



## Driving Tomorrow Research Initiatives—Grand Challenges Research Grants Phase 1 *Fall 2016*

Provost Karen Hanson has announced 29 Grand Challenges Research grants to advance the research goals of *Driving Tomorrow*, the TC Campus Strategic Plan. These initial Driving Tomorrow research investments total \$3.6 million, including \$1.48 million for 21 exploratory research grants and \$2.15 million for 8 collaborations shaped by interdisciplinary work groups that were built on an earlier [Call for Ideas process](#). The funds were reallocations earmarked for strategic plan investments during annual compact planning with college deans, augmented by funds from the Global Programs and Strategy Alliance for projects supporting the U's internationalization goals. [More on the Driving Tomorrow Research Initiatives >](#)

The 29 funded collaborations, listed below, address the University's [five interrelated Grand Challenges areas of special focus](#), with one integrative initiative spanning multiple areas. Additional grants will be made in future phases of the initiative.

[Project summaries are posted on the Driving Tomorrow website](#) ([strategic-planning.umn.edu](http://strategic-planning.umn.edu)).

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### Advancing Health through Tailored Solutions

#### A community-based approach toward advancing personalized medicine in underserved populations

*\$49K GC Exploratory Research Grant*

**Co-PIs:** Kathleen A. Culhane-Pera, Family Medicine; Robert J. Straka, Experimental & Clinical Pharmacology; Bharat Thyagarajan, Laboratory Medicine & Pathology

**Team Members:** Jeffrey Bishop, Experimental & Clinical Pharmacology; Muaj Lo, West Side Community Health Services; Heather Zierhut, Genetics, Cell Biology, & Development

#### Development of a clinical precision medicine program in ovarian cancer as a paradigm for 21<sup>st</sup>-century tailored health care solution

*\$60K GC Exploratory Research Grant*

**Co-PIs:** Constantin Aliferis, Institute for Health Informatics, Medicine; Joshua Baller, Supercomputing Institute; Pamala Jacobson, Experimental & Clinical Pharmacology; Andrew Nelson, Laboratory Medicine & Pathology; Boris Winterhoff, Obstetrics, Gynecology & Women's Health

**Team Members:** Ahmad Abusalah, Institute for Health Informatics; Peter Argenta, Obstetrics, Gynecology & Women's Health; Subbaya Subramanian, Surgery; Martina Bazzaro, Obstetrics, Gynecology & Women's Health; Linda Carson, Obstetrics, Gynecology & Women's Health; Melissa Geller, Obstetrics, Gynecology & Women's Health; Mahmoud Khalifa, Laboratory Medicine & Pathology; Sally Mullany, Obstetrics, Gynecology & Women's Health; Steve Shen, Institute for Health Informatics; Tim Starr, Obstetrics, Gynecology & Women's Health; Gyorgy Simon, Institute for Health Informatics; Zachary Rivers, PhD student in Social and Administrative Pharmacy; Locke

Uppendahl, Obstetrics, Gynecology & Women's Health clinical fellow in Gynecologic Oncology, Obstetrics, Gynecology & Women's Health; Zenas Chang, clinical fellow in Gynecologic Oncology; Salman Ikramuddin, third-year UMN medical student

#### Keys to preventing cancer: Unlocking barriers to HPV vaccinations in low-income countries

*\$50 GC Exploratory Research Grant; includes \$30k international enhancement award/Global Programs & Strategy Alliance*

**Co-PIs:** Nicole E. Basta, Epidemiology & Community Health  
**Team Members:** Fareed A. Awan, Philosophy; Cecily Banura, Child Health & Development Center, Makerere University; Joseph Rujumba, Department of Pediatrics and Child Health, Makerere University; Shalini L. Kulasingam, Epidemiology & Community Health; Ruby H. Nguyen, Epidemiology & Community Health.

