for the mind—provided a valuable starting point for discussion. Software, as opposed to hardware, has a particular function that can be reprogrammed, she noted, while the manmade part of the environment encompasses many stable and inflexible structures that are neither agile nor adaptable, even when responsiveness is required. This working group also commented on the relationship of culture to education and media, emphasizing that culture is not a fixed attribute and can change or evolve with education and media exposure. This evolution can lead to the development of multiple cultural registers that can be accessed and used. The multiplicity of cultures and cultural registers can enable individuals to bridge constituencies and to pivot from one to another. Several working group members noted that the bridging function is critical to facilitating understanding across cultural boundaries and enables negotiation and agreement in determining the initial goals, objectives, and structure of the research plan. Bridging cultures is also necessary for conflict resolution and communication throughout the execution of the research plan. Because this function is indispensable, those who fill the bridging role can be called "indispensables."

The working group talked about process being important and the fact that a process often begins much earlier than is usually appreciated. It is important to involve the right people—again, the "indispensables." The group also considered that identifying the "indispensables" could be an iterative process that repeatedly checks to make sure that the right people for each phase of the project are involved in a collaborative research project. That collection of right people should include those who represent both implicit and explicit knowledge of the culture and the actors involved.

The working group also discussed issues of cultural mistrust and cultural imperialism, and a constant theme throughout both breakout sessions was the need to listen and to be open to identifying differences and similarities. The discussion identified many different ways to do that, all based on an attitude of respect and openness in order to reach agreement. These accords are more than just agreements, however, several group members said; they are representations of the values of the cultures involved and of the value of the agreements to those cultures. If the parties to an agreement are not getting value out of the agreement it is not going to be worthwhile. Mittleman said that many in the group felt that there is a need to articulate the risks and benefits to the parties and recognize that to at least some extent the rewards, motivations and value systems were going to be highly culturally determined. The "indispensables" are important here as well; they help to frame the articulation of the risks and benefits so that they are understood by all sides involved in the agreement. This issue goes beyond language translation to an issue of sufficient trust that disagreement or misunderstanding can be communicated with sensi-

tivity, with the relevant parties insuring that agreement is reached and maintained, that face is not lost, and that all parties benefit. Communicating the behavioral and attitudinal aspects of the agreement and execution of it are far more difficult, since the underpinnings of business and academic/clinical ethics, interpersonal relations, expressions of respect and regard, management of conflict, and notions of the roles of age, gender, race and class are all highly culturally determined. The "indispensables" would be responsible for the communication of these more subtle messages as well.

Several group members noted that most collaborative research agreements are simply the usual kind of formal or legalistic definition of what needs to be represented when two parties agree with one another. However, there will likely need to be additional language that would represent some of the differences between the cultures as a means of sustaining a strong relationship between the collaborators. Mittleman said that the working group kept coming back to the word "relationship" in that these kinds of cross-cultural issues were going to be highly relationship-based. The memorialization of that relationship in agreements is important, but the relationship was more important than the document itself. It is also important to pay attention to the formal standards, whether international, regional or national, but also cultural norms that might be more informal or unstated and as a result might be harder to identify.

The "right people" to negotiate research agreements would include authority figures as well as elders, community leaders, and others who have the moral authority or voice that is respected by the community, group members said. There is also a recognized role for champions who will push forward the acceptance of a research agreement. It is important, Mittleman said, to conduct a continuous process of self-examination to ensure that the right people stay involved over the course of a project, as well as built-in redundancy to enable sustainability and durability of the agreement, even with the inevitable change in the individuals that will be involved in the initial stages of an agreement.

The working group's discussions raised the point that notions of science management, leadership, and administration are not necessarily going to be clear to everyone and that there may be a need to address this issue so that the latter stages of an agreement are able to proceed. Several participants emphasized the need for a mechanism that can adequately monitor an agreement and oversee its activities, and to ensure that the outcomes from the agreement are in fact as they ought to be. The working group also discussed the use of available tools for cultural diagnosis in organizational management, to identify things that could facilitate or enable the making of agreements. Not only are tools for cultural diagnosis lacking, but where they do exist, they may not be familiar to those working in fields other than anthropology or international relations. In addition, culturally informed metrics of success are also generally

unavailable. As such, it can be hard to know if culture is being adequately considered in international research agreements, their outcomes, or their end products.

The working group discussion pointed out the importance of defining the negotiable and non-negotiable parameters that could undermine an agreement, an exercise that has a big element of truth-telling. Several members noted, though, that developing a candid relationship and candid communication processes was not necessarily going to be easy and that even asking if someone was the "right person" for a particular agreement could in fact be insulting and scuttle the agreement before it could even be formulated. This echoed earlier discussion about the need for: trust, a strong set of relationships, champions for whom the success of the research activity is important, and the "indispensables" who can bridge the cultural divide, leading to the development of a strong document and a likelihood of success.

One point of discussion was the need to share benefits of a collaboration, particularly when there are significant power inequities. This includes identifying what the benefits of the agreement are, who is going to get them, and how they will be distributed equitably. It was noted that equitable does not necessarily mean equal, but something that would be useful to all of the parties. Some of the potential benefits that are important to consider are capacity building and publication. There was discussion, too, of the need to return biological specimens to their donors in some cultures so that the samples could be buried with them at death—this is not something that the head of a typical biospecimen-based project in the developed world would consider being an issue.

Finally, the group talked about the need for culturally appropriate ceremonies or public acknowledgment of engagement and the multiple kinds of values that they can have. International research agreements have the potential to yield a variety of benefits to the individuals and the societies represented in them, and by taking culture sensitively into account, greater success and benefit can be realized.

8.2 ENVIRONMENT AND NATURAL RESOURCES TRACK

John Carfora reported that this working group started its discussions by noting that there are many environmental factors that transcend national and international borders, and scientists need to consider a larger context when putting their work together—one that goes above and beyond the science. There are different ways of relating to nature across countries and within countries. Factors such as geographic scale, temporal dimensions (e.g., short-term vs. long-term considerations), gender, views on the role of people in the envi-

ronment, and others can play an important role in how partnerships are formed and proceed.

Several working group members emphasized the need to recognize the type of knowledge that indigenous peoples can bring to a project. Indigenous cultures can have information, experience, and insight that they have collected over generations. The group discussed the need for cultural sensitivity when training students, recognizing the importance of education and the fact that "students" may include the indigenous people with whom researchers will live and work when doing in-country studies. Given the role that culture plays in how humans interact with and are affected by their environment, it is important to involve social scientists in these collaborations.

Some time was spent discussing agreements themselves. Often, research agreements are quasi-legal in many ways in that they have budgets, timelines, deliverables, and statements of work. They do not often incorporate cross-cultural or even community-based questions, with those being left up to the principal investigators to manage. This group considered whether research agreements themselves could or should address more of the cultural dimensions.

Trust was a topic of long discussion, as was the importance of including metrics for attaining success in a way that reflects the sensitivities of all of the involved parties. While they agreed that cultural competence is needed, it was difficult for working group members to identify efficient methods of training for cultural competence. It can take a lifetime to develop a cultural competence that includes knowing the questions to ask, the ways of entering and exiting a culture, and how to bring research into a culture.

Carfora noted in his summary that this group spent time talking about the challenge of incorporating relevant perspectives and knowledge from the humanities into the training of scientists and engineers so that they are better prepared for international collaborations. While there is a need for a highly technical education for students, the standard academic calendar leaves little time for the necessary acculturation to take place in a formal educational setting. However, university students spend much of their time outside of class, and informal networks of cultural engagement can be very useful.

The working group spent some time talking about cultural competence. Several members observed that one of the first steps to developing cultural competence is for each individual to first recognize his or her own culture. Americans bring their culture to the partnership, in that they tend to focus on outcomes, focus on similarities, and can be preachy. In the United States, for instance, being a scientist is a specific culture filled with people who are rational and who understand scientific concepts and numeracy. However, there are other Americans who do not share those values and essentially form a different culture. Another way that culture plays out is that American scientists look at

success in terms of accomplishments, but in many cultures success is measured by the relationships that form over the course of a negotiation or a project.

