German Center for Research and Innovation – New York

Germany
Land of Ideas

ANNUAL REPORT 2015

Preface

The German Center for Research and Innovation (GCRI) in New York has become an essential component of our country's science policy. The Center, which opened in February 2010, has rapidly established itself as a cornerstone of the German government's internationalization strategy. The GCRI is a joint initiative of Germany's Federal Foreign Office and its Federal Ministry of Education and Research (BMBF). It has successfully strengthened transatlantic collaboration in science and technology since its inception. One of the hallmarks of GCRI's success is its ability to foster interdisciplinary collaborations by presenting cutting-edge German research to a diverse, highly educated audience.

Through its manifold panel discussions, symposia, and workshops, the GCRI provides a platform to enhance innovation between North America and Germany. Last year's topics ranged from cyber security and e-health to sustainable development and renewable energy. The Consulate General of the Federal Republic of Germany in New York and consortium leaders, the DAAD and the DFG, have collaborated with the GCRI from the outset, resulting in a fruitful relationship. The Consulate General was honored to host the GCRI's Fifth Anniversary Celebration on March 18, 2015, and is proud to continue to support the highly successful center. Organizing joint events, hosting scientific delegations, facilitating mutual introductions to a variety of stakeholders, and sharing ideas are just a few aspects that contribute to our successful collaboration. I hope this report will inspire you to actively engage with the German Center for Research and Innovation in the future.

Brita Wagener
Consul General of the Federal
Republic of Germany in New York

Since its launch in 2010, the German Center for Research and Innovation (GCRI) has become a multidisciplinary forum bringing together leaders in academia, industry, and government to foster strong public-private partnerships, facilitate the authorship of new publications, and address the global challenges of the 21st century. The GCRI, with its robust online presence and its extensive network in North America and Germany, is uniquely positioned to help Germany maximize leverage of its intellectual capital and entrepreneurial creativity.

Our 2015 Annual Report summarizes the activities of the GCRI during the past year and provides articles on cutting-edge developments in German research and innovation. The report also highlights the role of the GCRI in science diplomacy, an area that has grown in importance over the past decade.

One of the highlights of the past year was GCRI's participation in the German Chancellor's Second International German Forum, which brought together approximately 120 innovators from around the world to discuss future developments in social innovation. Following the Forum, the GCRI initiated a two-day symposium on social innovation at the German House in New York City, which brought together leading social innovators from Germany, the United States, and Canada and resulted in new collaborative activities among thought leaders in the field of social innovation.

The GCRI Foundation launched two pilot programs in 2015. The GCRI Foundation/DAAD-RISE summer scholarship program for university sophomores in science and engineering is designed to foster academic relationships with Germany for promising students early in their careers and, ideally, encourage future scientific engagement. The second initiative, the GCRI Foundation Engineering Prize, will recognize outstanding engineering students at universities in the United States and Canada. Both of these initiatives aim to further enhance engagement in STEM fields between North American entities and their counterparts in Germany.

I would like to acknowledge the unremitting and generous support of Germany's Federal Foreign Office, the Federal Ministry of Education and Research, the German Academic Exchange Service, and the German Research Foundation. I would also like to thank my colleagues at the GCRI for their constant commitment and devotion to making our programs the success they have become. Further, I would like to express my sincerest gratitude to the GCRI Advisory Council for its expert guidance and to the GCRI Foundation as well as our partners in North America and Germany for their thoughtful input into our governance and programming.

Dr. Joann Halpern
Director of the German Center
for Research and Innovation

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About the GCRI

First Point of Contact for German Science and Technology in North America

The German Center for Research and Innovation (GCRI) is a joint initiative of Germany's Federal Foreign Office and its Federal Ministry of Education and Research. Established as an information and networking platform, GCRI provides information and support for the realization of cooperative and collaborative projects between North America and Germany.

Since its opening in February 2010, GCRI has organized more than 150 events in the U.S. and Canada with leading experts from science and industry, including three Nobel Prize laureates and 16 Gottfried Wilhelm Leibniz Prize recipients.

To date, GCRI has participated in 134 conferences, published 74 editions of its newsletter *E-NNOVATION GERMANY,* significantly enhanced its website reach and social media presence, and appeared over 1,035 times in the media.

GCRI's areas of focus mirror those of Germany's High-Tech Strategy and include climate and energy, health and nutrition, mobility, security, and communication. GCRI has also led the transatlantic dialogue in emerging and evolving areas, such as e-health, smart cities, artificial intelligence, and medical technologies.

The center was created as a cornerstone of the German government's initiative to internationalize science and research and is one of six German Houses of Research and Innovation worldwide (Deutsche Wissenschafts- und Innovationshäuser, DWIHs). It is under the joint leadership of the German Academic Exchange Service (DAAD) and the German Research Foundation (DFG) and receives its funding from the German Federal Foreign Office. ■

With the goal of strengthening transatlantic communication on the critical challenges of the 21st century, GCRI:

- Presents Germany to the North American market as a land of ideas and innovation
- Enhances dialogue between academia and industry
- Creates a forum for the initiation and enhancement of transatlantic projects
- Acts as an information platform for the German research landscape

Building Bridges Through Science

In July 1975, two men from competing nations shook hands in zero gravity. As Apollo Commander Thomas P. Stafford and Soyuz Commander Alexei Leonov reached through the ports of their respective spacecraft, docked together in orbit, they gave the world the most photo-worthy example of the ability of scientists to create alliances that transcend policy differences. The term *science diplomacy* had yet to be coined, but its potential was clear.

Many of the great challenges of the 21st century have roots in the sciences. Climate change, global health and epidemics, food supply, energy, and information security, to name but a few, are far-reaching matters of both science and policy. In an increasingly globalized world, those who speak the language of science are a powerful force in building international cooperation to address these issues.

Since the early days of the nuclear era, scientists have provided critical expertise to inform policy decisions, and collaboration between scientists has since enabled important global initiatives, including the International Space Station and the establishment of the Intergovernmental Panel on Climate Change. Increasingly, rather than advising on or advocating for their own work, scientists are being called upon to open communications channels or assist in negotiations in difficult circumstances where traditional diplomacy falls short. In a recent example, scientists are credited with playing a key role in the high-stakes negotiations that limited Iran's nuclear capabilities in 2015. The values of their training, which centers on transparency, reliance on evidence and impartial analysis, along with longstanding traditions of international cooperation, allow scientists to occupy a crucial middle ground between politics and society.

"Scientists are being called upon to open communications channels or assist negotiations in difficult circumstances where traditional diplomacy falls short"

Science and Technology (S&T) cooperation agreements, commonly forged between major countries, can accomplish both scientific and political objectives. These agreements can increase collaboration among allies, as in the case of the S&T agreement between the United States and the European Union, or aim to build trust in times of crisis, as the post-9/11 agreements between the U.S. and several Muslim-majority nations has shown.

However, few countries have implemented their own long-term strategies for cultivating a role for science in international relations. Germany is a notable exception, and a forerunner in initiating international scientific partnerships and establishing best practices for linking scientific innovation to policy making.

Germany's history of building bridges through science reaches back more than 65 years, when joint research partnerships helped reunite Europe after the war. Programs such as the Alexander von Humboldt Foundation fellowships, originally founded in 1953 to promote exchange between Germany and other countries, continue to flourish, bringing German researchers together with those from more than 140 countries worldwide.

In 2008, the German government established the Strategy for the Internationalization of Science and

Research, formalizing a new commitment to global science outreach, and creating the German Center for Research and Innovation (GCRI) as a cornerstone of this initiative.

"Advancing the role of science in international relations isn't just a wise policy move, it's a responsibility"

Along with its partners, which include some of Germany's top research institutions and scientific councils, the

GCRI is a hub fostering scientific communication and cooperation between Germany and North America. With support from the German Consulate, German Foreign Office, and the German Embassy, the GCRI hosts a robust schedule of conferences and symposia, bringing cutting-edge research from German institutions to the academic and business communities in the United States, and creating networking opportunities between science and policy stakeholders in both countries. In 2015, such events spanned topics including cyber security, global entrepreneurship, sustainable ocean development, and dozens more.

"We are convinced that societies around the world can only flourish when they make efforts to foster scientific progress and cultivate academic exchange," said Dr. Robin Mishra, Head of the Science and Technology Section of the German Embassy in Washington, D.C., noting that in uncertain times, the common ground of science also offers an anchor to help establish or regain stability in international relations. In 2015, during

Germany's presidency of the G7, the Embassy hosted a panel discussion on the importance of science diplomacy in addressing international challenges. "As in other areas, many problems that involve the sciences cannot be solved through the efforts of one country," Mishra said. "There is an urgent need for global solutions, and a strong strategic approach in science diplomacy may be more important now than ever."

In addition to hosting and participating in scientific community events, GCRI director Dr. Joann Halpern frequently lectures on the importance of cultivating global scientific collaboration. In January 2015, Dr. Halpern joined representatives from UNESCO, the New York Academy of Sciences, the American Academy for the Advancement of Science, and New York University faculty as a guest lecturer in a postdoctoral course on science diplomacy held at NYU. That same month, she addressed the BILAT USA 2.0 EU-U.S. Innovation Conference in Brussels, Belgium, an event organized to explore ways to boost the innovation pipeline between EU nations and the United States. The GCRI also joined a subsequent BILAT USA 2.0 conference later in the year in Washington, D.C. "Advancing the role of science in international relations isn't just a wise policy move, it's a responsibility," said Halpern. "Germany has set a high bar for global collaboration, and our scientific institutions continue to be one of our greatest assets in making connections, solving problems, and improving the future." ■

By Hallie Kapner

"The German Center for Research and Innovation events provide an outstanding venue for showcasing U.S.-German technology and collaborations."

– James Sharp, President, Carl Zeiss, Inc.


123
81
67
Neuroscience
2015

2015 Calendar of Events

January 28

Cognitive Plasticity in Adulthood

Co-Sponsor:

Max Planck Society

February 24

German Center for Research and Innovation Student Outreach: How International Experience Can Enhance Your Career

March 18

German Center for Research and Innovation 5th Anniversary Celebration

Co-Sponsor:

Consulate General of the Federal Republic of Germany in New York

March 23

EU – USA Research Collaboration and Funding Opportunities in Horizon 2020, the European Framework Programme for Research and Innovation

Co-Sponsor:

Delegation of the European Union to the United States of America

April 9

SAP Start-Up Forum New York

Co-Sponsor:

SAP Labs, LLC

April 15

The Role of Higher Education in the Future of Workforce Development

Co-Sponsor:

Volkswagen Group of America, Chattanooga Operations, LLC

May 21

Cyber Security and Ethics

Co-Sponsor:

U15

June 16

Seeing the Art in Science

Co-Sponsors:

Carl Zeiss Microscopy, LLC

Carl R. Woese Institute for Genomic Biology, University of Illinois

August 28

GAIN T.E.N. 5th Transatlantic Entrepreneurial Breakfast

Co-Sponsors:

German Academic International Network (GAIN)

Consulate General of the Federal Republic of Germany in San Francisco

September 28 – 30

2015 International Conference on Sustainable Development

Co-Sponsors:

Christian-Albrechts-Universität zu Kiel

Columbia University

Alexander von Humboldt Foundation

Research in Germany

October 6 – 7

Transatlantic Perspectives on Social Innovation

Co-Sponsor:

University Alliance Ruhr (UA Ruhr)

October 22

Cyber Security in the U.S. and Germany

October 29

Arnhold Symposium on Education for Sustainable Peace 2015

Co-Sponsors:

Georg Eckert Institute for International Textbook Research (GEI)

The New School for Social Research (NSSR)

November 2

German Center for Research and Innovation Student Outreach: Osnabrück University of Applied Sciences

November 2

STEP NYC: Startup and Entrepreneur Program

Co-Sponsors:

German American Chambers of Commerce, Inc. (GACC)

University Alliance Ruhr (UA Ruhr)

November 2

Stress and the City

Co-Sponsor:

Heidelberg University Association

November 4

Opportunities and Risks in E-Health

Co-Sponsor:

University Alliance Ruhr (UA Ruhr)

November 5

The German Research Landscape: Funding Opportunities and Non-Academic Careers

Co-Sponsors:

INet NYC

German Academic Exchange Service (DAAD)

German Research Foundation (DFG)

November 12

FOCUS: Smart Grid 2015

Co-Sponsors:

Consulate General of the Federal Republic of Germany in New York

Transatlantic Climate Bridge

German American Chambers of Commerce, Inc. (GACC)

Selected Event Participants

The following is a selection of 2015 event participants who attended GCRI events in New York and at other locations.

