innovations and linkages between Public Policy and Engineering for curriculum and research at Georgia Tech?

Kaye Husbands Fealing

Georgia Tech School of Public Policy

Syracuse University – Arizona State University
2nd Annual Sloan Foundation Workshop
September 15-17, 2019
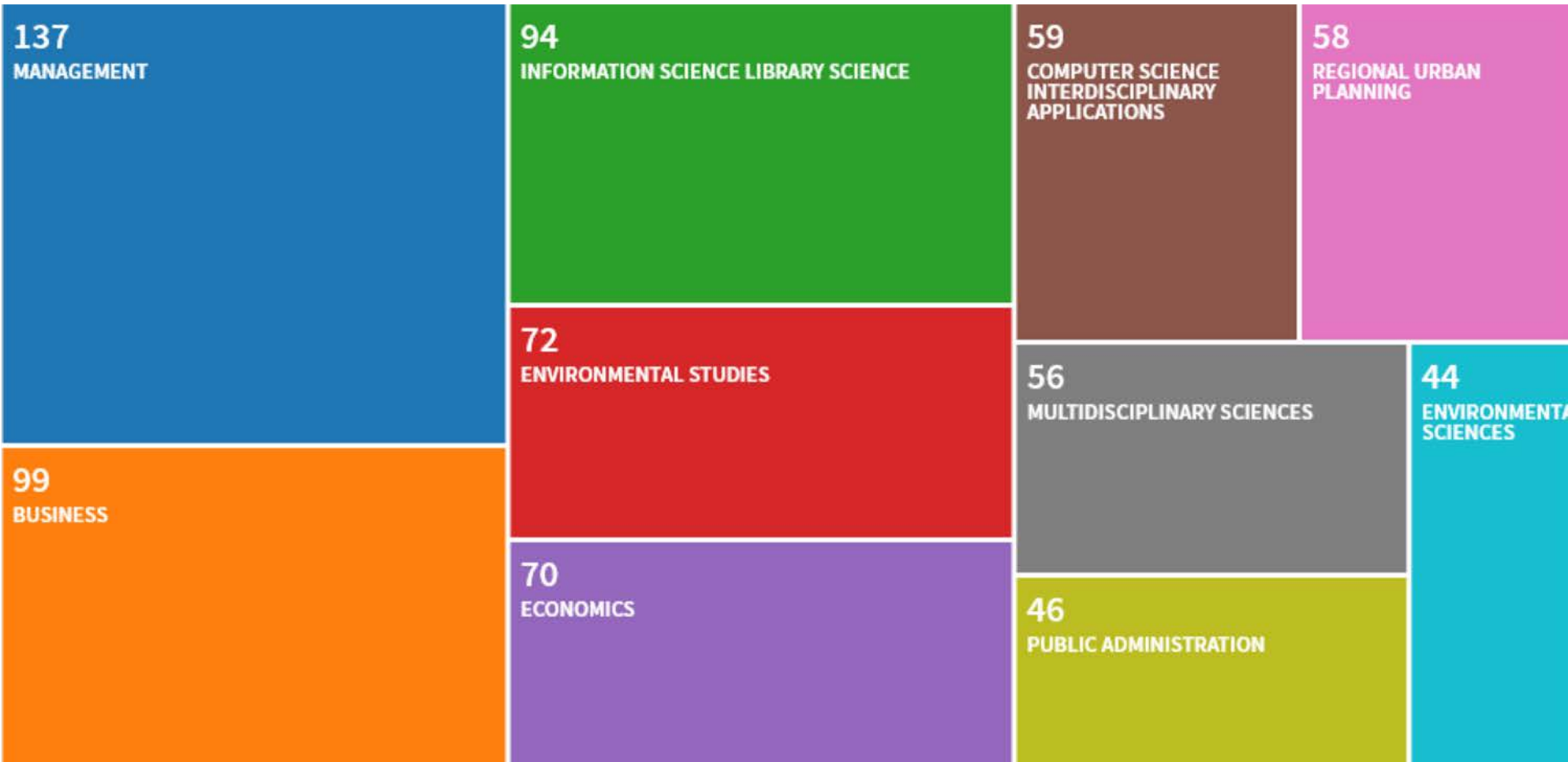
Disciplines of Faculty in SPP