**Current Students:** Kimberly Bonner, PhD student in Epidemiology & Community Health; Katie Gravagna, undergraduate; Daymian Snowden, undergraduate; Alexandra Mueller, undergraduate

#### Are networks key to solving America's healthcare crisis?

*\$50k GC Exploratory Research Grant*

**Co-PIs:** Barbara Daniels, Medicine; Russell Funk, Strategic Management & Entrepreneurship; Aks Zaheer, Strategic Management & Entrepreneurship

#### Toward a Minnesota model for brain health in youth sports

*\$48k GC Exploratory Research Grant*

**Co-PIs:** Bharathi Jagadeesan, Radiology; Christophe Lenglet, Radiology; Toben F. Nelson, Epidemiology & Community Health; Francis Shen, Law

**Minnesota Precision Medicine Collaborative:  
Transforming health and advancing equity**

*\$500k GC Interdisciplinary Work Group Collaboration*

**Co-PIs:** Constantin Aliferis, Institute for Health Informatics, Pamala Jacobson, Experimental & Clinical Pharmacology; Catherine McCarty, Family Medicine and Biobehavioral Health; Kingshuk Sinha, Supply Chain & Operations; Susan M. Wolf, Law, Medicine & Public Policy; Douglas Yee, Hematology, Oncology and Transplantation

**Team Members:** Bonnie LeRoy, Genetics, Cell Biology, & Development; Logan Spector, Pediatric Epidemiology & Clinical Research; Sophia Vinogradov, Psychiatry; Gerald August, Family Social Science; Abbie Begnaud, Pulmonary, Allergy, Critical Care & Sleep Medicine; Jeffrey Bishop, Experimental & Clinical Pharmacology; Joseph Gaugler, Nursing; Dorothy Hatsukami, Psychiatry; John (Riley) McCarten, Neurology; Ahmad AbuSalah, Institute for Health Informatics; Susan Berry, Pediatrics; Marilyn Bruin, Design, Housing & Apparel; Milton (Mickey) Eder, Family Medicine & Community Health; Patricia McCarthy Veach, Educational Psychology; Heather Zierhut, Genetics, Cell Biology, & Development; student researchers: Anna Wagner, Kelsey Moriarty, Lilly Zhong

Karen Roa, Visual Artist and actress, Member of *Tramaluna Theatre*; Carlos E. Satizábal, Theater Director, Universidad Nacional da Colombia; Ernesto Silva, Latin American/Latin Studies, Kennesaw State University, Georgia

**Understanding barriers to health equity**

*\$56k GC Exploratory Research Grant*

**Co-PIs:** Sarah Gollust, Health Policy & Management; Joanne Miller, Political Science

**Team Members:** Emma Klinger, undergraduate student

**Voicing the global immigration crisis: Documentation and analysis of immigrant stories for social change**

*\$80k; includes \$20k international enhancement award*

**Co-PIs:** Erika Lee, Immigration Research; Moin Syed, Psychology

**Assessing interventions for justice and equity**

*\$249k GC Interdisciplinary Work Group Collaboration*

**Co-PIs:** Myron Orfield, Civil Rights & Civil Liberties Law; Christopher Uggen, Sociology

**Team Members:** Ragui Assaad, Global Policy; Yingling Fan, Urban & Regional Planning; Paul Glewwe, Applied Economics; Rhonda Jones-Webb, Epidemiology & Community Health

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**Fostering Just and Equitable Communities**

**Human rights collaborative and faculty-student human rights laboratory to promote equitable civil society**

*\$110k GC Exploratory Research Grant; includes \$50k international enhancement award*

**Co-PIs:** Barbara Frey, Global Studies; Fionnuala Ni Aolain, Law; James Ron, Global Policy; Joachim Savelsberg, Sociology

**Team Members:** Alejandro Baer, Sociology; Elizabeth Heger Boyle, Sociology; Cosette Creamer, Political Science; Ana Forcinito, Spanish & Portuguese; Greta Friedemann-Sánchez, Global Policy; Jennifer Green, Law; Lisa Hilbink, Political Science; Harry Lando, Public Health; Amanda Lyons, Law; Patrick McNamara, History; Steven Miles, Medicine; Stephen Meili, Law; Leigh Payne, Human Rights Program; Christopher Roberts, Law