- AARP
- Albert Einstein College of Medicine
- Allianz Global Investors
- American Federation for Aging Research
- American Museum of Natural History
- Barnard College
- BASF Corporation
- Bayer Corporation
- BMW Manufacturing Co., LLC
- Boehringer Ingelheim
- Boston Consulting Group
- Brookhaven National Laboratory
- Carl Zeiss Microscopy, LLC
- CERN, the European Organization for Nuclear Research
- Citigroup Inc.
- Cold Spring Harbor Laboratory
- College Board
- Columbia University
- Consolidated Edison, Inc.
- Cornell NYC Tech
- Council on Foreign Relations
- Daimler AG
- Dartmouth College
- DB Schenker, Inc.
- Delegation of the European Union to the United States of America
- Deloitte & Touche LLP
- Department of Health and Human Services
- Deutsche Bank AG
- Deutsche Presse-Agentur
- Deutsche Telekom Group
- Die Zeit
- EADS North America
- Elsevier B.V.
- Ernst & Young
- European Central Bank
- Federal Ministry of Economics and Technology
- Federal Reserve Bank of New York
- Federal Trade Commission
- Food and Agriculture Organization of the United Nations
- General Electric
- German Aerospace Center
- German Academic Exchange Service
- German Research Foundation
- Goldman Sachs
- Google
- Handelsblatt
- Harlem Biospace
- Harvard University
- Howard Hughes Medical Institute
- IBM
- Institute of Electrical and Electronics Engineers
- Intel Corporation
- International Monetary Fund
- Johns Hopkins University
- Johnson & Johnson
- JPMorgan Chase & Co.
- Lufthansa
- Massachusetts General Hospital
- Massachusetts Institute of Technology
- Memorial Sloan-Kettering Cancer Center
- Merck

- Microsoft
- Mount Sinai Hospital
- National Academy of Engineering
- National Cancer Institute
- National Institutes of Health
- National Institute of Standards and Technology
- National Oceanic and Atmospheric Administration
- National Science Foundation
- Nature Publishing Group
- New York City Department of City Planning
- New York City Department of Education
- New York City Economic Development Corporation
- New York University
- Novartis Corporation
- Office of Science and Technology Policy, The White House
- Office of the Mayor, The City of New York
- Pfizer Inc.
- Princeton University
- Public Broadcasting Service
- Reuters
- Rutgers University, The State University of New Jersey
- SAP
- Science Friday – NPR
- Scientific American
- Siemens Corporation
- Social Sciences and Humanities Research Council of Canada
- Spiegel Online
- Stanford University
- Süddeutsche Zeitung
- The Andrew W. Mellon Foundation
- The Aspen Institute
- The Brookings Institution
- The Chronicle of Higher Education
- The Dana Foundation
- The Earth Institute, Columbia University
- The Economist
- The Henry Luce Foundation
- The Huffington Post
- The New York Academy of Sciences
- The New York Times
- The Rockefeller University
- The Wall Street Journal
- The World Bank Group
- U.S. Agency for International Development
- U.S. Department of Commerce
- U.S. Department of Energy
- U.S. Department of Health and Human Services
- U.S. Department of State
- U.S. House of Representatives
- United Nations
- University of California, Berkeley
- Volkswagen of America, Inc.
- WABC-TV
- Weill Cornell Medical College
- Wharton School of Business, University of Pennsylvania
- World Economic Forum
- WQXR – New York Public Radio
- Yale University
- Zweites Deutsches Fernsehen

2015 Conferences & Symposia

January 14 – 15

BILAT USA 2.0 E.U.-U.S. Innovation Conference:
How to Integrate the Innovation Dimension in the E.U.-U.S. S&T Agreement?

Location: Brussels, Belgium

January 19 – 20

2nd International German Forum 2015:
What Matters to People: Innovation and Society

Location: Federal Chancellery, Berlin, Germany

January 29

Science Diplomacy:
The Role of Science in International Relations and Global Development

Location: New York University, New York, NY

February 5 – 6

2015 AARP-UN Briefing Series on Global Aging

Location: United Nations Headquarters, New York, NY

February 15 – 18

Association of International Education Administrators 2015 Annual Conference:
Preparing Students for the Global Workforce in the 21st Century – New Challenges and Opportunities

Location: Washington, D.C.

February 21

19th European Career Fair at Massachusetts Institute of Technology (MIT)

Location: Cambridge, MA

February 26

5th Annual Conference on Sustainable Real Estate

Location: NYU Schack Institute of Real Estate, New York, NY

February 26

Initial Meeting for Research Marketing Coalition Group (Auftaktveranstaltung zum Aktionsbündnis Forschungsmarketing)

Location: Berlin, Germany

March 6

Columbia University Spring Career Fair

Location: Columbia University, New York, NY

March 28 – April 1

Experimental Biology Annual Meeting

Location: Boston, MA

April 10

Information Session on Funding and Career Opportunities in Germany

Location: Dartmouth College, Hanover, New Hampshire

April 30

8th Annual Psychology Day at the United Nations Conference:
Reducing Health Inequalities Within and Among Countries: Psychology's Contributions to the United Nations Post-2015 Global Agenda

Location: United Nations Headquarters, New York, NY

May 12

Success Stories in Non-Academic Career Tracks:
Overcoming the Barriers of an International Scientist in the USA

Location: The New York Academy of Sciences, New York, NY

August 14

DAAD Research Ambassadors Seminar

Location: New York, NY

August 16 – 20

250th American Chemical Society (ACS) National Meeting and Exposition

Location: Boston, MA

August 28 – 30

15th German Academic International Network (GAIN) Annual Meeting

Location: San Francisco, CA

September 16

Carnegie Bosch Innovation Conference:
Entrepreneurship and Innovation in Global Markets

Location: Pittsburgh, PA

September 17

Transatlantic Entrepreneur Partnership Conference – NYC International Day

Location: NYU Polytechnic School of Engineering, Brooklyn, NY

October 13

OktoberINVESTFest 2015 – The 4th Annual Investor's Conference

Location: The New York Academy of Sciences, New York, NY

October 16

Destination Europe

Location: Chicago, IL

October 17 – 21

Society for Neuroscience (SfN) Annual Meeting

Location: Chicago, IL

October 23

Engineering Consortium Career Fair

Location: Columbia University, New York, NY

October 23

Career Booster German(y)

Location: Goethe-Institut, New York, NY

October 28

East Coast Industry Forum

Location: Mac Mahon Center, Jersey City, NJ

October 30 – 31

German American Conference at Harvard

Location: Harvard University, Cambridge, MA

November 5

18th Annual Colloquium on International Engineering Education:
Collaborations in Germany and the U.S.: Challenges and Opportunities for Strategic International Partnerships

Location: New York, NY

November 10

German Career Day:
Are You Ready for the Global Market?
East Brunswick High School

Location: East Brunswick, NJ

December 7

2015 Global Trends Cybersecurity Conference:
Securing Our Financial Infrastructure

Location: New York, NY

2015 Speakers & Guests

...who participated in GCRI events in New York and at other locations

Keeping Wisdom in the Workplace

Germany's Older Workforce Creates a New Paradigm

Many of the world's major economies are grappling with how to manage an aging workforce, and Germany, which has the oldest population in Europe, is no different. But rather than bear the full brunt of what could be considered a perfect storm — large numbers of workers set to retire and too few young people filling their shoes — the country is changing the outcome, and improving the experience of all workers in the process.

As far back as the 1990s, when just one million members of the German workforce were age 60 or older, businesses forecasted that the looming costs of retirement pensions and increased healthcare associated with age, along with lower birth rates, could bring disastrous financial impacts and hamper future productivity. After exploring — and ultimately bypassing — the potential of earlier retirement to ease the crunch, companies realized that the best way to weather the loss of older workers was, simply, to keep them.

By 2011, more than three million German workers were over 60 years old. This leap was driven by major companies, including Bosch, BASF, Thyssen, Daimler, Audi, and others creating innovative programs to make the most of older workers' capabilities while respecting the physical changes that often accompany advancing age. Rather than the traditional model of retirement, where a worker reaches a designated age and exits the workforce permanently, these programs allow aging workers to either remain part of the company and adjust

"Since 2008, the number of working Germans aged 60-64 has jumped from 28 percent to 50 percent, allowing businesses to maintain productivity and even grow during difficult economic times."

their duties and schedules over time, or even to return to the company after a period of retirement.

For more than 15 years, Bosch has operated a program that allows retirees, dubbed "senior experts," to rejoin the company for contract periods to work on special projects. The advantages are immediately apparent — these workers bring decades of knowledge and experience to a task and can be immediately productive with no training and little guidance. The Generations@ Work program, which began at BASF in 2006, includes health management initiatives focused on improving physical fitness as well as prevention and screening, ongoing professional development training, flexible schedules, and opportunities for intergenerational teamwork to maximize gains and maintain productivity amid the shifting workforce demographics.

Whether the employee is aging on the job or returns to work following retirement, the benefits for younger employees are vast. One of the great drawbacks of the traditional retirement model, particularly when there's a shortage of younger workers coming into the system, is the loss of older workers' institutional knowledge and experience. By making multigenerational workplaces the new norm, these forward-thinking companies are ensuring that the next generation of leaders has the invaluable opportunity to learn from their predecessors.

These types of working arrangements, which emphasize flexibility, shorter-term goals, and opportunities to work from home, appeal to older workers not only from a financial perspective, but also from a health perspective. Research on aging supports the notion that the human brain is far more likely to suffer from underuse than overuse, and that contrary to earlier beliefs, the brain retains some degree of plasticity for a lifetime. The concept of a neural network that develops in a frenzy in infancy and early childhood, then peaks in efficiency until midlife, when it slowly and irreparably declines, has been replaced by a model that portrays the living brain as continually responsive, its circuitry changing to adapt to new activities and experiences. When it comes to engaging an older workforce, the science speaks to the need not only for work to continue as a means of maintaining brain function, but also for new tasks, challenges, and training to be introduced as a way of stimulating it. Research also shows that physical activity, even fairly gentle activities such as walking, may stave off the onset of dementia and stall the more devastating effects of diseases like Parkinson's. Rising each morning, traveling to an office, and moving through the work day isn't just good for the body, it can be good for the mind.

Efforts to extend careers and reengage retirees have been overwhelmingly successful. Since 2008, the number of working Germans aged 60-64 has jumped from 28 percent to 50 percent, allowing businesses to maintain productivity and even grow during difficult economic times. Pressures from the other end of the employment spectrum — at the entry level — still need to be addressed to stabilize the employment picture. But thanks to the work of insightful companies willing to adapt demands to the strengths of a changing workforce, within the most senior ranks, surprisingly, it's business as usual. ■

By Hallie Kapner

Cognitive Plasticity in Adulthood

January 28, 2015

Demographic change poses a serious challenge to Western nations. As society faces longer life expectancies and lower birth rates, older adults are becoming an increasingly influential force. As a result, aging is emerging as a key area of scientific research, with cognitive decline as one of the most pressing issues currently under examination. Scientists are not only studying diseases affecting the brain, but also ways to enhance cognitive performance in general. A panel of aging experts convened to discuss why some older adults perform at higher cognitive levels than others and how our habits and environments influence age-related cognitive trajectories.