In the broad domain of environment and natural resources, many group members commented that peoples' relationship with the land, water, and animals can be highly variable, even within a country. It is important then to understand how various groups of people relate to the environment and natural resources as individuals and collective groups and how those relationships have changed over time.

8.3 SCIENCE, ENGINEERING, AND MANUFACTURING TRACK

Richard Selby, Director of Engineering at Northrop Grumman Aerospace Systems, reported that this working group identified aspects of research agreements to explore in six different categories: leadership and governance, risk, human rights and gender, funding, outcomes, and levels of protection for intellectual property and export controls. For each of these categories, the group developed a list of questions that could be asked to spur the right kind of thinking in order to form better international research agreements. Selby presented a few examples of those questions for each category.

In the case of leadership and governance, questions included:

- To what extent have you formulated the overall common goals and interests?
- What does every partner want and how can you be sensitive to those stakeholder roles?
- To what extent are the stakeholders committed to the research agreement? For example, are they going to put staff onsite in the country? It is a significant financial commitment?
- To what extent have safety and liability issues been considered if students are going to be working "in country"?
- How have you structured a leadership and decision making approach that takes into consideration the sensitivities of the different cultures? For example, who is in control? Is there a steering committee? Is there a rotational approach?
- Will communication be in person or electronic?
- If there are in-person meetings, do they rotate among the different sites?

Regarding risk, the working group discussed the complexity of international research agreements and the merits of using a traditional risk manage-

ment approach. Addressing risk in this manner involves asking questions about the kinds of risks and to what extent an agreement defines risk mitigation strategies to anticipate the things that could go wrong and what preventive measures will be taken.

Risk also involves the concept of risk versus reward, and determining that involves asking each stakeholder what they want from an agreement and determining how that information is taken into consideration and balanced with regard to the potential upside of the rewards. For example, some group members identified falsification of data as a major risk, in which case it would be necessary to address ahead of time the steps that would be taken to prevent this in a way that strengthens trust between the partners. Other countries may be more comfortable with a detailed, written approach to risk management plans. In either case, it is important to understand the overall tolerance for risk in partner countries and what success means in that culture.

Dealing with risk means having to put in place mitigation strategies and clarifying the assumptions being made by each partner. Conflicts of interest can also create risk, several participants said, particularly when working with smaller countries in which there can be many layers of relationships that compromise independence. Understanding those relationships ahead of time can help mitigate risk. Dispute resolution mechanisms are an important part of risk mitigation and it is important to ask questions about mediation, jurisdictions, and how to wind down a project if a dispute cannot be resolved successfully.

The third category, human rights, is particularly important in the manufacturing sphere as this has become a broad concern throughout the world. Many group members said it is important to ask to what extent the partners have considered the human rights of the people involved, whether they are the direct parties of the research agreement or other people that could be affected. There can also be gender-specific barriers in different countries that need to be considered, so it is important to ask how partners are going to be sensitive to that concern to ensure the success of all parties involved.

Funding is a crucial issue in any agreement and it is important to ask questions about the hierarchy of money, wherever the resources are coming from. If money is coming from several sources, some members asked, how is that going to be administered and how will decisions be made? How will the money flow? It is important to ask whether people are investing their own money above and beyond the pool of resources and if there are other direct investments being made in the same project. Since most funding organizations have rules that specify how their funds are used, it is important to understand how those rules are factored into the broader scope of the overall research agreement.

Questions about the infrastructure that exists to manage the money were also identified. Selby explained that if a partner has operations in various

locations around the world, they might have local or regional mechanisms to administer funds specific to the project at hand and ensure that they are used for the intent of the research agreement.

In terms of outcomes, several working group members noted that it is important to determine at the start of a project just what the outcomes or deliverables will be, that is, if they will include publications, data, prototypes, models, and patents. How to attribute credit is a key issue relating to outcomes, particularly when large groups are involved in a project. If there is going to be a whole series of publications, it is important to define in advance how attribution will occur across the sum total of the publication output. Elements of prestige are extremely important, and culture is a central part of prestige. It is also important to determine mechanisms for distribution of physical products such as prototypes or software designs.

The final category—levels of protection for intellectual property and export controls—brought up questions about the extent to which partners have considered the different intellectual property approaches that would be appropriate for different countries and different participants. These issues should be addressed in advance. Group members noted that if there is technology of any kind developed as part of an international agreement, it is critical to know about country-specific regulations regarding export controls.

8.4 AGRICULTURE AND ANIMAL ISSUES TRACK

In his report on the discussions in this final track, **John Hickman, Director of Global University Relations at John Deere**, noted that there are about 3.5 billion people living in rural areas, many of whom are associated with agriculture and many who live in distinct cultures. Given that situation, this group started its discussions by talking about the uniqueness that exists culturally in agriculture—the traditions, the religious practices that may be involved, the local factors such as family or village hierarchy, how seeds are treated, how animals are treated and how breeding is done, the staple foods of that culture–and how those cultural practices have been carried out over time.

This group identified culture-based gender differences as an important issue which is prominent in agriculture. Women and often children play large roles in manual labor in agriculture around the world. Also, agriculture, unlike the other tracks, can involve differences in nomadic versus sedentary practices. In some cases, cultures may not even have land that it calls home, just an area. Language differences loom large when involved in agricultural agreements involving multiple cultures.

This group then discussed technical areas that would be unique to agriculture, some of which may be impacted by culture, education, or isolation. Projects spanning multiple countries or multiple isolated regions within a coun-

try can involve many cultures and varying levels of technical sophistication to be addressed when considering how to structure collaborations. Multi-country projects can also encounter difficulties from material transfers between countries, particularly when a transfer is repeated between multiple countries in succession.

Biodiversity can be an issue in agricultural research agreements, particularly with projects aimed at mining the genetic diversity of plants across geographical regions. A number of group members observed that agreements enabling this type of project need to consider local ownership of those genetic resources, the value that indigenous people place on that genetic resource, and how those resources can be shared while returning value to the local population.

The group discussed the lifecycle of agreements. Often, international collaborations start when conversations between scientists identify projects on which they might collaborate. Though informal, cultural awareness informs these conversations from the start. Next comes the formal process for creating an agreement, and it is here that culture plays a major role. As an example, some group members noted that U.S. agreements often go into great detail regarding possible problems that might arise, and this can offend many people around the world and complicate the approval process, which is the next step in a project's lifecycle. Culture can play a role both in terms of how long it takes approval to occur and what happens when it is time finally to sign the agreement: Is there a quick handshake and then everyone gets to work, or does there need to be a full-blown ceremony and celebration? The group noted that agricultural projects can be unusual in that they often have a post-project phase that includes education on how to use and disseminate the output of the project. This post-project phase often requires accommodating various cultural practices and language differences.

8.5 CONCLUDING REMARKS

Mittleman concluded the workshop by noting that much of the information shared was either new to the participants or more broadly applicable than they realized. She explained that cultural issues are relevant to and transcend a variety of domains. "Many interdependent and interdisciplinary scientific domains embody culture in ways we didn't anticipate," she said. The workshop helped participants to understand how to examine cultural differences and understand how to consider culture in a broader context.