1. Business administration
2. City and regional planning
3. Communications
4. Economics
5. **Engineering**
6. Ethics
7. Geography
8. History and philosophy of science
9. **Information systems**
10. Law
11. Management and organizational theory
12. Philosophy
13. Political science
14. Public affairs
15. Public management
16. Public policy
17. Science and technology studies
18. Sociology
19. Telecommunications policy
20. **Theoretical high energy physics**

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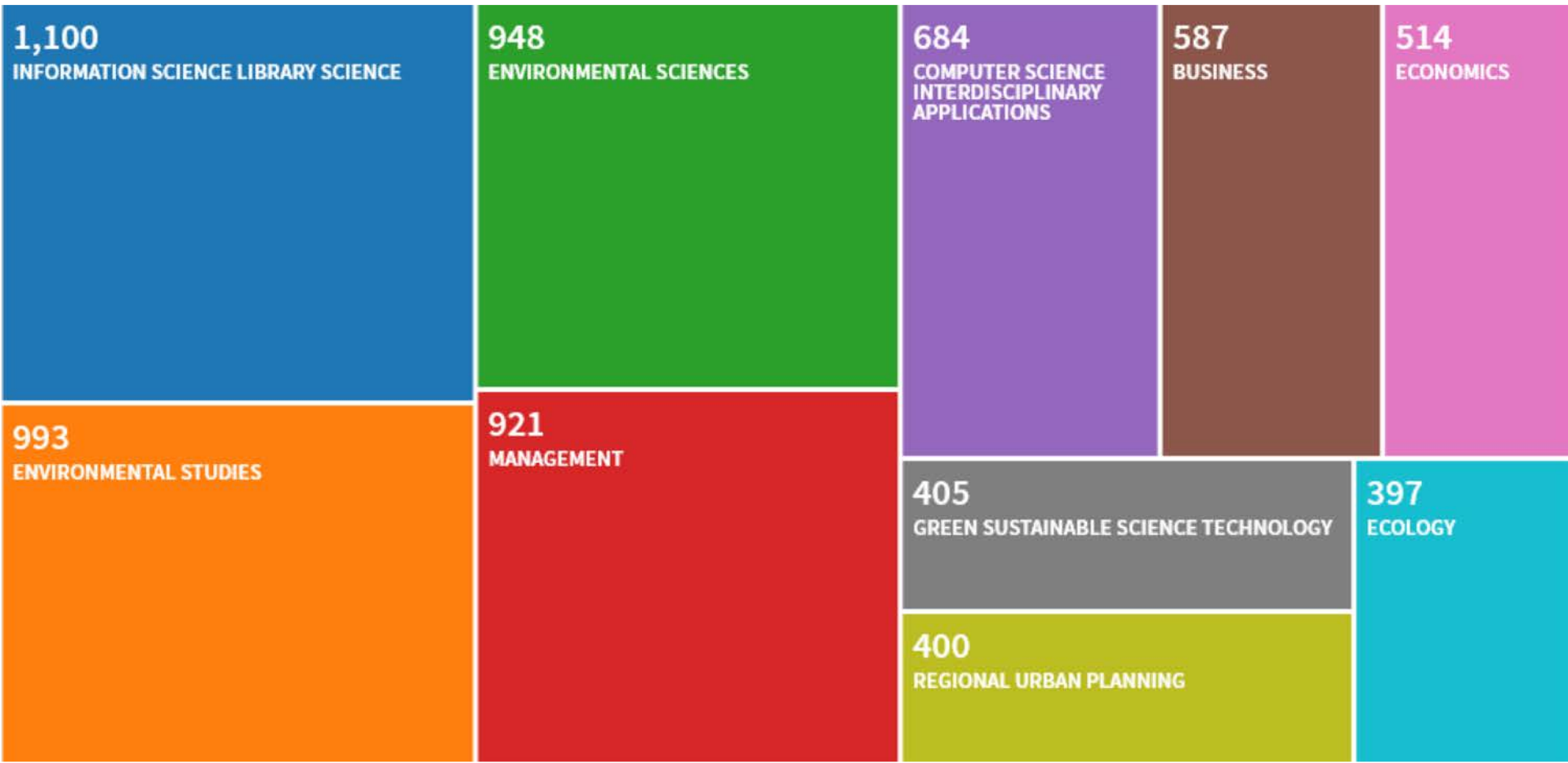# Science Overlay Map for SPP Publications (2010 to 2018)
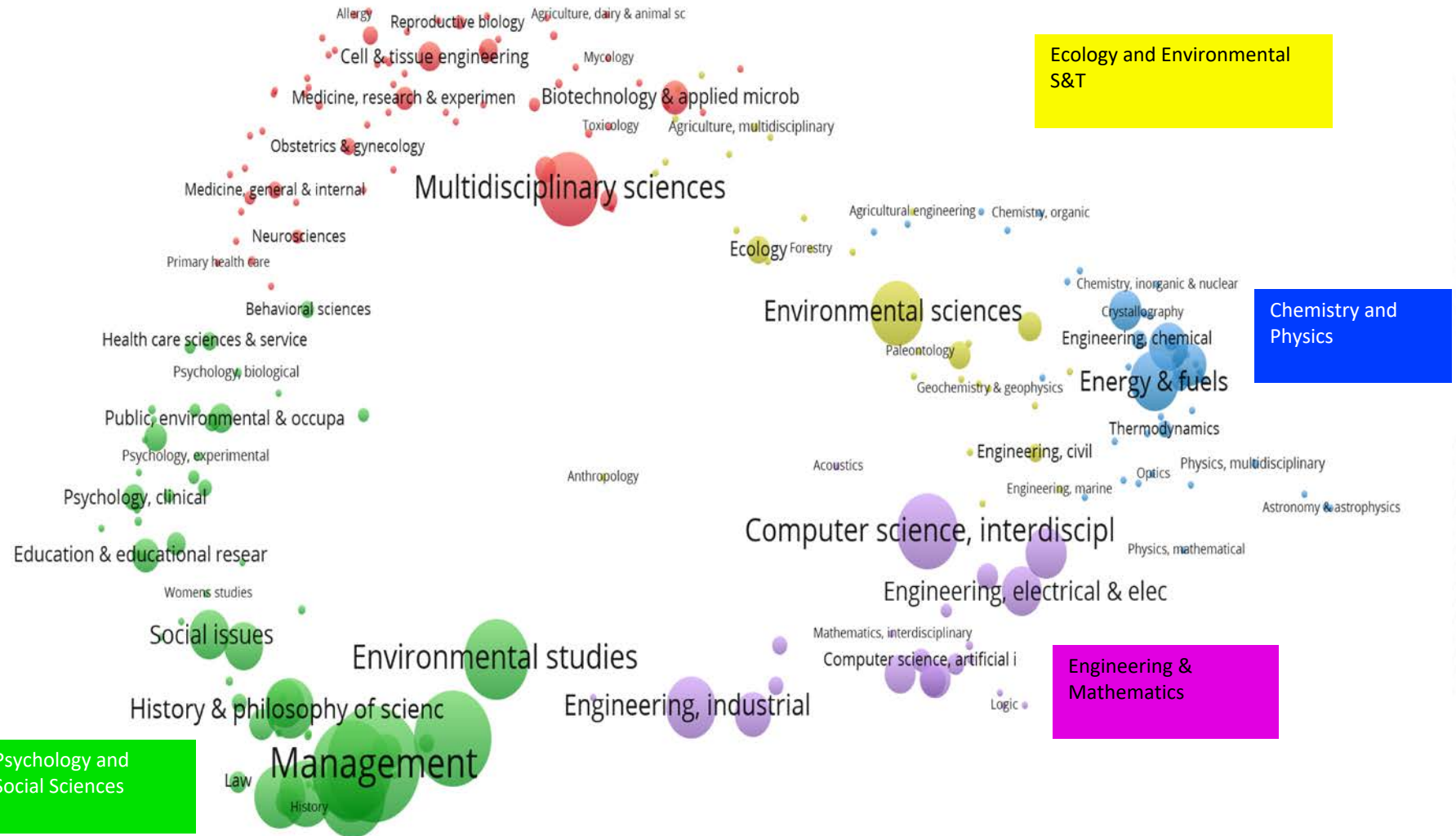
Size of bubbles reflects density of SPP publications referenced across a variety of science and engineering disciplines and fields.