Event Speakers:

Prof. Dr. Ulman Lindenberger
Director, Center for Lifespan Psychology
Max Planck Institute for Human Development

Dr. Ursula Staudinger
Director, Robert N. Butler Columbia Aging Center; Professor of Sociomedical Sciences and Professor of Psychology, Columbia University

Dr. Joann Halpern
Director, German Center for Research and Innovation (Moderator)

Co-Sponsor:

MAX-PLANCK-GESELLSCHAFT

Interview with:

Univ.-Prof. Dr. Claudia Voelcker-Rehage

Professor, Sports Psychology (with a focus on prevention and rehabilitation), Technische Universität Chemnitz

How does the way we process information change as we age?
As we age, information processing is slower and less efficient. This applies to cognitive, motor, and sensory information and is typically indicated by increased reaction times in laboratory tests.

The following changes are related to slower and less efficient processing: During aging, the average brain volume decreases; particularly, dendritic branches and spines show age-related decline. Furthermore, a reduction of blood capillaries and glial cells contributes to brain volume decline. The latter provide a protective and supportive structure for the neurons and connect them to the blood capillaries. Also, the microstructure of the white matter changes with age. The density and integrity of axons as well as their myelinization get impaired. In addition, a reduction in the number of important receptors and a reduced release of neurotransmitters can be observed with increasing age. The dopamine system, in particular, is ascribed a key role here as dopamine and the dopaminergic system are involved in many manufacturing processes in the brain as well as in learning. Functions controlled by the prefrontal cortex, like selective attention, response inhibition, and working memory, seem to be more affected by aging than functions that rely on activity in other cortical or even subcortical regions.

What is the relationship between physical activity and cognitive performance in older adults?
Age-related changes in the brain and cognition show remarkable individual differences. Aging trajectories may be delayed or reveal changes in slope in both a positive and a negative direction, revealing the plasticity of the aging process. The high variability of cognitive performance during aging indicates that aside from genetic predisposition, individual lifestyle is a crucial factor. Physical activity is an important and successful avenue for stimulating cognitive plasticity. It has been shown that physical activity in older adults can positively influence cognitive function, brain structure, and brain function. The effect of cardiovascular training, in particular, has been examined. Positive effects of cardiovascular training have been found for executive control tasks and episodic memory. Cardiovascularly fit participants show more efficient information processing and higher volumes of related anatomical structures. Not only does cardiovascular exercise seem to have positive effects on the brain and cognitive function, but so do other forms of exercise like coordinative exercise, dance, and strength training. It is worth noting that systematic exercise can improve cognitive performance even in previously inactive older adults.

How can organizations create an office environment that maximizes the productivity of its older workers?
Generally, age-related changes in biological and mental functions start early, already appearing in our late 20s or early 30s. However, these changes are mainly observed in the laboratory and may not necessarily appear at work. Thus, it is highly likely for people to be able to compensate for a moderate reduction of physical and cognitive function at work, thanks to their individual job-related expertise. Only in very complex or demanding situations, such as under very high physical stress, under extreme time pressure, or when many tasks have to be processed simultaneously, does degradation in performance become visible. In this vein, a number of studies have demonstrated that job performance depends more on experience than on one's actual calendar age. Especially monotonous occupations and work tasks have been shown to negatively affect mental performance and productivity in older age. People working in a profession in which they have to continuously deal with new tasks and challenges generally reveal stable performance levels or comparable performance levels to that of younger adults.

With respect to physical and mental age-related changes, the following aspects should be considered for an optimal work environment for older employees, e.g.,:

- Older adults are good at integrating new information into pre-existing knowledge: New content should be related to prior knowledge.
- Sensory deficits occur: Good visual and auditory conditions are necessary.

With respect to learning, the following should be considered:

- Older workers learn more slowly than younger workers: The learning pace should therefore be adapted and/or individualized.
- Memory decreases: More frequent repetitions and shorter sessions are necessary.
- Older adults are more easily distracted by irrelevant information: A good outline and restriction of materials will help them focus on the essentials.
- Stress disturbs the consolidation of what has been learned: A low-stress environment should be created. ■

Fighting Cybercrime
Joining Forces Against a Moving Target

Two of the most invasive attacks in government history took place in Germany and the United States in 2015. There were no militaries involved, no aircraft or ammunition. The attacks were silent, stealthy, and by the time they were discovered, huge amounts of potentially sensitive information had been exposed. Cyber attacks, such as those on the U.S. State Department and German Parliament, grow more frequent, complex, and costly each year, and in an ultra-connected world, no industry is spared.

The scope of cybercrime is staggering, and the impacts so far-reaching that the World Economic Forum counts cybercrime and data theft among the top ten global risks, alongside catastrophic events such as unmitigated climate change and forced mass migration. Annual updates on the state of cybercrime have long showed three troubling trend lines moving in the wrong direction. First, the number of attacks grows each year — globally, there were 48 percent more cyber attacks in 2014 than in the previous year, with more than one million pieces of new malware released each day. Second, hackers have grown savvier, and the time between the launch of an attack and its detection is increasing, as is the time it takes to patch vulnerabilities. Lastly, the financial losses due to cyberattacks are rising, and a single incident can drain millions from a business and damage its public image.

Cyber Security & Ethics

May 21, 2015

As Internet usage expands from PCs and smartphones to wearables, connected cars, and smart homes, cyber security is becoming an increasingly important aspect of our daily lives. It affects us on an individual basis as well as a community. We voluntarily give our data to companies in order to receive services free of charge, but we are also under surveillance without our knowledge. The more we share our data, the more we lose oversight of who has access to what, and whether access to this data will be used to protect or attack us. A panel of legal and technical experts discussed how we can defend against cyber threats in the future and achieve a balance between the protection of privacy and our desire to feel safe.

Event Speakers:

Prof. Russell Miller
Professor of Law
Washington and Lee University School of Law

Prof. Dr. Dr. h.c. Günter Müller
Director, Institute of Computer Science and Social Studies (IIG);
Professor, Albert-Ludwigs-Universität Freiburg

Prof. Dr. Stephanie Schiedermair
Chair of European, International and Public Law, Leipzig University

Prof. Steven M. Bellovin
Percy K. and Vidal L. W. Hudson Professor of Computer Science, Columbia University (Moderator)

Co-Sponsor:

U15

Keeping pace with a threat that evolves faster than any disease requires more than just local vigilance. It demands global cooperation between computer security professionals, businesses, and governments, a feat complicated by the fact that cybercrime often spans the globe. Hackers in one country may design an attack targeting a business or government in another country, which is then executed by colleagues in yet a third country. Sourcing attacks that crisscross borders is at least as difficult as preventing them, and apprehending those behind the attacks pushes the limits of international law.

"The new legislation also positions Germany to better cooperate with the international community on matters of information security, which is crucial to improving global defenses against cyber criminals."

The Council of Europe's Convention on Cybercrime is the only international treaty to set standards for collaboration against cybercrime, and it is more than a decade old. In light of new forms of cybercrime and an increase in criminal online activity in developing nations, many have argued for updates to the terms and increased enforcement. In the interim, some nations have taken their own steps to safeguard citizens and build cooperation between businesses and government, with the United States, France, United Kingdom, and many others taking notable steps in this area.

In 2015, Germany passed the most comprehensive cyber security legislation in the country's history, the IT Security Act, designed to enforce higher security standards for all critical infrastructures. This legislation is the latest in a series of moves to bolster online security in the face of increasing cyber attacks on all sectors. More than 96 percent of all small and medium-sized German businesses reported dealing with some form of information technology attack in 2014, and that same year, Deutsche Telekom estimated that hackers launched more than one million attempted attacks per day on its networks.

The IT Security Act combines the German government's history of setting strong requirements for maintaining information security safeguards with the country's technological prowess in cyber security research and computer engineering. The goal is to create a system in which top-notch technical defenses against cyber attackers are in place across the country, and incidents are detected quickly to minimize damage. Unlike in the United States, where companies implement cyber security measures as a matter of self-regulation and self-protection rather than of law, German entities are mandated not only to adhere to strict standards of cyber security, but also to report significant incidents to the German Federal Office of Information Security (BSI), which was established in 2011.

The new legislation also positions Germany to better cooperate with the international community on matters of information security, which is crucial to improving global defenses against cyber criminals. The Network and Information Security (NIS) Directive, proposed in 2013 and only recently approved, creates a framework for all EU nations to collaborate against cyber criminals. Professor Stephanie Schiedermair, Chair of European, International, and Public Law at Leipzig University, highlighted the need for such joint efforts not only between nations, but also between legal and technical experts. "It can be very difficult to find the author of a cyber attack, and if you don't find the author, you cannot apply the laws," said Shiedermair. "That's why any comprehensive approach to cyber security needs to be not just international, but interdisciplinary." ■

By Hallie Kapner

Interview with:

Prof. Dr. Michael Waidner

Director of the Fraunhofer Institute for Secure Information Technology (SIT); Professor at TU Darmstadt; Speaker of the Center for Research in Security and Privacy (CRISP)

How has cybercrime evolved over the past decade?
The impact of cybercrime on all of us has dramatically increased. A large fraction – at least one-third – of Internet users and companies in Germany has already experienced some kind of cyber attack. The overall economic impact is huge. In Germany it is considered to be similar to the economic impact of traffic accidents, i.e., in the double-digit billions. At the same time, trust in IT is very low due to people's personal experiences, but perhaps even more so due to the many high-profile cases, such as the successful cyber attack against the German Bundestag or the mass surveillance and cyber attack capabilities of the NSA. From a more technical perspective, cybercrime has become an astonishingly professional activity. There is a wide variety of tools and services that criminals use, e.g., for building malware, for hosting malware on innocent websites, and for having it installed on their victims' computers. Increasingly, cyber attacks are targeted at specific organizations or individuals. I assume all of us have received and hopefully recognized phishing emails that were addressed to us by name, which represents a very simple case of a targeted attack. Attacks against individuals who have access to particularly interesting data or systems – e.g., the CEO of a company or the system administrator in a government lab – can be significantly more sophisticated and targeted.

What can individuals and organizations do to protect themselves against cyber attacks?
The very first thing organizations need to do is to assess their situation and apply best practices, i.e., well-known processes and technologies. Organizations need to be aware of the risks and threats, and they also need to be prepared in case an attack is successful. The majority of today's attacks can be handled that way. This is not a one-time process; security needs to be continuously updated and maintained. Of course, this approach does not work vis-à-vis a very powerful adversary like foreign intelligence services. But it will work against the average cybercriminal.

Individuals, regular non-expert users, are in an even weaker position than organizations. It is important to raise awareness and offer education to them. But this approach is very limited; regular users are just not particularly interested in IT security; rather, they just want to get things done. It is therefore even more important that we as IT professionals come up with IT solutions that offer out-of-the-box security, without demanding too much from regular users. A good example of this is email encryption. The technology itself has existed for decades, but hardly anyone uses it because it is too complex. One of our current research topics is therefore developing a system, which we call "Volksverschlüsselung" (encryption for the people), which will make it absolutely trivial and effortless for everyone to encrypt their emails.

What will be required to fight cybercrime effectively in the future?
One very important step towards better security is incentivizing organizations to focus more on security and to apply best practices. Security must transition from a voluntary cost factor – which organizations tend to minimize – into a mandatory cost of doing business. One way of achieving this is establishing legislation that mandates minimum levels of security, e.g., as has been done for certain sectors by the new German IT security law. Of course, we also need to ensure that information technology matures and that the state of security and privacy improves overall. One key area of activity will be education for professionals – every computer engineer, every programmer must know at least the basics of security and privacy. And, last but not least, we need to invest in research, in particular, in how to measure security and how to achieve security and privacy by design. ■

Turning the Tide on Ocean Destruction

The most ancient place on Earth isn't an obvious site to look for wisdom about the future. But when it comes to the fate of our planet and its delicate environment, our oceans are a rich source of information. For 3.8 billion years, since life first began, the oceans have been home to countless species. But nothing has impacted the Earth's waters more than a species that arrived just 200,000 years ago — humans.