Appendix A

Workshop Agenda

Culture Matters: An Approach to International Research Agreements
Government-University-Industry Research Roundtable

July 29-31, 2013

National Academy of Sciences Building
2101 Constitution Avenue NW
Washington, DC 20418

FINAL AGENDA

With this GUIRR workshop, we intend to address how culture and cultural perception influence and impact the process by which research agreements are made and negotiated across international boundaries. Representatives from around the world and from GUIRR's three constituent sectors—government, university, and industry—will gather to provide input into four specific meeting tracks or domains. The tracks will focus on research and agreements affecting or involving:

(1) People/Human Subjects
(2) Environment and Natural Resources
(3) Science, Engineering, and Manufacturing
(4) Agriculture and Animal Issues

The task for the experts involved in each track will be to examine the domain under discussion and the role that culture and cultural expectations may have in the forging and implementation of international research agreements. In addition to the domain tracks, a set of six plenary sessions will be held, addressing topics of a cross-cutting nature and engaging all workshop participants.

MONDAY, JULY 29, 2013

3:30 pm **Registration–Lecture Room, National Academy of Sciences Building**

4:00 pm **Welcome–Lecture Room**

- Dr. Barbara Mittleman, Vice President for Immunology, Nodality Inc.
- Dr. Arturo Pizano, Manager, University Research Collaboration Program, Siemens
- Ms. Susan Sauer Sloan, Director, GUIRR
- Dr. C. D. Mote, Jr., President, National Academy of Engineering

4:20 pm **Global Trends 2030: Alternative Worlds**
Moderator: Ms. Katie Kalinowski, Senior Program Associate, The National Academies

- Dr. Mathew Burrows, Counselor, National Intelligence Council, Office of the Director of National Intelligence

4:50 pm **Plenary #1–Designing Projects with Culture in Mind**
Moderator: Ms. Susan Sauer Sloan, Director, GUIRR
How might one design international research projects while being cognizant of cultural distinctions, mannerisms, and sensitivities? What cultural issues should be taken into consideration?

- *Towards Culturally Responsible Conduct of International Research*
  Dr. Frederick Leong, Professor of Psychology and Psychiatry and Director, Consortium for Multicultural Psychology Research, Michigan State University
- *Why Culture Matters in Cancer Research*
  Dr. Ted Trimble, Director, Center for Global Health, National Cancer Institute

6:00 – 7:30 pm **International Wine Tasting Reception–Great Hall**

TUESDAY, JULY 30, 2013

8:00 am **Registration & Breakfast–Lecture Room, National Academy of Sciences Building**

8:30 am **Welcome and Review Agenda–Lecture Room**
Dr. Barbara Mittleman, Nodality and Dr. Arturo Pizano, Siemens

8:45 am **Plenary #2–Wealthy vs. Poor Developing Countries**
Moderator: Mr. Patrick Schlesinger, Assistant Vice Chancellor, University of California, Berkeley
How does or should research efforts differ in developing countries with significant financial resources versus those with very limited resources? How do you make research/science policy when there are lots/limited resources? How does governance structure and principles differ?

- *Academic Research in Developing Countries: From Paternalism to Partnership*
  Dr. Benjamin Caballero, Professor of International Health, Bloomberg School of Public Health and Professor of Pediatrics, School of Medicine, Johns Hopkins University
- *Rich vs. Poor, Developing Countries: Using Ethics in Decision Making*
  Prof. Ames Dhai, Director and Head–Steve Biko Centre for Bioethics, University of the Witwatersrand

9:45 am **Break**

10:15 am **Breakout Session #1**

- People/Human Subjects–Lecture Room
- Environment and Natural Resources–Room 118
- Science, Engineering, and Manufacturing–Room 120
- Agriculture and Animal Issues–Room 250

12:00 pm **Lunch–West Court**

1:00 pm **Plenary #3–Language**
Moderator: Ms. Mary Jordan, Senior Technical Advisor for Public-Private Partnerships, Office of HIV/AIDS, U.S. Agency for International Development
How does language influence the ability to have successful international research agreements? What are differences in acceptable terminology, how people use language and interpret words differently, etc.

- *Understanding the Global, Regional and National Dynamics of Interdisciplinary Research Lessons from a Multi-Year, Multi-Institutional Collaborative Cyberlearning Program*
  Dr. Derrick L. Cogburn, Associate Professor, School of International Service and Executive Director, COTELCO/IDPP, American University

- *Communicating Science: Major Language Issues in International Research Agreements*
  Mr. Scott L. Montgomery, Affiliate Faculty Member, Henry M. Jackson School of International Studies, University of Washington

2:00 pm **Breakout Session #2**

- People/Human Subjects–Lecture Room
- Environment and Natural Resources–Room 118
- Science, Engineering, and Manufacturing–Room 120
- Agriculture and Animal Issues–Room 250

3:30 pm **Break**

4:00 pm **Plenary #4–Urbanization, Ecological Sustainability, and Social Resilience**

Moderator: Dr. John M. Carfora, Associate Provost for Research Advancement and Compliance, Loyola Marymount University

How are changing population patterns and demand for access to urban infrastructure changing cultures? What do these changes mean for international research collaboration?

- *From Sustainability to Resilience: Reimagining the Role of the Healthy City in International Research Collaborations*
  Dr. Eric G. Strauss, President's Professor of Biology and Executive Director, Center for Urban Resilience, Loyola Marymount University
- *Open Innovation Platform for Sustainable Cities: A Paradigm Shift in International Collaboration*
  Dr. Osman Ahmed, Head, Global Research and Innovation, Siemens Building Technologies, Inc.
- *Culture Through the Numbers: Analytics Applied to Cities*
  Dr. Jurij R. Paraszczak, Director of IBM Research Industry Solutions and Leader of the Research Smarter Cities Program, IBM

5:30 – 7:00 pm **Reception–Sponsored by Noblis**
Great Hall

Welcome: Dr. H. Gilbert Miller, Corporate Vice President and Chief Technology Officer, Noblis

WEDNESDAY, JULY 31, 2013

7:30 am **Registration & Breakfast–Lecture Room, National Academy of Sciences Building**

8:00 am **Welcome, Recap, and Review Agenda–Lecture Room**
Dr. Barbara Mittleman, Nodality

8:15 am **Breakout Reporting–All Tracks**
- People/Human Subjects
- Environment and Natural Resources
- Science, Engineering, and Manufacturing
- Agriculture and Animal Issues

9:15 am **Plenary #5–Intellectual Property (IP)**
Moderator: Mr. James Casey, Interim Director of Pre-Award Services, University of North Carolina at Chapel Hill
How do differing cultural attitudes towards ownership of ideas/IP affect cross-cultural partnerships? What constitutes IP and what can you protect? How is IP enforced? Research integrity and IP.
- Ms. Julissa Reynoso, U.S. Ambassador to the Oriental Republic of Uruguay
- *Intellectual Property Development Across the Globe*
  Mr. Robert L. Stoll, Partner, Drinker Biddle & Reath LLP
- *Culture and Personality in Global Business*
  Mr. Daniel Satinsky, Vice President, Business Development, Foresight Science & Technology

10:30 am Break

10:50 am **Plenary #6–Change and Drivers**
Moderator: Dr. Lida Anestidou, Senior Program Officer, The National Academies
What changes are on the horizon that will influence international research agreements? How can positive change be driven through such work? What drives/motivates people to get together to do research?
- Dr. Robert Bertram, Director, Office of Agricultural Research and Policy in Technology, U.S. Agency for International Development

12:00 pm **Wrap-up**
Dr. Barbara Mittleman, Nodality and Ms. Susan Sauer Sloan, GUIRR

12:15 pm **Adjourn**

Appendix B

Guiding Questions for the Breakout Sessions

1) What is culture?
   a. To what extent is this a monolithic notion?
   b. How many cultures does one belong to and/or represent?
      i. Region/nation, SES, class/caste, education, language, religion, gender, age
      ii. Sector-academia, government, industry, public
   c. To what extent do institutions and organizations bridge or cross cultures?
   d. Can culture be removed from human and organizational interactions?
   e. How does culture relate specifically to the content area covered in this breakout group?