**Social justice through collaborative artistic expression:  
The state of Iberoamerican Studies Series: human rights across the disciplines and Voice to Vision project**

*\$55k GC Exploratory Research Grant; includes \$15k international enhancement award*

**Co-PIs:** Luis A. Ramos-Garcia, Spanish & Portuguese Studies; David Feinberg, Art

**Team Members:** Beth Andrews, Art; Patricia Ariza, Artistic Director La Candelaria Theater; Eduardo Cabrera, Spanish, Millikin University, Illinois; Gerardo Cajamarca, US Latino Community and Union Organizer, Minneapolis; Yeisson Cajamarca Zapata, Colombian Government Official; Gary Christensen, Boynton Health/Psychiatry; Nelsy Echávez-Solano, Spanish-Portuguese Studies; Percy Encinas, theatre professor, Universidad Nacional Mayor de San Marcos; Fredy Frisancho, Education Sciences, UAP-Arequipa; Nohra Gonzalez, La Candelaria Theater actress; Kimchi Hoang, Visual Artist and actress; Alberto Justiniano, Teatro del Pueblo Artistic Director; Marcos Martinez, Theatre, California State University San Marcos; Vivian Martinez Tabares, Theatre, Director of La Candelaria Theatre; Tu-Nguyen Phan, College of Liberal Arts;

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**Enhancing Individual and Community Capacity for a Changing World**

**Art of healing: Embodied storytelling as resistance and practice**

*\$110k GC Exploratory Research Grant; includes \$50k international enhancement award*

**Co-PIs:** Abimbola Asojo, Design, Housing & Apparel; Ananya Chatterjea, Theater Arts & Dance; Jigna Desai, Gender, Women, & Sexuality Studies; Roli Dwivedi, Community-University Health Care Center; Priscilla Gibson, Social Work; Lena Palacios, Gender, Women, & Sexuality Studies; Madhuri Shors, Community-University Health Care Center; Catherine Squires, Communication Studies

**Team Members:** Graduate students: Koua Yang, Art; Naimah Petigny, Feminist Studies; Tia Simone-Gardner, Feminist Studies. Undergraduate students: Miranda McNamara, Interior Design; Laura D' Almeida, Communication Studies; Jessika Akpaka, Kealoha Ferreira, Margaret Ogas; Theater Arts & Dance

**Climate, conflict, and displacement: Shifting patterns in the Horn of Africa arid lands**

*\$96k GC Exploratory Research Grant; includes \$46k international enhancement award*

**Co-PIs:** Cheryl Robertson, Population Health & Systems, School of Nursing; Dominic Travis, Ecosystem Health Initiative

**Team Members:** Eunice Areba, Nursing; Joel Hartter, Environmental Studies Program, University of Colorado-Boulder; Sarah Hoffman, Nursing; Katey Pelican, Veterinary Population Medicine; Michael Mahero, Veterinary Population Medicine; Shamilah Namusisi, One Health Resident, Makerere University; Carolyn Porta, Nursing, Epidemiology; Paul M. Porter, Agronomy & Plant Genetics; Innocent B. Rwego, Veterinary Population Medicine; Jacinta Mukulu Waila, One Health Resident, Makerere University

### **Cracking the speech code: A cross-linguistic neurobehavioral approach to language learning in typical and atypical populations**

*\$51k GC Exploratory Research Grant; includes \$4k international enhancement award*

**Co-PIs:** Yang Zhang, Speech-Language-Hearing Sciences; Jed T. Elison, Child Development; Hui Zou, Statistics; Xiaohu Yang, Laboratory for Language & Cognition; Hua Shu, National Key Laboratory of Cognitive Neuroscience & Learning; Suiping Wang, Psychology