Over the past century, the forces of industrialization and population explosion, along with overfishing, pollution, and coastal destruction, have pushed the world's oceans to the brink of ecological collapse. A snapshot of the state of marine life leaves much to lament — more species are endangered or extinct than any time in human history, crucial reefs are eroding, and an estimated five trillion pieces of plastic are afloat in the world's increasingly polluted waters.

Public awareness campaigns have done little to curb the flow of garbage into the world's waterways. Eighty percent of the plastic in the ocean originated as beach litter or washes into the sea from rivers, fatally ensnaring or choking fish and marine mammals who mistake these objects for food.

As the world's population grows, the oceans bear the burden of satisfying human appetites not just for food, but for goods shipped from afar to markets around the globe. More than half of global fish populations are fully exploited — there is no more room for growth — and fully one-third are overexploited to the point of collapse. Without a global shift to more sustainable fishing practices, experts warn that the world's fisheries could collapse as a whole before 2050. Massive shipping vessels tirelessly crisscross the seas, transporting goods from one side of the world to the other, leaving toxic

"As part of the Science Year agenda, a high-tech fleet of research vessels is conducting interdisciplinary research on marine environments, with a particular focus on changes in the Arctic."

spills, damaging fragile reef systems, and dumping garbage and sewage. Shipping vessels are also a primary method by which invasive marine species spread to new environments, often wiping out native species and destroying local ecosystems.

Discussions of climate change have long focused on greenhouse gases and limiting emissions. Today, that conversation has moved from air to water, as scientists are discovering how the ocean reveals the state of the planet not just in the dwindling species and mountains of trash, but in the changing chemistry of the water itself. Oceans absorb about one-third of the carbon dioxide released into the air, and as levels of environmental CO_2 rise, so too does the amount taken in by the oceans. Increased levels of CO_2 have shifted marine pH, tipping a balance that had been stable for more than 300 years. The resulting phenomenon, called ocean acidification, imperils thousands of aquatic species, especially corals, crustaceans, mollusks, and some species of plankton.

Amid the many difficulties, however, are considerable signs of hope. A growing group of activists, scientists, policymakers, and even everyday citizens are determined to use the same power that humans have long wielded to the detriment of our oceans to redeem this precious resource.

Major international collaborations, such as those led by the United Nations, Greenpeace, and Conservation International, have raised billions to bring awareness and action to preserve the world's marine habitats. Increasingly, nations are pioneering their own efforts as well. The German Federal Ministry of Education and Research (BMBF) recently announced the theme for Germany's Science Year 2016 — Oceans and Seas — marking a year-long push for public awareness under the motto, "Discover, Use, Protect."

As part of the Science Year agenda, a high-tech fleet of research vessels is conducting interdisciplinary research on marine environments, with a particular focus on changes in the Arctic, where melting glaciers represent not only a loss of local habitat, but also a major threat to the currents that regulate temperature worldwide.

By Hallie Kapner

Sustainable Ocean Development Conference: A Perspective from Kiel Marine Scientists

September 28-30, 2015

The aim of this conference was to help solve today's global challenges by bringing together scientists from various backgrounds in the natural and social sciences from Germany, the U.S., and Canada to discuss and explore possible inter- and transdisciplinary solutions for sustainable ocean development, a critical challenge facing the Earth today. Topics addressed included marine conservation, environmental change and sea level rise, the deep ocean and ocean services, and the question of stakeholder involvement.

Co-Sponsors:

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Interview with:

Prof. Dr. Martin Visbeck

Head of the Research Unit, Physical Oceanography, GEOMAR Helmholtz Centre for Ocean Research Kiel

What is the effect of climate change on the state of oceans today?
Science distinguishes human climate change from natural climate change (sometimes referred to as climate variability). The addition of CO_2 and other gases to the Earth's atmosphere alters its radiative balance. On average, less heat is able to 'escape' the planet and the planet begins to warm. Today, we can show that 90 percent of that additional heat in the Earth's system is warming the ocean. More than half of that energy is located in the upper 1,000 meters of the ocean, but almost half of the warming has already reached the deep sea. A warming ocean expands and that expansion causes the sea level to rise. Global sea level rise is measured by satellite systems. However, in the last decade, the sea level has risen twice as fast as a warming ocean could explain. The melting of land-based glaciers and ice sheets is providing significant extra runoff water to the ocean. A warming ocean and atmosphere change ocean circulation and wind patterns. Today, those changes are still small, but the expectation is that they will grow with time. Increasing levels of CO_2 in the atmosphere cause increasing gas transfer of CO_2 from the atmosphere to the ocean. The CO_2 dissolves in the ocean water and changes its chemistry. The pH drops and the ocean becomes more acidic. This process – called ocean acidification – is expected to worsen in the future. Many other secondary effects exist, including a slower uptake of oxygen because the solubility of warm water is lower than that of cold water. Together with a more active marine ecosystem in a warmer climate, the level of dissolved oxygen will be reduced. We call this ocean deoxygenation.

Why is the biodiversity of marine ecosystems so important?
From a human perspective, the ocean provides many services that are important for human survival. It provides 50 percent of the oxygen we breathe, 90 percent of long distance transport, and 95 percent of telecommunications. Half of the global population is dependent on marine food, which constitutes roughly 20 percent of its protein diet. Fish and algae both depend on a healthy and productive ecosystem and research shows that a more diverse ecosystem is more resilient to change and stress. The protection of marine biodiversity is one of the measures necessary for maintaining a healthy and productive marine ecosystem.

Where are GEOMAR's research vessels located? What type of research is being conducted on these vessels?
GEOMAR scientists have access to a German fleet of research vessels. The fleet is owned by the German government and operated by different institutes on behalf of the research community. We operate an ice breaker (Polarstern), two ocean vessels (Sonne and Meteor), and several regionally operating vessels (Merian, Poseidon, Alkor, and Heinke). All vessels are designed as multipurpose ships that can support a wide range of marine science. That includes hydrographic measurements of the physical, chemical, and biological properties of the ocean. They also conduct sea floor observations and seismic imaging as well as provide support for an increasing range of autonomous vehicles, including a drifter, profiling floats, gliders, propelled autonomous vehicles, and moored observatories. We look at changes in water mass properties, circulation, and the ocean's biogeochemistry as well as further explore the discovery of new species and geological sea floor properties. We are interested in discovering the deep ocean and understanding the oceans' role in climate dynamics and the marine ecosystem. We are exploring new ways to use ocean resources in a more just and sustainable manner. ■

Social Innovation:
A New Path for Creating Social Change

In the 21st century, it doesn't take much to call something "new." The pace of innovation in the technology sector alone is dizzying, and anyone with access to the Internet can testify to the nonstop parade of newer, better, and faster ways to accomplish the tasks of daily life.

Few would argue that innovation has not served to enrich the lives of billions — connecting us in ways unimaginable a generation ago, preventing and reversing disease, and creating extraordinary new markets for goods and services. But not everyone benefits from the pace of progress, and for every success story, there are many left far behind. In the headlines, as well as in the stories of billions who never make it into the media, are tales of large-scale disenfranchisement, financial collapse, unemployment, persecution, oppression, and poverty.

Bringing innovation to the darker, more challenging aspects of society is notoriously difficult, yet over the past decade, a concept known as social innovation has shown that "doing good" can be both a means and a very successful end.

Social innovation is familiar by way of examples, including microfinance, the Fair Trade movement, and cap-and-trade emissions policies. Each addresses a social problem by blurring the traditional boundaries of government, private and nonprofit sector solutions, creating a new space where problems are solved to the benefit of all. By definition, social innovation is a solution to a social problem that is more effective than the current systems, and through which value accrues not to an individual, but to society as a

Transatlantic Perspectives on Social Innovation

October 6, 2015

Social innovation is on the rise worldwide. As a novel approach to addressing complex problems in global health, social care, education, and environmental policies, social innovation has been embraced by stakeholders and communities at the local, regional, and even national levels. The speakers discussed success factors that lead to lasting social change, how cross-sector dynamics can be enhanced to create sustainable social value, and how different social, economic, cultural, and historical contexts enable or inhibit social innovation. Leading social innovators from North America and Europe tackled these issues during a workshop the following day.

Event Speakers:

Kriss Deiglmeier
CEO, Tides

Prof. Dr. Josef Hochgerner
Senior Strategy Advisor
Centre for Social Innovation Vienna

Prof. Dr. Jürgen Howaldt
Director, Central Scientific Institute
Technische Universität Dortmund

Eleni Janis
Vice President, Social Capital Desk
New York City Economic Development Corporation
(Moderator)

Co-Sponsor:

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whole. The solution itself need not be entirely novel — financial loans, for instance, are not new. But situated within a new context — using small loans as a means to spur entrepreneurship among those with no access to traditional banking — a new paradigm for poverty relief and social change was born.

The social innovation movement springs in part from an acceleration of some global crises, including climate change, mass migration, aging populations, and financial market collapse. The strain of such stresses exposes weaknesses in the traditionally siloed systems of government and business, paving the way for an environment where new systems can emerge and social innovation can thrive.

"The social innovation movement springs in part from an acceleration of some global crises, including climate change, mass migration, aging populations, and financial market collapse."

Like many other countries, Germany is well-acquainted with the pressures of globalization and urbanization, the impact of global financial instability, the need to take action to reduce climate change, and the difficulties of maintaining a strong economy amid a shrinking workforce. Unlike other countries, however, Germany has embraced the idea of social innovation as a national priority, calling on government, businesses, and nonprofits to suspend some of the rigors of traditional procedures and collaborate in the name of creating systemic change.

The International German Forum, founded in 2013 by Chancellor Angela Merkel to facilitate international exchange on complex issues, convened its second annual conference in 2015. The theme, "What Matters to People — Innovation and Society," focused on exploring the potential for social innovation to improve societal well-being. Experts from 30 countries attended, including the director of the German Center for Research and Innovation.

"We know that economic growth and employment rely on more than just technological development," said MinDir. Matthias Graf von Kielmansegg, Director General for Strategies and Policy Issues at the German Federal Ministry of Education and Research (BMBF). "Research to better understand social innovation and how to foster it is an important element of the new High-Tech Strategy of the German Federal Ministry," he said.

The roots of social innovation are already taking hold, with Berlin emerging as a hub for the kinds of business incubators and collaborative workspaces from which new social initiatives often spring. But nationwide, the rapid influx of more than one million refugees is testing Germany's appetite for social change, as well as providing unprecedented opportunity to test new ideas. Social innovation is likely to play a key role in developing strategies for assimilation and acceptance, and the crisis will no doubt provide ample fodder for research on the impacts of mass human migration, and how social innovation may help mitigate them.

In April 2015, following the Forum, the German government launched a national dialogue with its citizens, inviting diverse perspectives and suggestions on how to improve quality of life for all. This unprecedented act testifies to the country's commitment to rewiring the traditional mechanisms of change by tapping a fundamental tenet of social innovation — the notion that transformative ideas can come from anyone, anywhere. ■

By Hallie Kapner

Interview with:

Prof. Dr. Jürgen Howaldt

Director, Central Scientific Institute, Technische Universität Dortmund

Why is social innovation an important topic for Germany?
Social innovation enhances the innovative capacity of society. With regard to Germany, social innovations are urgently needed to make our economy more sustainable, to promote innovative workplaces, develop new solutions in health and social care, and foster new forms of intelligent mobility. The significance of social innovations for successfully meeting social, economic, political, and environmental challenges is not only recognized by stakeholders at the local, regional, and national levels, but also on a global scale.

Innovation policies are of critical importance because they have the potential to facilitate societal participation in social innovation on a larger scale. Policies can increase involvement, for example, through co-creation and citizen empowerment. Policies should take into account the potential of social innovation in the social economy, civil society, businesses, and the state (multi-level governance), as well as promote alliances between universities, companies, and the state around social innovation.