2) What are international research agreements?
   a. Are there cultural notions about research?
      i. Does it depend on the field or topic?
   b. Are there cultural notions about agreements?
      i. Oral/interpersonal agreements, 'handshakes'
      ii. Legal/written agreements
      iii. Implied vs. explicit agreements
   c. How do international research agreements relate specifically to the content area covered in this breakout group?

3) How does culture influence such agreements? How do [culture and international agreements] specifically relate to the topic area of this breakout group?
   a. Process
      i. Getting the right people identified and meeting together
      ii. How to structure the discussion and negotiation
      iii. Bribery, influence, connections, conflicts of interest

b. Content
   i. Who, what, when, why, and how…..?
   ii. Rights, roles, responsibilities
   iii. Sticking points, what must be said, what can't be said

Appendix C

Speaker Biographies

In alphabetical order:

Dr. Osman Ahmed, Head, Global Research and Innovation
Siemens Building Technologies, Inc.

Dr. Osman Ahmed currently focuses on leading innovation for the Building Performance and Sustainability Business Line. He served as the Head, Siemens Center of Excellence for Smart Buildings in Masdar City, UAE. He also headed the Global Research and Innovation Organization at the Building Technologies Division.

He has been with Siemens for about 25 years and served as a visionary leader, corporate entrepreneur, successful strategic innovator, expert, and experienced technology and research manager. His experience includes leadership in:

- Systematically identifying, assessing, forecasting, pre-developing, and integrating technology for business units.
- Commercializing breakthrough and high-value ideas by aligning business needs, technology development, and innovation.
- Accelerating innovation pace through global collaboration networks, open innovation and living laboratory platforms.

For the past five years he has successfully launched a global strategic partnership program in pursuing collaboration on smart cities, smart consumptions, Smart Grid, and smart building environment. He was the founding architect of Masdar City (world's first carbon neutral city of 50,000 people in UAE; www.masdar.ae)—Siemens BT partnership agreement on Smart Grid Smart Building (SGSB), Smart Cities, and Smart Consumption. He spearheaded the partnership agreement with Masdar City and created and implemented investment, research, and innovation models.

He has been engaged in establishing an open innovation network model around the globe, specifically with the research and educational institutions, in order to increase innovation capacity for the company while accelerating the pace of innovation in the areas of building energy, environment, and sustainability.

He has published/presented more than 85+ technical papers worldwide. He has 85+ patents, awarded and pending combined, covering a wide variety of subjects including artificial intelligence, software modeling, control and automation, microsystems, and energy and building performance. A two-time technical achievement award winner within the SBT, Ahmed also is the recipient of the 2004 prestigious "Siemens Inventor of the Year" award for his work on microsystem applications for buildings. His work on microsystems has been given broad coverage in the media.

Recently, Ahmed invented "Building as a Tree" concept—applying artificial photosynthesis on a nano-structure to a building envelope to harvest energy from ambient CO_2 and release O_2 in atmosphere. He has been selected as one of the most creative minds within the entire Siemens organization and his work has been included in a Siemens published book on invention.

He speaks around the globe and interacts with high-profile customers on various topics such as future of building systems, Microsystems, technology and innovation management, and lately, building energy, environment, sustainability, and bio-mimicry. He received his Ph.D. degree in Mechanical Engineering from the University of Wisconsin-Madison and is a registered professional engineer in the State of Illinois. He authored chapters on future vision of sensing and buildings in a printed book and online journal, respectively.

Dr. Lida Anestidou, Senior Program Officer, Institute for Laboratory Animal Research
The National Academies

As Senior Program Officer, Dr. Lida Anestidou directs a diverse portfolio of studies on the use of laboratory animals and animal models; on research with dual use potential and biosecurity; and responsible science/research integrity. Prior to this position she was faculty at the Center for Biomedical Ethics and Society, Vanderbilt University Medical Center. She earned her doctorate in biomedical sciences from the University of Texas at Houston. Working with physiologist Norman Weisbrodt, she explored the effects of nitric oxide on the motility of the gastrointestinal musculature. Working with research integrity expert and biomedical ethics educator Elizabeth Heitman, she concurrently

pursued her interests in biomedical ethics, scientific integrity and science policy. Anestidou also holds a Doctor of Veterinary Medicine degree from Greece (her home country) and an M.S. in Veterinary Sciences from the University of Florida. She is an editorial board member of Science and Engineering Ethics, Lab Animal, and SciTech Lawyer and an ad hoc reviewer for the American Journal of Bioethics. She is a member of the National Conference of Lawyers and Scientists. Anestidou serves as an expert reviewer in the Ethics Evaluation of grant applications to the 7th Framework Program of the European Research Council and the European Commission Directorate General Research.

Dr. Robert Bertram, Director, Office of Agricultural Research and Policy in Technology
U.S. Agency for International Development

Dr. Bertram is Director of the Office of Agriculture, Research and Policy in Technology at the U.S. Agency for International Development (USAID). He has been with USAID for more than 20 years, and comes from a plant breeding and genetics background, with degrees from University of California-Davis, the University of Minnesota and the University of Maryland. His doctoral work focused on molecular techniques in assessing plant genetic resources and evolution in the genus which includes cassava. His work includes building stronger research ties between the U.S. research community (especially universities and the U.S. Department of Agriculture) and the international centers, and research partners in Europe and Japan. He has been active for many years in plant genetic resources policy, having served on the CGIAR Genetic Resources Policy Committee and as a technical advisor during the negotiation of the International Treaty on Plant Genetic Resources. He chaired the FAO Commission on Genetic Resources for Food and Agriculture from 2002 to 2004.

Dr. Mathew Burrows, Counselor
National Intelligence Council, Office of the Director of National Intelligence

Dr. Burrows was appointed counselor to the National Intelligence Council (NIC) in 2007 and director of the council's Analysis and Production Staff (APS) in 2010. He was the principal drafter of the NIC publication *Global Trends 2025: A Transformed World* and its latest edition—*Global Trends 2030: Alternative Worlds*. In 2005, he was asked to set up and direct the NIC's new Long Range Analysis Unit. Burrows joined the CIA in 1986, where he served as analyst for the Directorate of Intelligence, covering Western Europe, including the development of European institutions such as the European Union. In 1998-1999 he was the first holder of the Intelligence Community Fellowship and served at the

Council on Foreign Relations in New York. Other previous positions included assignments as special assistant to the U.N. Ambassador Richard Holbrooke in 1999-2001 and deputy national security adviser to U.S. Treasury Secretary Paul O'Neill in 2001-2002. Burrows graduated from Wesleyan University and received a Ph.D. in European history from Cambridge University.

Dr. Benjamin Caballero, Professor of International Health, Bloomberg School of Public Health and Professor of Pediatrics, School of Medicine
Johns Hopkins University

Dr. Caballero is Professor of International Health at the Bloomberg School of Public Health, and Professor of Pediatrics at the School of Medicine, Johns Hopkins University. He is the Director of the Johns Hopkins Global Center on Childhood Obesity, an international research and training center aimed at reducing the burden of obesity worldwide. He has over 20 years of experience as a scholar, researcher and leader in the area of child health and nutrition. He obtained his M.D. from the University of Buenos Aires and his Ph.D. (in neuroendocrine regulation) from MIT. He started his career as assistant professor of pediatrics at Harvard Medical School and director of the Nutrition Unit of Boston Children's Hospital, and moved to Johns Hopkins in 1990 to found the Center for Human Nutrition.

Caballero is a recognized expert on the nutritional needs of children and adults and on nutrient requirements in undernourished populations. For the past 15 years, he has focused on the problem of childhood obesity in the United States and in developing countries, and explored the impact of dietary transition and globalization on health indicators. He is an active participant in key domestic and international scientific committees related to diet and health, including the Dietary Reference Intakes (DRI) Committee, the Expert Panel on Macronutrient Requirements, and the Food and Nutrition Board of the Institute of Medicine, National Academy of Sciences. He was a member of the Dietary Guidelines for Americans Advisory Committee, and of the Scientific Advisory Board of the Food and Drug Administration (FDA), and is currently on the board of directors of the International Life Sciences Institute (ILSI) in Washington, the Nevin Scrimshaw International Nutrition Foundation (INF) in Boston, and the Nestle Foundation in Lausanne, Switzerland.