**Team Members:** Jean Decety, Child NeuroSuite and the Social Cognitive Neuroscience Laboratory, University of Chicago; Kaibao Hu, Foreign Languages, Shanghai Jiao tong University; Patricia Kuhl, Speech & Hearing Sciences, University of Washington; Michael Reiff, Pediatrics; Robert S. Schlauch, Speech-Language-Hearing Sciences

### **Reducing early language disparities: A key to lifelong academic, socioeconomic, and health success**

*\$60k GC Exploratory Research Grant*

**Co-PIs:** Lizbeth H. Finestack, Speech-Language-Hearing Sciences; Scott McConnell, Educational Psychology & Child Psychology

**Team Members:** Marianne Elmquist, graduate student in Educational Psychology; Amanda Kriese, graduate student in Speech-Language-Hearing Sciences; Sarah Pinon, undergraduate student in Speech-Language-Hearing Sciences; Asha Koritala, undergraduate student in Speech-Language-Hearing Sciences

### **Reminders for readiness: E-communication to support parents in promoting early childhood development**

*\$250k GC Interdisciplinary Work Group Collaboration*

**Co-PIs:** Akosua O. Addo, Music; Megan Gunnar, Institute of Child Development; Richard Lee, Psychology; Sheila Riggs, Primary Dental Care; Olihe Okoro, Pharmacy Practice & Pharmaceutical Sciences; Aaron Sojourner, Work & Organizations

**Team Members:** Priscilla Flynn, Primary Dental Care; Amy Susman-Stillman, Center for Early Education & Child Development; Susan Walker, Family Social Science

### **Shared leadership lab: Analyzing success factors to address complex societal challenges**

*\$300k GC Interdisciplinary Work Group Collaboration; includes \$50k international enhancement award*

**Co-PIs:** Akosua O. Addo, Music; Vanessa Laird, Leadership & Management; Kathy Quick, Leadership & Management; Myles Shaver, Strategic Management & Entrepreneurship

**Team Members:** Tim Sheldon, Humphrey School; Liz Sopdie, Humphrey School; Elizabeth Dressel, Humphrey School; Danbi Seo, Humphrey School; Peter Frosch, Greater MSP; Rhonda Sivarajah, Greater Metropolitan Workforce Council; Amy Susman-Stillman, College of Education & Human Development; Suzanne Gagnon, McGill University; Ann Langley, HEC Montréal; Viviane Sergi, Université du Québec à Montréal; Megan Gunnar, College of Education and Human Development; Aaron Sojourner, Carlson School of Management; Olihe Okoro, Academic Health Center; Susan Walker, College of Education & Human Development; Richard Lee, College of Liberal Arts; Priscilla Flynn, Academic Health Center; Xiang Zhou, College of Liberal Arts; Sahra Noor, The People Center; Melanie Leehy, City of Falcon Heights; Randy Gustafson, City of Falcon Heights; Peter Lindstrom, City of Falcon Heights; Sack

Thongvahn, City of Falcon Heights; John Thompson, Fight for Justice Enterprises, LLC; Mariah Levinson, Bureau of Mediation Services; Sharon Press Mitchell, Hamline School of Law; John Finnegan, School of Public Health, Epidemiology and Community Health; Art Rolnick, Humphrey School; David MacCallum, Civic Consulting; Jennifer Pelletier, Minnesota Department of Health

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## **Assuring Clean Water and Sustainable Ecosystems**

### **21<sup>st</sup>-century technologies for advancing bio-manufacturing**

*\$85k GC Exploratory Research Grant; includes \$25k international enhancement award*

**Co-PIs:** Claudia Schmidt-Dannert, Biochemistry, Molecular Biology, & Biophysics; Vincent Noireaux, Physics

**Team Members:** Mikael Elias, BioTechnology Institute; Fernando Lopez-Gallego, Biofunctional Nanomaterials Laboratory, Spain; Bernd Nidetzky, Biotechnology, Biochemistry, & Engineering, University of Graz; Sven Panke, Biosystems, Science, & Engineering, ETH Zürich; Maureen Quin, BioTechnology Institute; Jon Marles Wright, Structural & Synthetic Biology Laboratory, University of Edinburgh