How can universities cultivate the next generation of social innovators?
We need universities and research institutes as important drivers of social innovation. Universities and research institutes play a significant role in the field of technological innovation, but until now have not been systematically involved in processes of social innovation. The emerging issue of University Social Responsibility has shown that there is untapped potential for higher education institutions to be socially innovative in relation to their environments. This can be observed at the local level, in which universities establish relationships with communities and neighborhoods in order to participate in the processes of problem-solving. In this sense, one central question is how universities can become systematically involved in social innovation processes beyond typical top-down patterns where the former create solutions and the latter just play the passive role of a target group that receives support. Concepts like design thinking or action research may help universities and research institutes get involved in social innovation processes.

At the same time, intermediary structures, such as social innovation laboratories and social innovation centers have been established in local communities, cities, interministerial and transnational contexts – sometimes in cooperation with universities. Such structures have gained importance especially at the local level. Yet despite their growth both in terms of sheer numbers and diversity, there are still only a few successful examples. With more and more of these intermediaries emerging, we will be able to better understand and develop structures and strategies for social innovation for the urban environment alongside their counterparts for technological innovation in a complementary way.

Last but not least, there is a growing necessity for the social sciences and humanities to find new roles and relevance by generating knowledge applicable to the new dynamics and structures of contemporary and future societies.

In which areas will social innovations have the greatest impact in the future?
Our society is not only facing such challenges as social exclusion and unemployment as well as inequalities in wealth, education, and health care, but also climate change and sustainable development. The most urgent and important innovations in the 21st century will take place in the social field. Traditional ways in which the market and the state have responded to societal demands are no longer sufficient. At the same time, technological innovations reveal limitations when it comes to coping with pressing societal challenges. If Germany wants to move forward on its way to becoming a global innovation leader, it will be necessary to include social innovation as part of a comprehensive innovation strategy and to open up the innovation process to society. However, in order to better assess the impact of social innovations, we need to understand the conditions under which they emerge, spread, and lead to social change. This is a key task of social innovation research, an emerging area which should be given higher priority if we want to meet the numerous challenges our society is facing. ■

Interview with:

Prof. Dr. Andreas Meyer-Lindenberg

Director, Central Institute of Mental Health, Mannheim, Germany; Professor and Chairman of Psychiatry and Psychotherapy, Heidelberg University

Living in a major urban area is associated with greater lifetime risk for anxiety, schizophrenia, and mood disorders. Why?

That's a very good question. It's actually quite interesting because cities are a big success story, in general. People in cities are, as a rule, healthier; they have better access to health care and contraception; they are richer; and that is one of the reasons why there is massive urbanization. But there is also a dark side, and that is exhibited by mental illness, which is clearly increased in cities. If you're currently living in a big city like New York, your risk for depression and anxiety increases by about 30, 40, 50 percent in large analyses. And if you're born in a big city and raised there in the first years of your life, then the risk for schizophrenia, a severe mental disorder, increases by 300 percent. That's a lot more than any gene, for example, that we know for these illnesses. So, that curious observation has led many people to theorize: "What could it be in cities that causes increased risk of mental illness?" And one of the findings that our laboratories had in a study conducted at the University of Heidelberg was that this might have to do with social stress – with people in cities being more reactive to social stress and we think also being more exposed to social stress, especially when social networks in cities are fragmented.

What can a city dweller do to immunize his or her brain against the effects of urban stress?

This is a very good question because you can't easily move out of the city. That is something people can try individually, but as a group, more than half of the world's population lives in cities, so it will become rather crowded in the country if you try that. You'd have to try something else and part of what our research is currently doing is trying to figure out which aspects of city life are good for you or bad for you with regards to resilience to stress. One result from that research is that it is really good to be exposed to green space. It can be as small as a tree in the corner; it can be Central Park or The High Line. The extent to which you are exposed to green space is up to you; however, research has clearly shown this to have a very beneficial effect on your stress processing. Another thing that you should be trying to do is to improve your social connectedness because one of the paradoxes of cities is you are very close together, the packing density is high, if you will, but the connectedness of people is lower and the connections themselves are often not very positive; they can even be adversarial. So, working on that, having spaces where people know you and like you, like a club or you go to a choir and sing, or work with your family and friends, that's going to be very beneficial. And finally, if you're really stressed, there are proven techniques that are easy to learn, such as mindfulness, which is a technique derived from meditation that we now use very broadly in psychiatry to help people relax and get a grip on their emotions. So there are always things that you can try to do to reduce your stress in cities.

What are some of the studies you're currently conducting in this area?
As a follow-up to our experiment that showed that social stress processing is abnormal in the brains of city dwellers, we're currently using this observation to try to find out what exactly it is in a city that increases your risk or increases your resilience to city life and stress. We are doing this by using a smartphone that people carry. It allows researchers to localize people in cities. We ask them: "How do you feel?" "What's your stress level?" Things like that. We also have maps of the city environment, maps of green spaces or socioeconomic status or noise or pollution, things that we believe might be important. So we track people's experience in conjunction with their social geographic environment and then we bring people into the laboratory at the University of Heidelberg. We conduct our experiment and measure in their brains the extent to which their stress processing is abnormal. Then we ask which aspects of the urban environment these people have been exposed to in the previous days predict the brain response. In this way, what we're getting – through a combination of neuroscience and urban science – is a rank ordering of things that are good for you or bad for you as a result of living in a city. ■

Stress and the City

November 2, 2015

Currently, over 50 percent of the world's population lives in cities. By 2050 over two-thirds of people will reside in urban environments. Although city living has many advantages, residing in cities is often associated with a high cost of living, high crime rates, and large population density. Research has also shown that people who grow up in cities process negative emotions, such as stress, differently from those who move to the city as adults. These and other factors often result in severe or prolonged stress. A panel of experts discussed whether city living makes the brain more susceptible to mental health conditions, whether people living in cities and rural areas differ in the way that their brains process stressful situations, as well as whether scientists are able to detect which aspects of city life are most stressful — findings which may help to improve the way urban areas are designed.

Event Speaker:

Prof. Dr. Andreas Meyer-Lindenberg
Director, Central Institute of Mental Health, Mannheim, Germany; Professor and Chairman of Psychiatry and Psychotherapy, Heidelberg University

Prof. Dr. Andrew Rundle
Associate Professor of Epidemiology, Mailman School of Public Health, Columbia University

Irmintraud Jost
Executive Director
Heidelberg University Association (Moderator)

Co-Sponsor:

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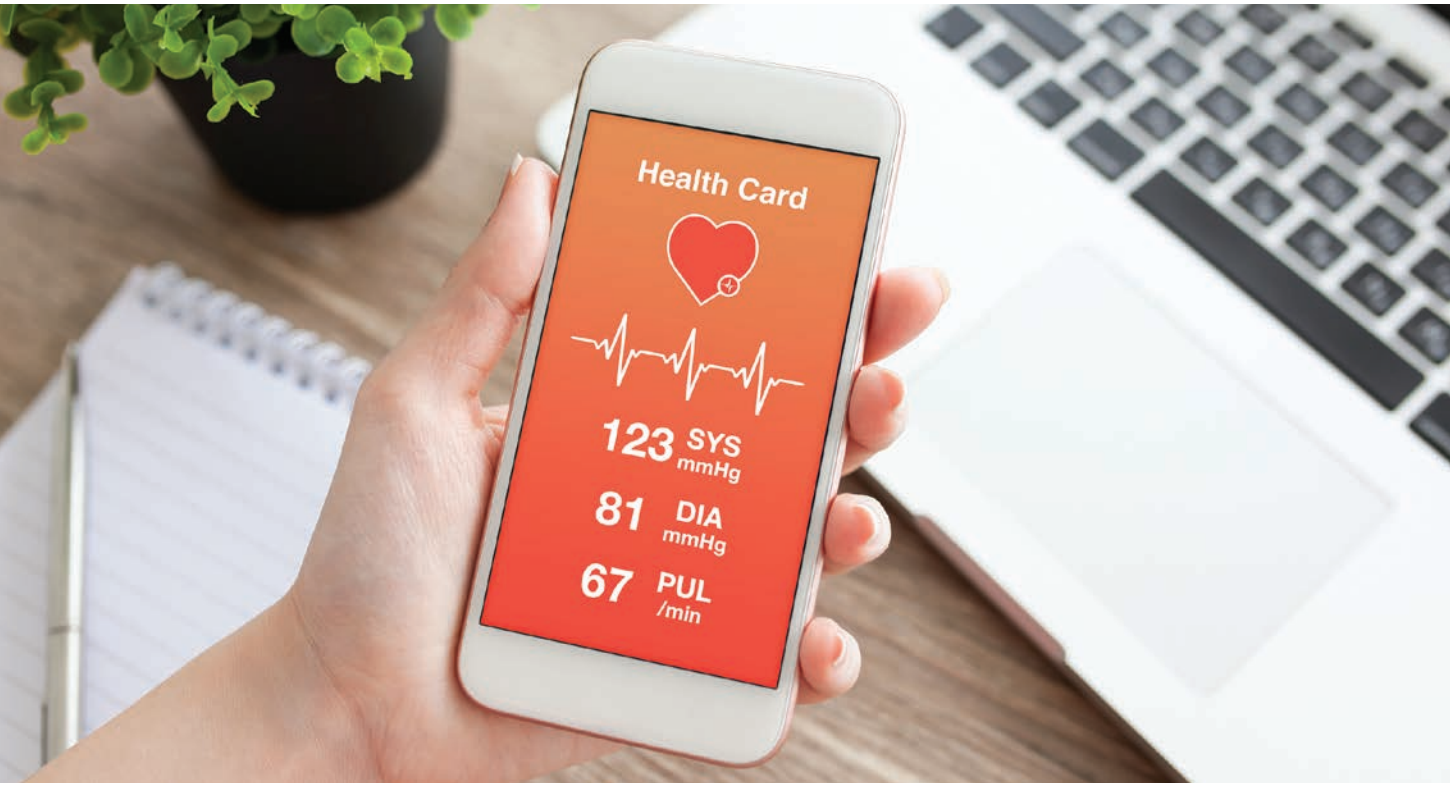
Patient, Monitor Thyself: Risks and Revolution in Personal Health Monitoring



Just ten years ago, asking a friend or colleague how many steps they walked that day would have been met with blank stares and befuddlement. Today, more people than ever have this number at their fingertips — along with how many miles they traveled, their average heart rate, and the number of calories burned in the process. Each morning, millions of people wake up and consult a smartphone app to find out how many hours they slept the night before.

Wearable technologies, like the activity trackers now ubiquitous among city dwellers and suburbanites alike, have shifted people's perception of fitness. What was once an amorphous concept has been transformed into a set of health-related data points as real and tangible as the exquisitely tuned, sensor-packed wristbands that millions wear each day.

An estimated 500 million smartphone users have downloaded personal health-related applications, and that number is expected to more than double before 2020. Whether the goal is to exercise more, eat less, stop smoking, dodge food allergens or learn to meditate, there's an app to support it.

Beyond fitness, chip miniaturization and the rapid advancement of sensor technologies is fueling a revolution in both wearable and implantable devices that can help diagnose and manage disease. For those with chronic illness, the wearables market is driven by neither form nor novelty; unlike the more than 50 percent

of people who have bought wearable health trackers but do not use them daily, a diabetic patient or one suffering from Alzheimer's disease may turn to such tools not for interest, but for survival.

As medical devices join the ranks of the Internet of Things, patients and physicians have the opportunity for unprecedented access to health information. Skin patches can track a diabetic patient's blood glucose levels 24 hours a day, without a single finger prick, to prevent spikes or crashes. Adhesive devices not much larger than a Band-Aid can monitor an elderly patient's heart rhythm at all times, or deploy 3-D sensors and onboard accelerometers to detect an unstable gait and call for help in the event of a fall. Smartphones can perform electrocardiograms and ultrasounds, and engineers have turned mobile devices into optical microscopes capable of fast, sophisticated disease detection in any setting.