Caballero is the author of over 200 scientific publications. He is the Editor-in-Chief of the *Encyclopedia of Food Sciences and Nutrition*, a 10-volume work on food production, consumption and biological effects. He is also Editor-in-Chief of the *Encyclopedia of Human Nutrition*, which received the Book of the Year Award from the British Medical Association. His *Guide to Dietary Supplements*

summarizes the current scientific basis for the use of mineral and vitamin supplements. His book *The Nutrition Transition: Diet and Disease in the Developing World* explored the impact of demographic and economic development on diet- and lifestyle-related diseases in developing countries. His book *Obesity in China* summarizes research conducted in rural and urban China to track the impact of socioeconomic development on health outcomes. He is also co-editor of a widely used textbook on human nutrition, *Modern Nutrition in Health and Disease,* currently in its 11th edition.

Recent awards include the Ancel Keys Prize for achievements in international public health and the Thompson-Beaudette Lectureship from Rutgers University. In 2011 he was elected to the Spanish Academy of Nutritional Sciences.

Dr. John Carfora, Associate Provost for Research Advancement and Compliance
Loyola Marymount University

Dr. Carfora holds graduate degrees from a number of universities, including The London School of Economics, Harvard University, and a doctorate from Teachers College, Columbia University. A recipient of several international research awards, John has lectured throughout the USA, Europe, Canada and Africa. He was a Fulbright Scholar to Ireland, an IREX Fellow to Russia, and recipient of the Distinguished Service Award from the National Council of University Research Administrators.

Carfora has been a tenured professor of economics, research scholar, and an international consultant with clients such as American Airlines, Disney and *U.S. News and World Report*. He served as Director of International Education at the Russian Academy of Management, and was founding Curator of the Sir Leonard Schapiro Collection at the British Library of Political and Economic Sciences. John is also a bioethicist and Certified Compliance and Ethics Professional (CCEP).

He is a member of the Board of the Higher Education Teaching and Learning Association, Senior Advisor to the Fulbright Association, and serves on the Board of the National Organization of Research Development Professionals. John is a former member of the Board of the Alumni and Friends of The London School of Economics (1982-1990).

Carfora co-authored *The Art of Funding and Implementing Ideas: A Guide to Proposal Development and Project Management* (Sage, 2011), and wrote the Foreword *to Universitas: The Social Restructuring of Higher Education in Ameri-*

ca. He co-authored a popular article on the New Deal economist Stuart Chase (Harvard Magazine, 2004), and is writing a book on *Leadership, Decision-Making and the Academic Presidency*.

Mr. James Casey, Interim Director of Pre-Award Services
University of North Carolina at Chapel Hill

Mr. Casey is Interim Director of Preaward Services at The University of North Carolina at Chapel Hill. In his present position he directs preaward proposal and contract activities for all units at UNC-CH with the exception of the Medical School. Earlier in his career he worked at Northwestern University and the University of Wisconsin-Madison. Casey has been involved in international research administration for the past nineteen years, including the negotiation of numerous agreements and the active management of international projects. In 2007-08 he was a Visiting Professor of Leadership at the Upper Iowa University campus in Hong Kong, China, and has given research administration presentations in twelve foreign countries. He is a member of the Interim Executive Committee (IEC) for the AAAS BMENA Bioscience Forum, currently under development.

A research manager for the past nineteen years and a member of the Wisconsin Bar since 1990, Casey was one of the founding members of the GUIRR "I-Group" project in 2008. From 2009-2011 he was co-chair of the project. He is a member of the National Council of University Research Administrators (NCURA) Board of Directors and is a past member of the Executive Board for the University-Industry Demonstration Partnership (UIDP), a project under the GUIRR umbrella.

In addition to his J.D. from the University of Dayton School of Law, he holds bachelor's and master's degrees in political science and a master's degree in international affairs. He is a member of the American Association for the Advancement of Science, American Bar Association, and State Bar of Wisconsin.

Dr. Derrick L. Cogburn, Associate Professor, School of International Service and Executive Director, COTELCO/IDPP
American University

Dr. Cogburn is Associate Professor in the School of International Service at American University, and Executive Director of COTELCO: The Collaboration Laboratory and its Institute on Disability and Public Policy. He is editor of the Palgrave Macmillan book series *Information Technology and Global Governance,* and serves on editorial boards for *Journal of Information Technology and Politics*, *Review of*

Policy Research, and *Journal of Political Science Education*. He is Chair of the Review Panel for the American Association for the Advancement of Science (AAAS), Diplomacy, Security, and Development, Science Technology Policy Fellowships. He is also a member of the High-Level Panel of Advisors for the UN Global Alliance for Information and Communication Technologies and Development.

Cogburn has been Principal Investigator on grants from the National Science Foundation and the Committee of Visitors for the Office of Cyberinfrastructure. At Syracuse University, he was faculty in the School of Information Studies and Senior Research Associate in the Moynihan Institute at the Maxwell School. He is past president of the Information, Technology, and Politics section of the American Political Science Association and of the International Communication section of the International Studies Association. He served as Executive Director of the Global Information Infrastructure Commission-Africa and Vice Chair of the Global Internet Governance Academic Network. He holds a Ph.D. in political science from Howard University, where he was a W.K. Kellogg doctoral fellow at the Ralph J. Bunche International Affairs Center.

Professor Ames Dhai, Director, Steve Biko Centre for Bioethics
University of Witwatersrand

Professor Dhai is the Director of the Steve Biko Centre for Bioethics at the Faculty of Health Sciences, University of the Witwatersrand, which she established in 2007. The Centre is recognized as the lead Centre in Bioethics, Human Rights and Health Law on the continent and has local and international recognition. She began her career as a medical doctor, specialized in Obstetrics and Gynecology, and then went on to graduate with a Masters in Law and Ethics.

Dhai heads the only Masters and Ph.D. programs in Bioethics and Health Law on the continent and is an ethicist of international standing who can be credited with entrenching bioethics as an integral aspect of health sciences in South Africa (SA). She serves regularly as a consultant/expert advisor for the World Health Organization and is on the WHO's African Advisory Committee for Health Research. She serves on several national policy making bodies and is Deputy Chair of the National Health Research Ethics Council since 2006, Chair of the Hospice Palliative Care Association of SA Research Ethics Committee and co-chair of the Wits Human Research Ethic Committee (Medical) amongst others. She is currently the President of the Gauteng Branch of the South African Medical Association (SAMA) and is President-Elect of the National SAMA.

She is editor-in-chief of the *South African Journal of Bioethics and Law*; a Department of Education accredited journal and the first such journal in the coun-

try. Together with a colleague, she produced the first textbook in *Bioethics, Human Rights and Health Law* specific to the South African context for health sciences and law students and practitioners. She has over 75 publications in peer reviewed journals in the fields of bioethics, human rights and health law. Dhai has received several special recognition awards and certificates including the South African Medical Association (SAMA) Human Rights and Health Gender Acclaim Award for outstanding contributions (2012); the SAMA NAMDA Doctors Certificate Award in honor of patriotism, courage and contributions made in the struggle for the liberation of the Medical Profession (2012); the Academy of Sciences of SA (ASSAf) Certificate of Recognition for serving as a member on the Clinical Research Study Panel from 2007–2009, the results of which influenced an increase in the research budget from the Department of Health; the 2011 Health Professions Council of SA Certificate of Service for outstanding service rendered as a member of the Medical and Dental Professions Board from 13 February 2004; the Joe Veriava Medal in Bioethics, University of the Witwatersrand (2009); the Dean's Merit Award for outstanding performance, University of the Witwatersrand (2009); and Top Student Award in the Post Graduate Diploma in International Research Ethics, University of Cape Town (2004).