### **Innovations at the nexus of food, energy, and water: Reclaiming wastewater from local food industries to produce energy and high-value urban crops**

*\$60k GC Exploratory Research Grant*

**Co-PIs:** Alptekin Aksan, Mechanical Engineering; Neil Anderson, Horticultural Science; Bill Arnold, Environmental, & Geo-Engineering; Julie Grossman, Horticultural Science; William Northrop, Mechanical Engineering; Paige Novak, Civil, Environmental, & Geo-Engineering; Mary Rogers, Horticulture Science; Chengyan Yue, Horticultural Science

### **Protection of biodiversity and ecosystems services through early detection of tree disease using hyperspectral remote sensing**

*\$60k GC Exploratory Research Grant*

**Co-PIs:** Jeannine Cavender-Bares, Ecology, Evolution & Behavior; Rebecca Montgomery, Forest Resources; Jennifer Juzwik, Plant Pathology

**Team Members:** Isabella Armour, undergraduate student, College of Biological Sciences; Beth Fallon, Postdoctoral Researcher, Ecology, Evolution & Behavior; John Gamon, University of Nebraska-Lincoln; Sarah Hobbie, Ecology, Evolution, & Behavior; Forest Isbell, Cedar Creek Ecosystem Science Reserve; Cathleen Nguyen, Ecology, Evolution & Behavior; Anna Schweiger, Ecology, Evolution, & Behavior; Phil Townsend, University of Wisconsin-Madison; Anna Yang, Forest Resources; Art Zyguelbaum, University of Nebraska-Lincoln

### **Sustainable development: Architecture and planning within the ecological footprint of one planet**

*\$110k GC Exploratory Research Grant; includes \$50k international enhancement award*

**Co-PIs:** Richard Graves, Center for Sustainable Building Research; Bonnie Keeler, Institute on the Environment

**Team Members:** Tianwei Gu, Graduate Student Researcher; Mary Guzowski, Architecture; Maike Hamann, Institute on the Environment; Elizabeth Kutschke, Center for Sustainable Building Research; Lucas McCann, Graduate Student Researcher; Christopher Nootenboom, Institute on the Environment; Neeraja Pandav, Graduate Student Researcher; Richard Strong, Center for Sustainable Building Research; William Weber, Center for Sustainable Building Research

### **Developing a simple, inexpensive smart chip to detect water pollutants**

*\$315k GC Interdisciplinary Work Group Collaboration; includes \$50k international enhancement award*

**Co-PIs:** Daniel R. Bond, Microbiology & Immunology BioTechnology Institute; Mikael Elias, Biochemistry; Jeffrey A. Gralnick, Microbiology & Immunology BioTechnology Institute; Mark Herzberg, Diagnostic & Biological Science; Lawrence P. Wackett, Biochemistry

**Team Members:** William Arnold, Civil, Environmental & Geo-Engineering; Paige J. Novak, Civil, Environmental & Geo-Engineering; Casim A. Sarkar, Biomedical Engineering; Michael Smanski, Biochemistry, Molecular Biology, & Biophysics; Joseph Talghader, Electrical & Computer Engineering

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## **Feeding the World Sustainably**

### **Addressing the challenge of tuberculosis in the animal-human interface**

*\$85k GC Exploratory Research Grant; includes \$25k international enhancement award*

**Co-PIs:** Srinand Sreevatsan, Veterinary Population Medicine; David Boulware, Infectious Diseases & International Medicine

**Team Members:** Joel Bazira, Mbarara University; Dominic Travis, Veterinary Population Medicine

### **Big-data transparency in global food supply**

*\$96k GC Exploratory Research Grant; includes \$46k international enhancement award*