This nonstop stream of data comes at a cost, however, explained Dr. Sam Bierstock, a retired surgeon and expert on healthcare information technology. "It's one thing to have all this data, and to collect it and make it accurate — but you have to get it to the people who can use it and not overload them. It's a huge challenge," he said. Data from personal health tracking apps as well as medical devices can bombard users and their healthcare providers with information that is certainly plentiful, but may have limited utility. Simply being able to generate data is not the end point — designing useful algorithms to interpret and transmit data to those in a position to act on it, whether it's the patient or his physician, is the ultimate goal of such personal health monitoring.

"Electronic health records are more valuable than credit card or even social security numbers, making them prime targets for cyber criminals."

Synchronizing and securing health data is also an area of concern. Electronic health record (EHR) systems, now used by most major and many smaller hospital systems, do not share information. Thus, data collected at one hospital is not accessible to hospitals using a different EHR, a major factor compromising continuity and quality of care. Additionally, electronic health records are more valuable than credit card or even social security numbers, making them prime targets for cyber criminals. "It costs the bad guys almost nothing to try to get into these systems, and they only need to find one way in," said Dr. Peter Levin, CEO of Amida Technology Solutions and the former Chief Technology Officer for the United States Department of Veterans Affairs. "As the good guys, we have to not only defend against blistering attacks [on our health record systems], but we have to remember all the ways attackers have tried to get in. The asymmetry is enormous."

Personal monitoring devices for both disease prevention and management are predicted to become a ubiquitous component of healthcare as quickly as the year 2020. But experts caution that even the smartest monitoring devices and the most precise data are useless without interpretation. As Dr. Bierstock noted, "medicine is not a digital science — you have to put the information into the hands of professionals." ■

By Hallie Kapner

Opportunities and Risks in E-Health

November 4, 2015

An increasing number of medical devices, such as heart rate monitors, pacemakers, defibrillators, and drug delivery systems, use wireless communication to monitor patients both in hospitals and at home. These devices use personal data and health-related information. Moreover, devices such as implantable cardiac defibrillators and pacemakers treat chronic diseases with electrical therapy that can be wirelessly modified. These devices and systems thus represent a growing risk with respect to the security of the medical data they contain. The speakers discussed patient privacy, data security, and a more integrative approach to healthcare in aging societies.

Event Speakers:

Dr. Peter Levin
Co-Founder & CEO, Amida Technology Solutions

Sam Bierstock, MD, BSEE
President & Founder, Champions in Healthcare, LLC

Guido Schmitz
Director of Global Packaging Design, Innovation R&D Department, Bayer Consumer Care

Prof. Dr.-Ing. Christof Paar
Chair for Embedded Security, Ruhr-Universität Bochum; Adjunct Professor in Electrical & Computer Engineering, University of Massachusetts Amherst (Moderator)

Co-Sponsor:

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"GCRI continues to facilitate meaningful and robust dialogue on international innovation trends driving the 21st century global economy. Through a dynamic digital presence and other media platforms, they have created a very useful hub of thought leadership networks emblematic of these most interdisciplinary times."

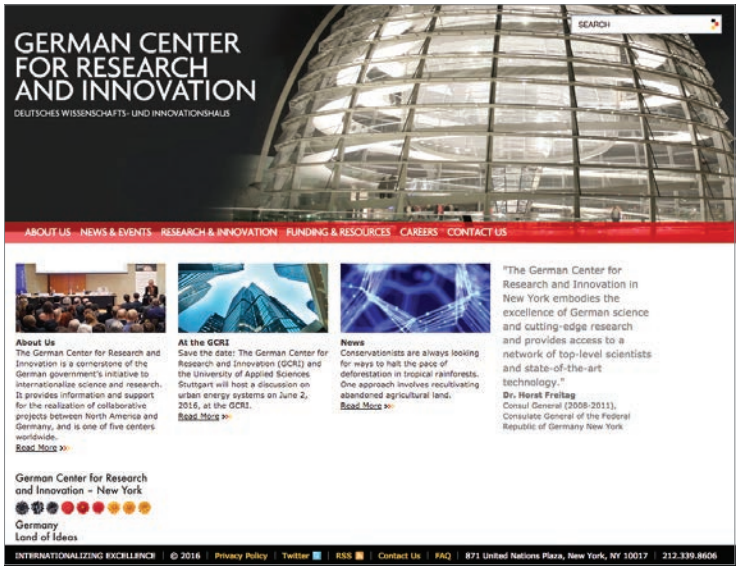
– Jeremy A. Abbate,
Vice President & Publisher,
Scientific American

GCRI ON THE WEB

The GCRI Website www.germaninnovation.org

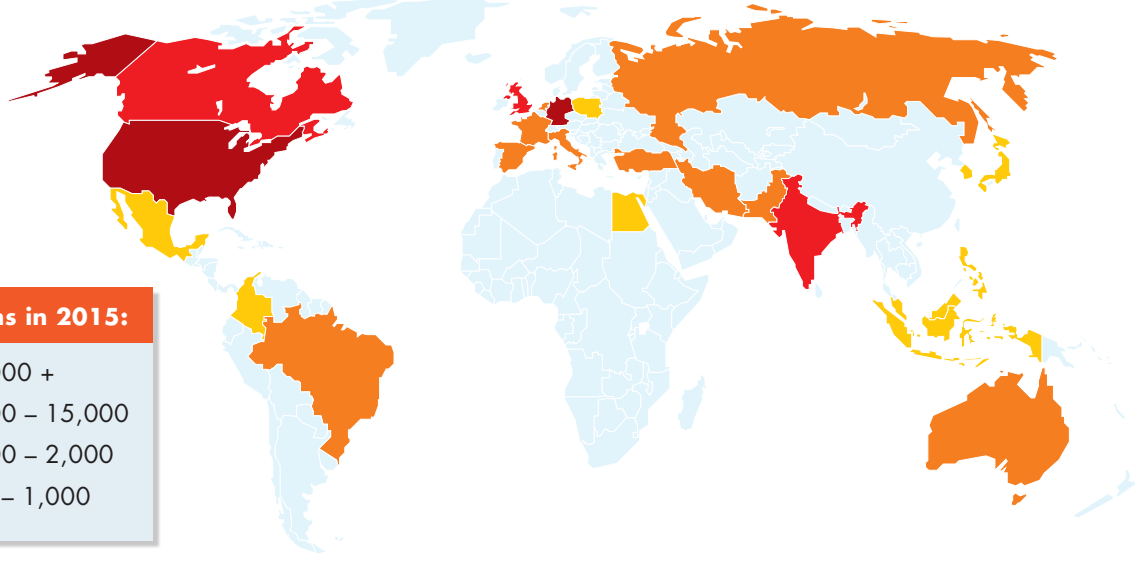
The GCRI's website, a key instrument in fulfilling the organization's mission, provides an information platform for individuals who are interested in the German science and innovation landscape and wish to conduct research or business. In addition to presenting GCRI events and related media, such as videos, podcasts, and photo galleries, the GCRI website features a wealth of programs, funding opportunities, and first points of contact for academia and industry. As a one-stop shop, www.germaninnovation.org also offers an overview of German research organizations, current research focus areas as well as the German higher education system.

In 2015, the GCRI website tracked 234,941 page views.



The Most Popular Pages in 2015:

- Home
- Job Postings
- Resources for Postdocs
- Resources for Graduates & Doctoral Students
- Events Calendar
- Technology Parks & Centers
- Careers
- Ph.D. in Germany
- Entrepreneurship Funding
- Resources for Undergraduates



Sessions in 2015:

- 15,000 +
- 2,000 – 15,000
- 1,000 – 2,000
- 500 – 1,000

E-NNOVATION GERMANY

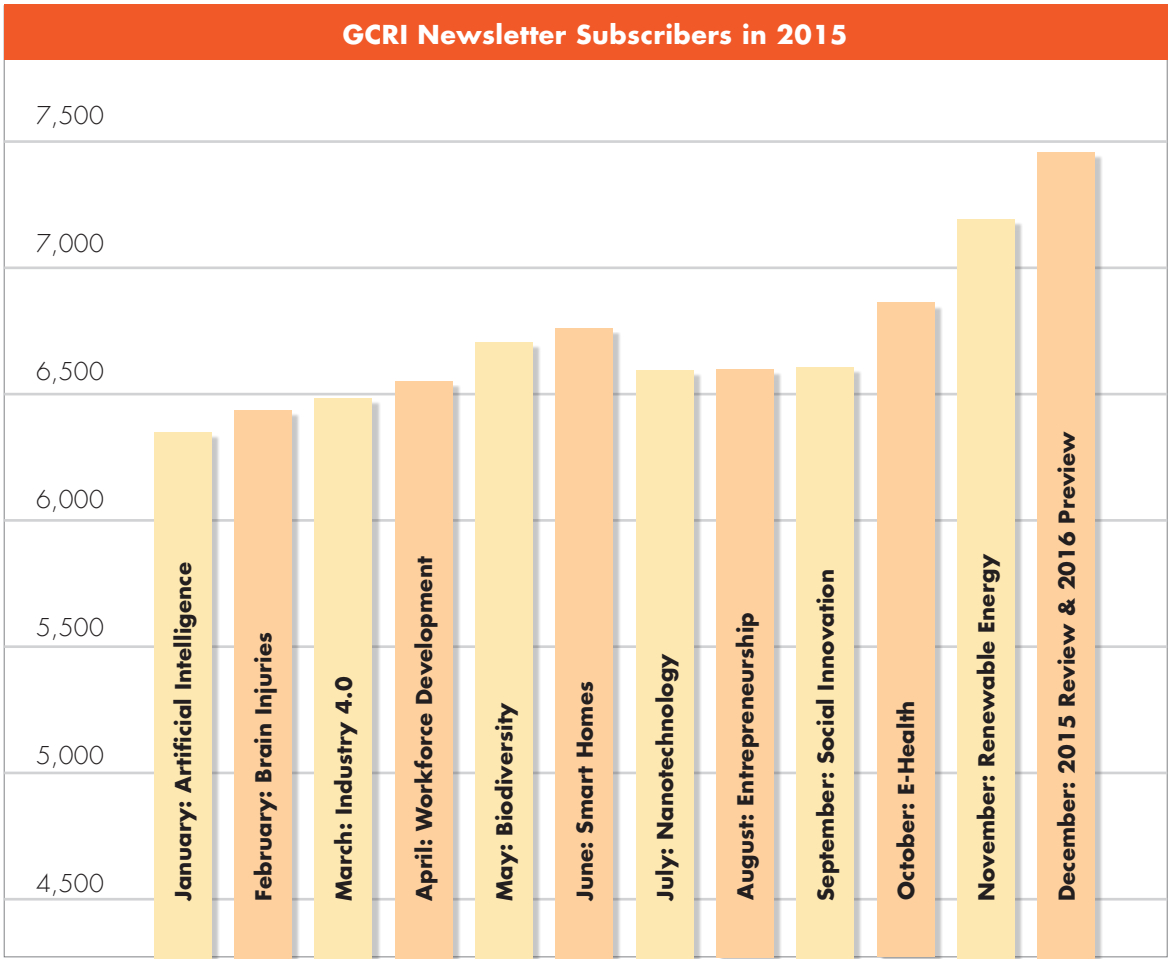
The GCRI Newsletter

Each month, GCRI's newsletter, *E-NNOVATION GERMANY* highlights a different topic from the German science, research, and innovation landscapes. Since its launch in April 2010, *E-NNOVATION GERMANY* has captured the attention of a growing readership in North America and Germany. During the past year, the number of readers increased by 18%.

GCRI newsletter articles and interviews have also been published on the *Innovation Daily* blog by *Innovation America*, which reaches over 1,000,000 unique visitors in over 185 countries and was voted fourth Best Blogger in the World by *Blogging Innovation*.





German Innovations of the Month

Each issue of *E-NNOVATION GERMANY* presents a "German Innovation of the Month," which is also listed on the GCRI website.