Ms. Mary Jordan, Senior Technical Advisor for Public-Private Partnerships, Office of HIV/AIDS
U.S. Agency for International Development

Ms. Jordan currently serves as a Senior Technical Adviser for Public Partnerships in the Office of HIV/AIDS, United States Agency for International Development. In this capacity Jordan creates entry points for businesses to partner within identified gaps of public programs and strengthens both public and private sectors.

As the cornerstone of her career, Jordan worked for more than 20 years in the pharmaceutical industry. Jordan served as a Brookings Institution Legislative Fellow for management executives. As part of this program, she served on Capitol Hill as a senior healthcare policy adviser to the Chairman of the United States Senate Health, Education, Labor and Pensions Committee.

Ms. Katie Kalinowski, Senior Program Associate
The National Academies

Ms. Kalinowski is a project manager for the Government-University-Industry Research Roundtable (GUIRR) and University-Industry Demonstration Partnership (UIDP) at the National Academies. Prior to joining the Academies in 2012,

she analyzed green power and climate change issues for the Renewable Northwest Project and she facilitated the National Wind Coordinating Collaborative, a national forum on wind power development, at RESOLVE. She served as a U.S. Peace Corps volunteer in Macedonia from 2009-2011. Kalinowski holds a master's degree in Economics from North Carolina State University, a B.S. in Natural Resources from the University of Nebraska-Lincoln, and is a certified Project Management Professional (PMP).

Dr. Frederick Leong, Professor of Psychology and Psychiatry and Director, Consortium for Multicultural Psychology Research
Michigan State University

Dr. Leong is Professor of Psychology and Psychiatry at Michigan State University. He is a faculty member in the Organizational and Clinical Psychology programs. He is also the Director of the Consortium for Multicultural Psychology Research at MSU. He has authored or co-authored over 240 journal articles and book chapters and also edited or co-edited 14 books. He is Editor-in-Chief of the *Encyclopedia of Counseling* (Sage Publications) and the APA *Handbook of Multicultural Psychology* (APA Books), and also Editor of the Division 45 Book Series on Cultural, Racial and Ethnic Psychology. He is the Founding Editor of the *Asian American Journal of Psychology* (2010-2014) and Associate Editor of the *American Psychologist* (2012-2014). Leong is a Fellow of the American Psychological Association (Divisions 1, 2, 5, 12, 17, 29, 45, 52), the Association for Psychological Science, the Asian American Psychological Association, and the International Academy for Intercultural Research.

His major research interests center around cross-cultural psychopathology and psychotherapy (especially with Asians and Asian Americans), cultural and personality factors related to career choice, work adjustment, and occupational stress. He is Past President of APA's Division 45 (Society for the Psychological Study of Ethnic Minority Issues), the Asian American Psychological Association, and Division 12 Section VI (Clinical Psychology of Ethnic Minorities) of APA. He was the founding President of the Division of Counseling Psychology in the International Association of Applied Psychology. He is also a member of the Executive Council of the International Test Commission. He received the APA Award for Distinguished Contributions to the International Advancement of Psychology as well as the Stanley Sue Award for Distinguished Contributions to Diversity in Clinical Psychology from APA's Division 12. He is also the recipient of the APA Division 45 Distinguished Contributions to Research Award, the Division 17 International Section's Lifetime Achievement Award, the APA Minority Fellowship Program's Dalmas Taylor Distinguished Contributions Award, and

the APAGS Kenneth and Mamie Clark Award for outstanding contributions to the professional development of ethnic minority graduate students.

Dr. Barbara Mittleman, Vice President, Clinical and Head, Immunology
Nodality Inc.

Dr. Mittleman is Vice President, Clinical and Head, Immunology at Nodality, Inc., a South San Francisco biotechnology company focused on multi-parametric flow cytometry for diagnosis and drug development support. Before joining Nodality, Mittleman served as Director of the Public-Private Partnership Program at the National Institutes of Health (NIH), developing an agency-wide approach to partnering with public, private, advocacy and other organizations to meet NIH's biomedical research mission. In this role she interacted with U.S. and global organizations in the pharmaceutical, biotechnology, diagnostics, IT, electronics, and other industries patient and public advocacy groups, and U.S. and other governmental agencies, in the development of policy, negotiation of partnerships, and implementation of programs and activities. Mittleman is trained as a rheumatologist and cellular immunologist, receiving a B.A and M.D. as well as residency and fellowship training at the University of Pittsburgh. She then came to NIH in 1991 for post-doctoral training in cellular immunology. Her research efforts have included work on the cellular immune mechanisms of murine and human SLE and pediatric post-streptococcal neuropsychiatric disease; health disparities in the rheumatic diseases; and principles and structures of cross-sectoral partnerships.

Mr. Scott L. Montgomery, Affiliate Faculty Member, Henry M. Jackson School of International Studies
University of Washington

Mr. Montgomery is an author and affiliate faculty member in the Henry M. Jackson School of International Studies at the University of Washington. His research interests include scientific language and communication, history of science, education, and energy-related science and policy. For 25 years he was a consulting petroleum geologist in the U.S. energy industry and is widely known for his many technical papers and monographs on emerging oil and gas plays in North America and around the world. In addition to teaching and lecturing, his current work includes consulting with corporate and research organizations to improve their level of scientific communication.

He is the author of 12 books, most recently *Does Science Need a Global Language? English and the Future of Research* (University of Chicago), which appeared in May 2013. His previous work, *The Powers That Be: Global Energy for*

the Twenty-first Century and Beyond (Chicago, 2010) was a *Choice* outstanding academic title for 2010. Other recent titles include *The Chicago Guide to Communicating Science* (2003; Second Edition forthcoming 2014) and *A History of Science in World Cultures* (Routledge, forthcoming 2014). He has lectured widely on the basis of these works in the U.S. and abroad. He currently lives in Seattle with his wife and two sons.

Dr. C. D. Mote, Jr., President
National Academy of Engineering

Dr. C. D. Mote, Jr. is President of the National Academy of Engineering (NAE) and Regents Professor, on leave, from the University of Maryland, College Park. Mote is a native Californian who earned his B.S., M.S., and Ph.D. degrees at the University of California, Berkeley in mechanical engineering between 1959 and 1963. After a postdoctoral year in England and three years as an assistant professor at the Carnegie Institute of Technology in Pittsburgh, he returned to Berkeley to join the faculty in mechanical engineering for the next 31 years. He and his students investigated the dynamics, stability, and control of high-speed rotating and translating continua (e.g., disks, webs, tapes, and cables) as well as biomechanical problems emanating from snow skiing. He coined the area called "dynamics of axially moving materials" encompassing these systems. Fifty-eight Ph.D. students earned their degrees under his mentorship.

At Berkeley, he held an endowed chair in mechanical systems and served as chair of the mechanical engineering department from 1987 to 1991 when the National Research Council (NRC) ranked its graduate program effectiveness highest nationally. Because of his success at raising funds for mechanical engineering, in 1991 he was appointed vice chancellor at Berkeley expressly to create and lead a $1 billion capital campaign for the campus that ultimately reached $1.4 billion.

In 1998, Mote was recruited to the presidency of the University of Maryland, College Park, a position he held until 2010 when he was appointed Regents Professor. His goal for the university was to elevate its self-expectation of achievement and its national and global position through proactive initiatives. During his tenure the number of Academy members among the faculty tripled, three Nobel laureates were recognized, and an accredited school of public health and a new department of bioengineering were created. He also founded a 130-acre research park next to the campus, faculty research funds increased by 150 percent, and partnerships with surrounding federal agencies and with international organizations expanded greatly. The number of students studying

abroad tripled, and he created an annual open house day that has attracted over 100,000 visitors on that day, founded a charitable foundation for the campus whose board of trustees launched a $1 billion capital campaign that reached its goal, and took every student to lunch that wanted to go. The Academic Ranking of World Universities ranked the campus #36 in 2010 and its Engineering School #13 globally.