**Co-PIs:** Timothy M. Smith, Bioproducts & Biosystems Engineering; Shashki Shekhar, Computer Science; Derric Pennington, World Wildlife Fund, Institute on the Environment, and Department of Fisheries, Wildlife & Conservation Biology; Anu Ramaswami, Science, Technology & Environmental Policy

**Team Members:** Luyi Hunter, Bioproducts & Biosystems Engineering; Lloyd Rivera, Natural Resources Science & Management; Peter Nixon, Science, Technology & Environmental Policy

### **Microbiomes in engineered ecosystems: Integrative science to elucidate microbiome roles in mediating plant, soil, ecosystem, and human health**

*\$60k GC Exploratory Research Grant*

**Co-PIs:** David Baumber, Food Science & Nutrition; Jessica Gutknecht, Soil, Water Climate; Cory Hirsch, Plant Pathology; Linda Kinkel, Plant Pathology; Jonathan Schilling, Bioproducts & Biosystems Engineering

**Team Members:** Elizabeth Borer, Ecology, Evolution, & Behavior; Daryl Gohl, Genomics Center; Julie Grossman, Horticulture; Satoshi Ishii, BioTechnology Institute; Peter Kennedy, Plant Biology; H. Corby Kistler, Plant Pathology; Georgiana May, Ecology, Evolution, & Behavior; Paige Novak, Civil, Environmental, & Geo-Engineering; Eric Seabloom, Ecology, Evolution, & Behavior

### **Reinventing year-round food production in Minnesota**

*\$45k GC Exploratory Research Grant*

**Co-PIs:** John Erwin, Horticultural Science; Ned Mohan, Electrical & Computer Engineering

**Team Members:** Kathy Draeger, Minnesota Extension Service; Greg Schweser, Minnesota Extension Service

### **Charting a path for Midwest agriculture through scenario-based foresight**

*\$150k GC Interdisciplinary Work Group Collaboration*

**Co-PIs:** Mae Davenport, Forest Resources; Nicholas Jordan, Agronomy & Plant Genetics; David Mulla, Soil, Water, & Climate; David Rand, Psychology, Economics; Tonya Schoenfuss, Food Science & Nutrition Technology; Nathan Springer, Plant Biology; Montserrat Torremorrell, Veterinary Medicine

**Team Members:** David Beurle, Future IQ Partners; Heather Branigan, Future IQ Partners; Kris Johnson, The Nature Conservancy; Charlotte Melin, German, Scandinavian, & Dutch; Nathan Meyer, Center for Agriculture, Food & Natural Resources; Charles Myers, Political Science; Mark Pedelty, Communication Studies & Anthropology; Bryan Runck, Geography, Environment & Society; Shaul Shenhav, Political Science, The Hebrew University of Jerusalem

### **Sustaining food production, health, and the environment**

*\$147k GC Interdisciplinary Work Group Collaboration*

**Co-PIs:** Jason Hill, Bioproducts & Biosystems Engineering; David Tilman, Ecology, Evolution & Behavior

**Team Members:** Alexandra Klass, Law; Stephen Polasky, Ecological & Environmental Economics; Anu Ramaswami, Science Technology & Public Policy; Brian Steffenson, Plant Pathology

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## **Integrative GC Research Initiative: Assuring Clean Water and Feeding the World**

Also addresses the Enhancing Community Capacity theme

*\$250k GC Interdisciplinary Work Group Collaboration*

### **Backyard phenology: Integrating citizen science and public art to build collective agency on climate change**

**Co-PIs:** Christine Baeumler, Art; Mae Davenport, Forest Resources; Nicholas Jordan, Agronomy & Plant Genetics; Rebecca Montgomery, Forest Resources

**Team Members:** Chris Buyarski, Forest Resources; Francis Bettelyoun, Native Medicine Garden; Kate Flick, Forest Resources; Beth Mercer-Taylor, Institute on the Environment

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Driving Tomorrow [project summaries](https://strategic-planning.umn.edu/gc-research-grants-awarded) may be found online (<https://strategic-planning.umn.edu/gc-research-grants-awarded>).