January 2015

Charlie the Model Chimpanzee: The First Robot with a Flexible Spine and Sensitive Feet

Robotics Innovation Center, DFKI GmbH

February 2015

Airo-Mobile Intraoperative CT Scanner®

Brainlab AG

March 2015

LBR iiwa – Enabling a New Generation of Human-Robot Collaboration

KUKA Roboter GmbH

April 2015

German Embassy's Skills Initiative

Embassy of the Federal Republic of Germany in Washington, D.C.

May 2015

The Varroa Gate – Protecting Honeybees

Bayer HealthCare Animal Health

June 2015

tado° – Intelligent Solutions for Home Climate Control

tado°

July 2015

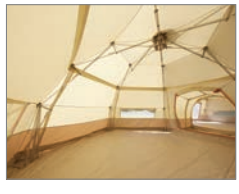
Dynamic DNA Nanomachines – New Flexibility in DNA Origami

Technical University of Munich (TUM)

August 2015

auticon – Tapping into the Talents of Autistic Adults

auticon GmbH



September 2015

DOMO – Rethinking & Re-Engineering Refugee Camps

MORE THAN SHELTERS

October 2015

Tinnitracks – Treating Tinnitus with Your Favorite Tunes

Sonormed GmbH

November 2015

Blue Freedom – A Hydropower Plant So Small It Fits in a Backpack

Aquakin GmbH

GCRI Interviews

Each newsletter features an interview with a leading German expert to highlight the month's topic. In 2015, GCRI conducted interviews with authorities from academia and industry.

Prof. Dr. Wolfram Burgard
Professor of Computer Science,
Head of Research Lab for Autonomous Intelligent Systems, University of Freiburg

Artificial Intelligence
Issue 58, January 2015

Prof. Dr. med. Ulf Ziemann
Chairman, Department of Neurology and Stroke, University Hospital Tübingen; Director, Hertie Institute for Clinical Brain Research, University of Tübingen

Brain Injuries
Issue 59, February 2015

Prof. Dr.-Ing. Birgit Vogel-Heuser
Chair and Director, Institute of Automation and Information Systems, Department of Mechanical Engineering, Technical University of Munich (TUM)

Industry 4.0
Issue 60, March 2015

Yorck Sievers
Director, Deutsche Auslandshandelskammern (AHK) Vocational Education and Training, Association of German Chambers of Industry and Commerce (Deutscher Industrie- und Handelskammertag, DIHK)

Workforce Development
Issue 61, April 2015

Prof. Dr. Katrin Böhning-Gaese
Director, Senckenberg Biodiversity and Climate Research Centre (BiK-F)

Biodiversity
Issue 62, May 2015

Prof. Dr. Elisabeth André
Chair, Human-Centered Multimedia, Department of Computer Science, University of Augsburg

Smart Homes
Issue 63, June 2015

Prof. Dr. Wolfgang M. Heckl
General Director, Deutsches Museum; Oskar-von-Miller Chair in Science Communication, TUM School of Education; Professor, Physics Department, Technical University of Munich (TUM)

Nanotechnology
Issue 64, July 2015

Dirk Kanngiesser
Co-Founder, German Accelerator Inc.; CEO, Seebright Inc.

Entrepreneurship
Issue 65, August 2015

Prof. Dr. Dr. Ann-Kristin Achleitner
Chair of Entrepreneurial Finance, Center for Entrepreneurial and Financial Studies (CEFS), Technical University of Munich (TUM)

Social Innovation
Issue 66, September 2015

Dr. Philipp Daumke
CEO, Averbis GmbH

E-Health
Issue 67, October 2015

Dr. Patrick Graichen
Executive Director,
Agora Energiewende

Renewable Energy
Issue 68, November 2015

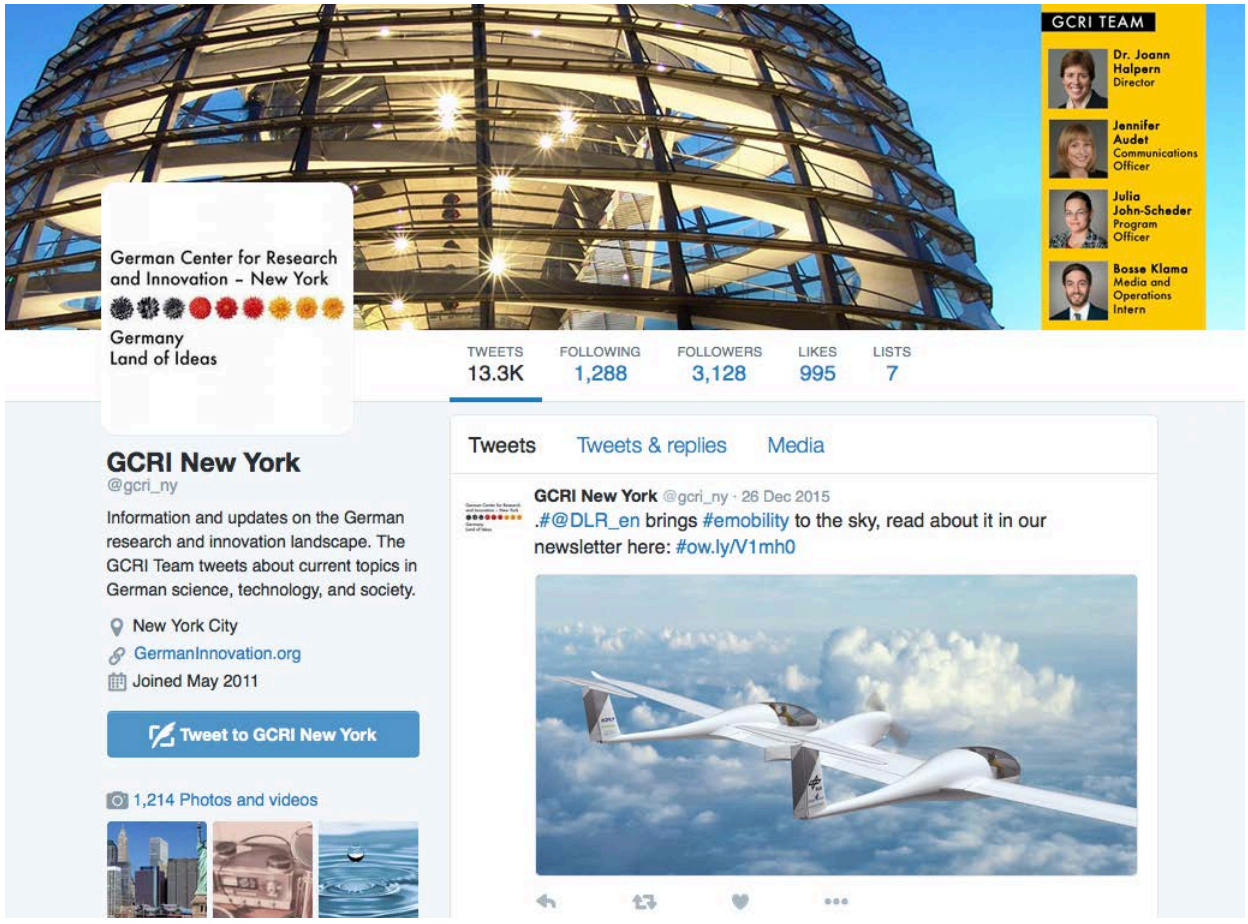
GCRI Twitter – @gcri_ny

The German Center for Research and Innovation joined the online social networking and microblogging service Twitter www.twitter.com on May 31, 2011. By December 31, 2015, GCRI had sent 13,300 tweets to over 3,120 followers. As part of its social media strategy, GCRI's tweets correspond to the monthly newsletter topics of *E-NNOVATION GERMANY*. In addition to these topics, GCRI tweets about funding opportunities for research as well as jobs and internships in Germany.

Twitter Statistics

% Increase in Number of Followers in 2015	**53.86%**
Number of Tweets Sent in 2015	**2,801**
Number of Followers	**3,128**
Number of Followers Gained in 2015	**1,095**
Average Reach per Day*	**~20,000 accounts**

*Estimated accounts reached as calculated via the measuring tool TweetReach using the @gcri_ny handle



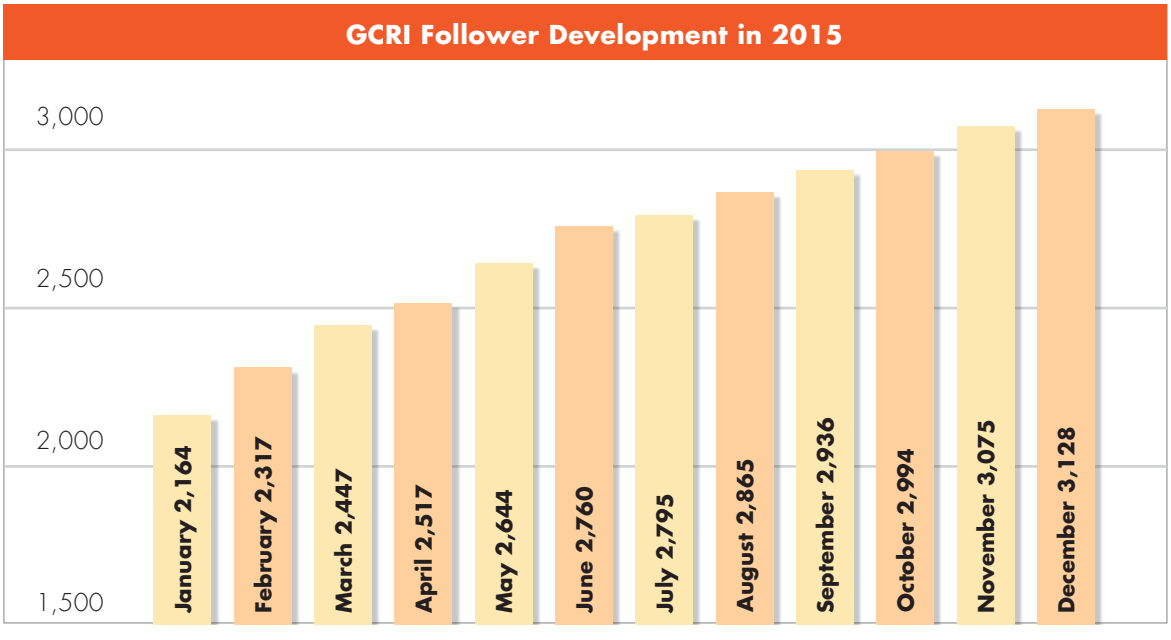
GCRI Twitter – @gcri_ny

Most Commonly Used GCRI Hashtags*

*As calculated via the measuring tool TweetStats

Most Successful Tweets

GCRI Follower Development in 2015



"Since taking up my post at the E.U. Delegation to the U.S., the GCRI has been an excellent partner in our efforts to reach the U.S. S&T community in both the academic and business sectors in order to stimulate increased transatlantic exchange and cooperation through E.U. and national programs. Our cooperation with the GCRI has always been first-rate and exemplary."

– Dr. James P. Gavigan,
Minister Counselor,
Head of the Science, Technology,
and Innovation Section of the European Union Delegation to the U.S.