The NAE elected him to membership in 1988, and to the positions of Councilor (2002-2008), Treasurer (2009-2013), and President for six years beginning July 1, 2013. He has served on the NRC Governing Board Executive Committee since 2009. He chaired the NRC Committee on Global Science and Technology Strategies and Their Effects on U.S. National Security (2009-2010), co-chaired the National Academies Government-University-Industry Research Roundtable (2007-2013), and co-chaired the Committee on Science, Technology, Engineering, and Mathematics Workforce Needs for the U.S. Department of Defense and the U.S. Industrial Base (2011-2012). He was vice chair of the NRC Committee on the Department of Defense Basic Research (2004) and served on the NRC committee authoring the *Rising Above the Gathering Storm* reports of 2005 and 2010. He was also a founding member of the FBI's National Security Higher Education Advisory Board (2005-2010).

Mote's recognitions include the NAE Founders Award, the American Society of Mechanical Engineers Medal, and the Humboldt Prize of the Federal Republic of Germany. At the University of California, Berkeley, he was honored with the Distinguished Teaching Award, Distinguished Engineering Alumnus Award, Berkeley Citation, and Excellence in Achievement Award. He is an Honorary Fellow of the American Society of Mechanical Engineers, and Fellow of the American Academy of Arts and Sciences, the American Academy of Mechanics, the Acoustical Society of America and the American Association for the Advancement of Science. He holds three honorary doctorates and two honorary professorships.

Dr. Jurij Paraszczak, Director of IBM Research Industry Solutions and Leader of the Research Smarter Cities Program
IBM

Dr. Jurij Paraszczak is Director of IBM Research Industry Solutions and the leader of the Research Smarter Cities program focusing on helping cities manage the complex set of demands placed on their infrastructure by their constituents and on the optimization of flows of energy, people and water through this infrastructure.

As the IBM research lead for Smarter Cities, Paraszczak is responsible for aligning the 10 Research Laboratories around Smarter Cities opportunities emerging around the globe.

In this role he is also responsible for integrating research capabilities in materials and processes, IT innovation, modeling and optimization to implement sustainable solutions with IBM's customers in industries as diverse as retail, telecom, automotive, electric power, government. In addition, Paraszczak manages a team of specialists who help develop research innovations in ICT into customer solutions for all industry verticals.

Previously Paraszczak was Chief Technology Officer of the IBM Venture Capital group and also Director of Technology for the IBM Research Emerging Business Group, where he was responsible for identifying and harvesting all sources of innovation for IBM's solutions and products from the global venture community and the Research Division. Prior to these roles, Paraszczak worked in Digital Media as the CTO and in IBM Research working variously in telecommunications systems, chip design and materials science focusing on the design and use of materials for semiconductor devices.

Paraszczak has over 55 publications in various areas of telecommunications, technology and systems and over 18 patents in a wide variety of fields including communications, plasma chemistry, microlithography, materials manipulation and chip fabrication, packaging systems, media delivery and characterization. He has a broad experience to draw on to help span a wide variety of disciplines and to synthesize new approaches to old problems. He obtained his Ph.D. and B.Sc. from the University of Sheffield, UK.

Dr. Arturo Pizano, Manager, University Research Collaboration Program
Siemens Corporation

Dr. Arturo Pizano is Manager, University Collaboration for Siemens Corporation, Corporate Research and Technology. In this capacity he is responsible for establishing and maintaining relationships with U.S. universities of strategic importance to Siemens's R&D organization across the globe. Prior to his current position, Pizano was a part of the internal audit organization of Siemens as a member of the Operational Audit team.

Pizano joined Siemens Corporate Research in 1993 as a Member of the Technical Staff in the Imaging and Visualization Department. He became Program Manager in Multimedia Communications and Collaboration and later Head of the Multimedia and Video Technology Department. Prior to joining Siemens he

worked as a Staff Scientist in the Software Research Center of Ricoh Corporation in Santa Clara, California.

Pizano holds a B.Sc. in Actuarial Science from the National Autonomous University of Mexico and a M.Sc. and Ph.D. in Computer Science from the University of California, Los Angeles.

Ms. Julissa Reynoso, U.S. Ambassador to the Oriental Republic of Uruguay
Oriental Republic of Uruguay

Julissa Reynoso was confirmed by the United States Senate as Ambassador to the Oriental Republic of Uruguay on March 30, 2012.

Prior to her nomination, Ambassador Reynoso served as Deputy Assistant Secretary for Central America and the Caribbean in the Bureau of Western Hemisphere Affairs at the Department of State.

Reynoso is an attorney by trade and, prior to joining the U.S. State Department, practiced law at the international law firm of Simpson Thacher & Bartlett LLP in New York, focusing on international arbitration and antitrust law. She was also a fellow at New York University School of Law and Columbia Law School.

In 2006, Reynoso served as Deputy Director of the Office of Accountability at the New York City Department of Education. She has published widely in both Spanish and English on a range of issues including regulatory reform, community organizing, housing reform, immigration policy, and Latin American politics for both popular press and academic journals.

Reynoso holds a B.A. in Government from Harvard University, a Masters in Philosophy from the University of Cambridge in the UK, and a J.D. from Columbia University School of Law. After law school, she clerked for the Honorable Federal Judge Laura Taylor Swain. Reynoso is a member of the Council of Foreign Relations.

Mr. Daniel Satinsky, Vice President for Business Development
Foresight Science & Technology, Inc.

Daniel Satinsky is Vice President for Business Development at Foresight Science & Technology, Inc. (www.foresightst.com), a global technology commercialization consulting company. For more than 20 years, Satinsky has been engaged in technology-related Russian business projects, market entry for both Russian and U.S. companies, thought leadership on Russian-American economic issues,

and building practical business networks. He has participated personally in three startup companies and has acted as an advisor to a number of established companies. He is a co-author of the soon-to-be published article, "Emerging Innovation in an Emerging Economy: Can Institutional Reforms Help Russia Break through Historical Barriers." Past publications include*:* co-author of *Yaroslavl Roadmap 10-15-20*, a New York Academy of Sciences study of worldwide innovation best practices and Russia*; Buyer's Guide to the Russian IT Outsourcing Industry*; co-author *Perm Innovation Roadmap* and *Industrial Giants, Entrepreneurs and Regional Government-The Changing Business Environment in the Yaroslavl' Oblast 1991-98*. He has been President of the Board of the U.S.-Russia Chamber of Commerce of New England for more than 15 years. He holds a Master of Law and Diplomacy degree from the Fletcher School of Law & Diplomacy, a J.D. from Northeastern University Law School and a B.A. from James Madison College of Michigan State University.

Mr. Patrick Schlesinger, Assistant Vice Chancellor for Research Administration and Compliance
University of California, Berkeley

Patrick Schlesinger is the Assistant Vice Chancellor for Research Administration and Compliance at the University of California, Berkeley. The Research Administration and Compliance office oversees Berkeley's Office for the Protection of Human Subjects, the Animal Care and Use Committee, the Conflict of Interest Committee, and the Sponsored Projects Office. Prior to joining UC Berkeley, Schlesinger served as the systemwide Director of Research Compliance at the UC Office of the President and as University Counsel in the Office of the General Counsel.

Before joining the University, Schlesinger was a partner at the law firm of Landels, Ripley & Diamond in San Francisco and was an attorney with the U.S. Environmental Protection Agency in Washington, D.C. He has a Bachelor of Music from San Diego State University with majors in music performance and American History and a J.D. from the George Washington Law School in Washington, D.C.