Neuroscience
2015

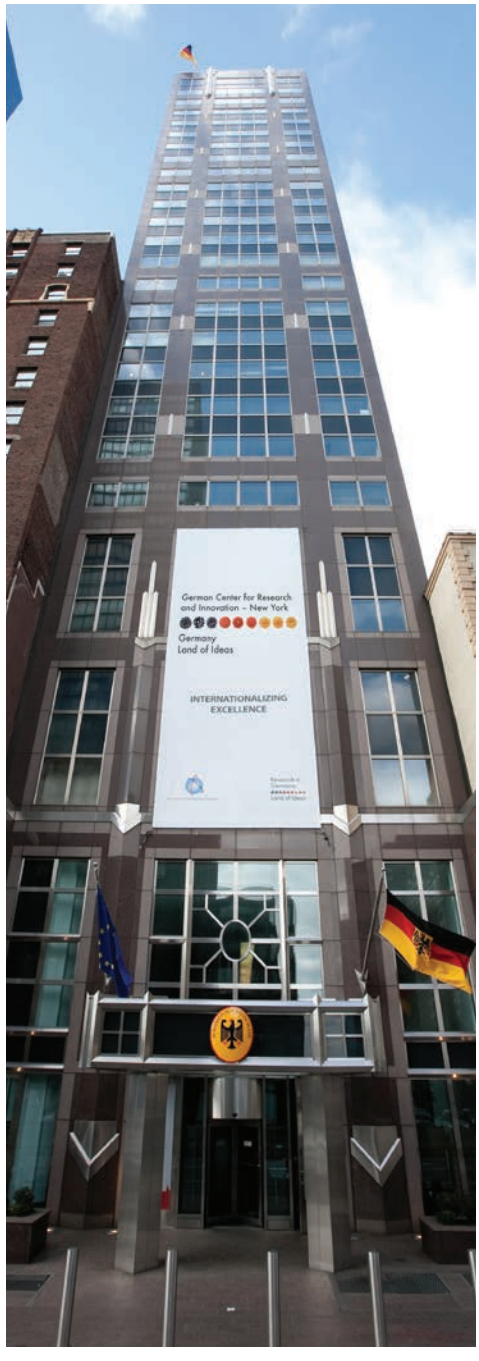
German Houses of Research and Innovation

The German Houses of Research and Innovation (DWIHs) are part of the Internationalization Strategy of the German federal government and the Federal Foreign Office's Research and Academic Relations Initiative. Located in Cairo, Moscow, New Delhi, New York, São Paulo, and Tokyo, the DWIHs facilitate collaboration with Germany by bringing together leaders in science, the humanities, technology, and industry and providing a platform to foster creativity and enhance innovation.

The Federal Foreign Office is implementing this project in cooperation with the Federal Ministry of Education and Research (BMBF) and in close collaboration with the Alliance of German Science Organizations, which includes the Alexander von Humboldt Foundation (AvHF), Fraunhofer-Gesellschaft, German Academic Exchange Service (DAAD), German Council of Science and Humanities (WR), German National Academy of Sciences – Leopoldina, German Rectors' Conference (HRK), German Research Foundation (DFG), Helmholtz Association, Leibniz Association, Max-Planck-Gesellschaft as well as the Association of German Chambers of Industry and Commerce (DIHK).

The houses were created to:

- Promote Germany as a research location
- Provide a forum for international dialogue and scientific exchange
- Offer support and services (advising for international researchers; organizing educational events; facilitating collaboration)



Deutsche Wissenschafts- und Innovationshäuser (DWIHs)

New York

German Center for Research and Innovation

Deutsches Wissenschafts- und Innovationshaus New York

General Questions:
info@germaninnovation.org
www.germaninnovation.org

São Paulo

Deutsches Wissenschafts- und Innovationshaus São Paulo

Centro Alemão de Ciência e Inovação São Paulo

General Questions:
info@dwih.com.br
www.dwih.com.br

Cairo

German Science Centre Cairo

Deutsches Wissenschaftszentrum Kairo

General Questions:
info@dwz-kairo.de
www.dwz-kairo.de

Moscow

Deutsches Haus für Wissenschaft und Innovation Moskau

General Questions:
dwih@daad.ru
www.dwih.ru

New Dehli

German House for Research and Innovation New Delhi

General Questions:
info@dwih.in
www.dwih.in

Tokyo

German Research and Innovation Forum Tokyo

General Questions:
info@dwih-tokyo.jp
www.dwih-tokyo.jp

GCRI Advisory Council

Under the leadership of its past and current chairs, Dr. Cathleen Fisher and Dr. Kurt Becker respectively, the Advisory Council strongly supports the GCRI's activities and outreach as it presents Germany to the North American market.

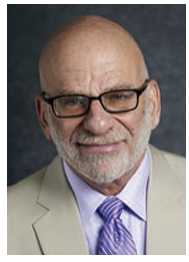
The Advisory Council works collaboratively to help the GCRI achieve its mission. The Council members' expertise and leadership ensure that the GCRI is well connected to key stakeholders in the United States and Germany across the business, government, academic, and nonprofit sectors.

Andrea Adam Moore

Director, IU Consulting & Research Germany GmbH (since November 2015)
Executive Director, German University Alliance (until October 2015)
Representative of the German Universities Liaison Offices in New York (until October 2015)

Dr. Cathleen S. Fisher

President
American Friends of the Alexander von Humboldt Foundation



Dr. Jeffrey Peck

Director, Europe, AKA | Strategy (since September 2015)
Dean of the Weissman School of Arts & Sciences & Vice Provost for Global Strategies, Baruch College, The City University of New York (CUNY) (until June 2015)

Dr. Kurt H. Becker

Vice Dean for Research, Innovation, & Entrepreneurship
Professor of Applied Physics; Professor of Mechanical & Aerospace Engineering
NYU Tandon School of Engineering

Dr. Nina Lemmens

Director
DAAD North America

Dietmar Rieg

President & CEO
German American Chamber of Commerce, Inc. New York

Dr. Annette Doll-Sellen

Director
DFG Office
North America/New York

Andrea Noske

Head of Division 617– Bio-economy, Federal Ministry of Education & Research (BMBF) (since September 2015)
Head of the Science & Technology Section, Embassy of the Federal Republic of Germany (until August 2015)

Irmintraud Jost

Executive Director, Heidelberg University Association
Representative of the German Universities Liaison Offices in New York (since November 2015)

Dr. Robin Mishra

Head of the Science & Technology Section, Embassy of the Federal Republic of Germany (since September 2015)

Brita Wagener

Consul General
Consulate General of the Federal Republic of Germany in New York

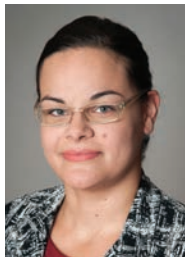
GCRI Team

Dr. Joann Halpern
Director

Main Responsibilities:
- Strategic Planning
- Strategic Outreach
- Program Development

Jennifer Audet
Communications Officer

Main Responsibilities:
- GCRI Web & Social Media Presence
- *E-NNOVATION GERMANY*
  GCRI's Monthly Newsletter
- Public Relations & Marketing



Julia John-Scheder
Program Officer (since October 2015)

Main Responsibilities:
- Program Planning & Coordination
- Event Logistics
- Office Administration

Katharina Glaser
Program Officer (until September 2015)

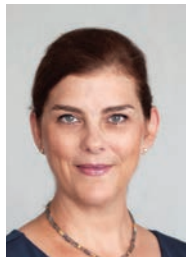
Main Responsibilities:
- Program Planning & Coordination
- Event Logistics
- Office Administration

GCRI Foundation Board

The GCRI Foundation, Inc. held its inaugural Board meeting on August 14, 2012, at the German House in New York City. The Foundation supports the mission and work of the German Center for Research and Innovation through activities to expand the Center's funding base and enhance the sustainability of GCRI's operations, including its public events, workshops, publications, website, and other relevant projects. On November 17, 2013, the GCRI Foundation, Inc. received its official status as a 501(c)(3), and in 2015, it launched an exciting new partnership with the DAAD-RISE Germany program. In 2016, the GCRI Foundation, Inc. will fund five research internships, matching highly qualified sophomores with an interest in the STEM fields from universities in North America with top universities and research institutions in Germany. The first GCRI Foundation Engineering Prizes will be awarded to outstanding undergraduate engineering students at universities in the United States and Canada in 2016.

Dr. Annette Doll-Sellen
Treasurer of the Board
Director, DFG Office
North America/New York

Dr. Joann Halpern
Director
German Center for
Research and Innovation



Dr. Nina Lemmens
Director
DAAD North America

Wolfgang Renz M.D. Ph.D.
Co-President of the Board
Managing Director
GERENWA GmbH

James Sharp
Chairman of the Board
President
Carl Zeiss Microscopy, LLC
President & CEO
Carl Zeiss, Inc.

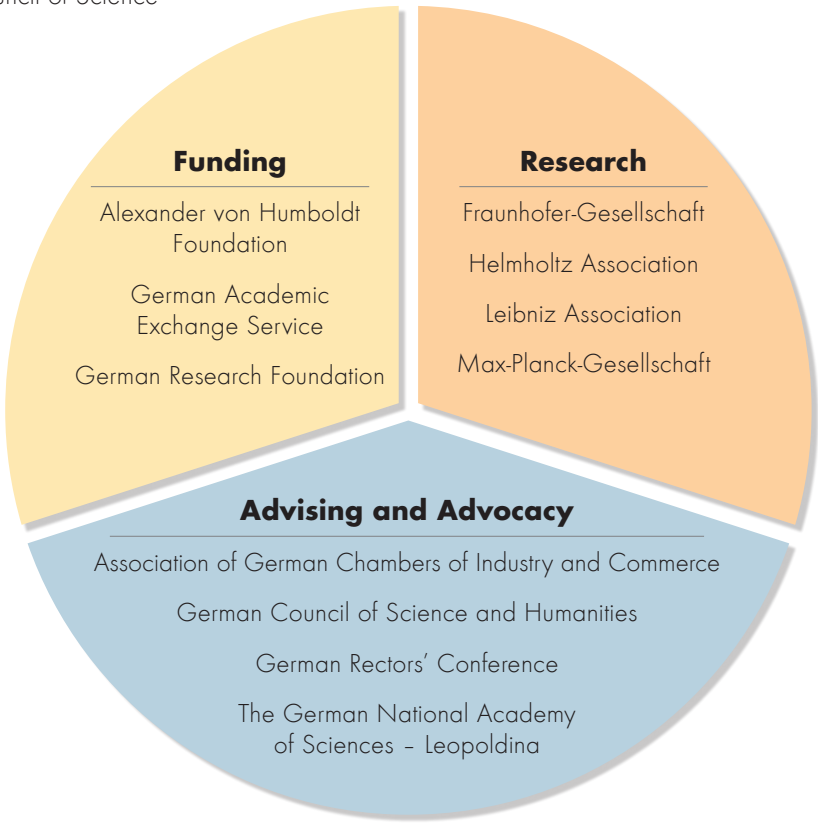
Joerg Sommer
Vice President
Product Marketing & Strategy
Volkswagen of America, Inc.

O. Sinan Tumer
Co-President of the Board
Senior Director
SAP Co-Innovation Lab
SAP Research, Technology &
Innovation Platform
SAP Labs, LLC

GCRI Partner Institutions

GCRI is under the joint leadership of the German Academic Exchange Service (DAAD) and the German Research Foundation (DFG), and is funded by the German Federal Foreign Office. Additional designated partners are the Association of German Chambers of Industry and Commerce and the Alliance of German Science Organizations, which in addition to DAAD and DFG, also includes the Alexander von Humboldt Foundation, the Fraunhofer-Gesellschaft, the Helmholtz Association, the German Rectors' Conference, the Max-Planck-Gesellschaft, the Leibniz Association, the German National Academy of Sciences – Leopoldina, and the German Council of Science and Humanities.

GCRI works closely with the following organizations, which are also located in the German House New York: the Consulate General of the Federal Republic of Germany in New York, the German Academic International Network (GAIN), and the German Universities Liaison Offices in New York. These include Bucerius Law School, German University Alliance, Heidelberg University Association, UAS 7 German Universities of Applied Sciences, University Alliance Ruhr, University of Cologne, and University of Freiburg.



Imprint

The German Center for Research and Innovation is a cornerstone of the German government's Internationalization Strategy and its Research and Academic Relations Initiative.

German Center for Research and Innovation – New York

Germany
Land of Ideas

Under the Joint Leadership of:

DAAD Deutscher Akademischer Austausch Dienst
German Academic Exchange Service

DFG Deutsche Forschungsgemeinschaft
German Research Foundation

Funding Provided by:

Federal Foreign Office

Design Agency:
www.thinkersdesign.com
ideas@thinkersdesign.com

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michael.reilly@proforma.com

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German Center for Research and Innovation – New York

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Land of Ideas

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