Ms. Susan Sauer Sloan, Director, Government-University-Industry Research Roundtable
The National Academies

Susan Sauer Sloan joined the National Academies in 2008 as Director of the Government-University-Industry Research Roundtable (GUIRR). Before assuming the role, she served a six-month appointment as Executive in Residence at

the Center for the Advancement of Scholarship on Engineering Education (CASEE) of the National Academy of Engineering and, for the six years prior, as Chief Executive Officer of the Global Wireless Education Consortium (GWEC), a university-industry membership organization committed to the development and incorporation of current wireless technology curricula in academic institutions worldwide. Earlier in her career, Sloan worked as Corporate/Foundation Relations Consultant to the National Science Foundation's Division of Undergraduate Education, as Associate Director of the Master of Health Science (MHS) in Health Policy program at the Johns Hopkins University School of Hygiene and Public Health, as Director of Communications for Sigma-Tau Pharmaceuticals, Inc., and as Senior Program Associate for the American Association for the Advancement of Science (AAAS). Sloan got her start in Washington, DC, working as a staff assistant to Representative Timothy E. Wirth (D-CO), U.S. House of Representatives. She holds a B.S. in Biology from the University of Oregon.

Mr. Robert L. Stoll, Partner
Drinker Biddle & Reath LLP

Robert L. Stoll is a partner on the Patent team at Drinker Biddle & Reath LLP and Co-Chair of the Intellectual Property Group. As the former United States Patent and Trademark Office (USPTO) Commissioner for Patents, he was instrumental in the passage of landmark patent legislation, the America Invents Act, and lauded for his efforts to reduce patent pendency and improve patent quality. He has spent his career improving the intellectual property system and educating the public, applicants, corporations and foreign governments on the criticality of intellectual property to economic growth and job creation. The 2012 recipient of *Managing Intellectual Property* magazine's lifetime achievement in intellectual property award, he has a deep understanding of domestic and foreign intellectual property law and was instrumental in the development and analysis of legislation concerning all areas of intellectual property and was one of the country's leaders in establishing the U.S. government's positions on international issues related to intellectual property. He earned his J.D. in 1985 from the Catholic University of America and his B.S. degree in Chemical Engineering in 1979 from the University of Maryland.

Dr. Eric Strauss, President's Professor of Biology and Executive Director, Center for Urban Resilience
Loyola Marymount University

Dr. Eric Strauss serves Loyola Marymount University as President's Professor of Biology, Executive Director of the Center for Urban Resilience (CURes) and Di-

rector of the graduate program in urban ecology. With collaborative research specialties in animal behavior, endangered species management, urban ecosystem dynamics and science education, he has extended the model for faculty scholarship by co-founding the Urban Ecology Institute in Boston while he served as a faculty member at Boston College and CUREs in LA, both of which provide educational, research and restoration programs to underserved neighborhoods and their residents. In addition, Strauss is the Founding Editor of a web-based peer-reviewed journal, *Cities and the Environment*, which is funded in part by the U.S. Department of Agriculture Forest Service. His research includes collaborative long term studies of coyotes, white-tailed deer, crows, turtles and other vertebrates, with a specialty in understanding wildlife in urban areas and the appropriate management responses to wildlife problems and zoonotic disease. His work also includes investigating the role of green space and urban forests in supporting of healthy neighborhoods and how those features can be used to improve science education in underserved neighborhoods. He has co-written multi-media textbooks in biology and urban ecology as well as hosting multiple video series on the life sciences and ecology. Strauss received his B.S. in Mass Communication from Emerson College and Ph.D. in Biology from Tufts University in 1990.

Dr. Edward (Ted) L. Trimble, Director, Center for Global Health
National Cancer Institute

Following graduation from Harvard College and the Johns Hopkins University School of Medicine, Edward L. Trimble trained in obstetrics and gynecology at the Vanderbilt University Medical Center. He earned a master's degree in public health from the Johns Hopkins School of Hygiene and Public Health, then completed a fellowship in gynecologic oncology at Memorial Sloan-Kettering Cancer Center. He is board-certified in obstetrics and gynecology, as well as in gynecologic oncology, by the American Board of Obstetrics and Gynecology.

In September 2011 Dr. Harold Varmus, Director of the U.S. National Cancer Institute (NCI) appointed Trimble Director of the NCI's new Center for Global Health. Between 1991 and 2011, Trimble was Head, Gynecologic Cancer Therapeutics and Quality of Cancer.

Care Therapeutics, Clinical Investigation Branch, Cancer Therapy Evaluation Program, Division of Cancer Treatment and Diagnosis, at the NCI. His duties involved scientific liaison with the Gynecologic Oncology Group and the American College of Surgeons Oncology Group, as well as oversight of issues involving the elderly, minorities, women's health, international collaboration, cost, cancer health disparities, health-related quality of life and patient-reported

outcomes in NCI-sponsored treatment trials. For his work at NCI he has received two Public Health Service Commendation Medals, six NIH Merit Awards, and the NCI Director's Gold Star Award.

Appendix D

Workshop Participants

Osman Ahmed
Head, Global Research and Innovation
Siemens Building Technologies, Inc.

Lida Anestidou
Senior Program Officer
The National Academies

Thomas Arrison
Senior Staff Officer
National Research Council

Michael Bard
Musician

William Berry
Director, Board on Global Science and Technology
The National Academies

Robert Bertram
Director, Office of Agricultural Research and Policy in Technology
U.S. Agency for International Development

Elise Blaese
Project Manager
IBM Research

Mat Burrows
Principal Author
Global Trends 2030 Report

Giulio Busulini
Scientific Attaché
Embassy of Italy

Benjamin Caballero
Professor
Johns Hopkins University

Frenanda Cabello Reyna
Assistant
Embassy of Mexico

John Carfora
Associate Provost for Research Advancement and Compliance
Loyola Marymount University

James Casey
Interim Director of Pre-Award Services
The University of North Carolina at Chapel Hill

Kristina Chinn
Procurement Agent
The Boeing Company

Denise Clark
Associate Vice President for Administration
University of Maryland

Gwen Coat
Senior Program Associate
American Association for the Advancement of Science

Derrick Cogburn
Associate Professor, School of International Service and Executive Director, COTELCO/IDPP
American University

Ames Dhai
Professor
Steve Biko Centre for Bioethics

Christoph Ebell
Science and Technology Counselor
Embassy of Switzerland

Dennis Fortner
Senior Manager Intellectual Property & Strategic Technology Agreements
Northrop Grumman Corporation

Amit Frank
Assistant to the Minister of Agriculture & Science Affairs
Embassy of Israel

Kirt Fuller
Industry Contracts Manager
Oregon State University

Matthew Gerdin
Foreign Affairs Officer
U.S. Department of State

Aura Gimm
S&T Policy Fellow
American Association for the Advancement of Science/DoD Basic Research Office

Olivia Goldstein
Assistant for U.S. Russia Innovation Corridor
American Councils for International Education

Kenneth Goretta
International Program Manager
Air Force Office of Scientific Research

Sabrina Hall
Program Associate
The National Academies

Robert Hardy
Director, Contracts and IP Management
Council on Governmental Relations

Stephanie Harrington-Hurd
International Programs Manager
American Society for Engineering Education

Chris Henderson
Intern
The National Academies

John Hickman
Director, Global University Relations
John Deere

Lynne Hollyer
Associate Director
University of California, Berkeley

Marie Imbs
Deputy Attache for Science and Technology
French Embassy

Mary Jordan
Senior Tech Adviser, Public–Private Partnerships
U.S. Agency for International Development

Katie Kalinowski
Senior Program Associate
The National Academies

Miriam Kelty
Independent Consultant
National Institutes of Health (retired)

Frederick Leong
Professor of Psychology and Psychiatry
Michigan State University

Jess Lowenberg-DeBoer
Associate Dean and Director of
International Programs in Agriculture
Purdue University

Elizabeth (Libby) Lyons
Senior Advisor
U.S. Department of State

Philipp Marxgut
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