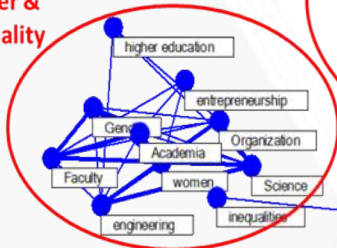# Disciplines Represented in SPP's Publications

Disciplines Citing SPP's Publications

1,100 INFORMATION SCIENCE LIBRARY SCIENCE	**948** ENVIRONMENTAL SCIENCES	**684** COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS	**587** BUSINESS	**514** ECONOMICS
993 ENVIRONMENTAL STUDIES	**921** MANAGEMENT	**405** GREEN SUSTAINABLE SCIENCE TECHNOLOGY **400** REGIONAL URBAN PLANNING		**397** ECOLOGY

Complex Web of Topics Define Georgia Tech's School of Public Policy
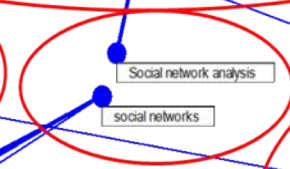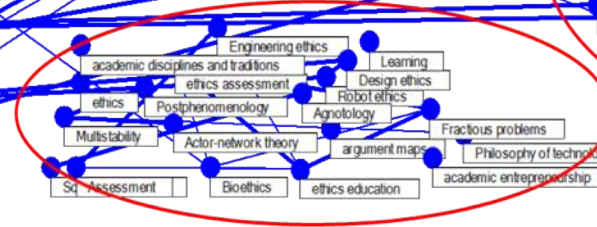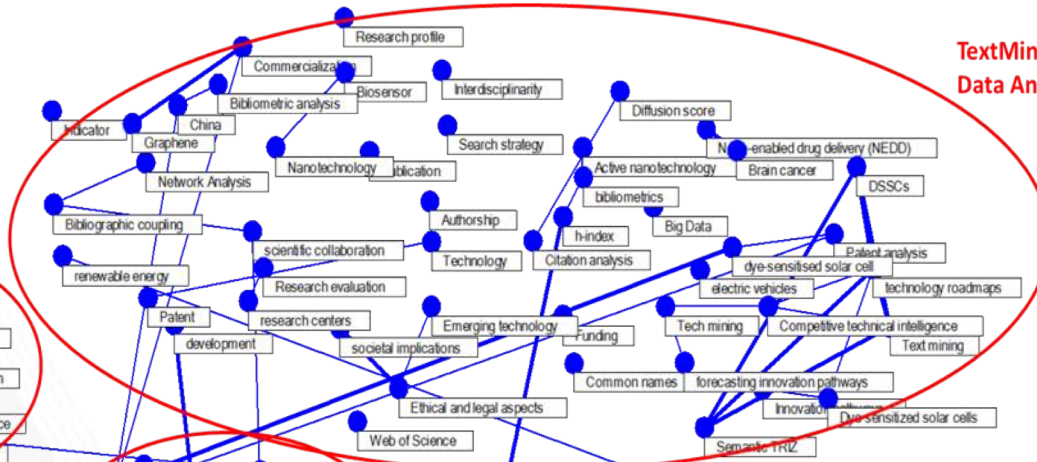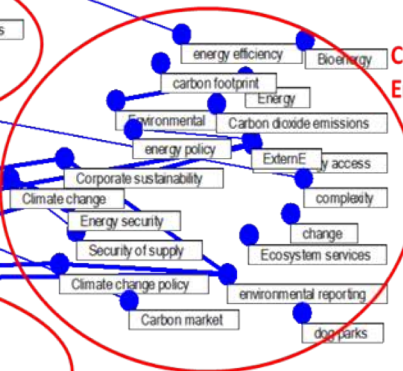
Our Connectedness & Interdisciplinarity

Marilyn Brown

1. John Crittenden
2. Valerie Thomas
3. Santiago Grijalva
4. Richard Fujimoto
5. Tim Lieuwen
6. Ronald Harley
7. Tom Orlando
8. Aris Georgakakos
9. Miroslav Begovic
10. Joe Montoya
11. Peter Webster
12. Gleb Ushin
13. Pinar Keskinocak
14. Carlos Santamarina
15. Dan Matisoff
16. Lakshimi Sankar
17. Liang Peng
18. Michael Elliot
19. Bojan Petrovic
20. Leigh McCook
21. Elsa Reichmanis
22. Doug Noonan
23. Jennifer Clark
24. Rafael Bras
25. Julia Kubanek
26. Steve French
27. Deedee Bennett
28. Sam Graham
29. Monica Halka
30. Judy Curry
31. Ann Carpenter
32. Paul Baer
33. Hai-Ru Chang
34. Steve Cross
35. Shijie Deng
36. Jian Luo
37. Usha Nair-Reichert
38. Philip Roberts
39. Maryam Saeedifard
40. Terry Sturm
41. Huaming Yao

Direct Proposal Collaborations
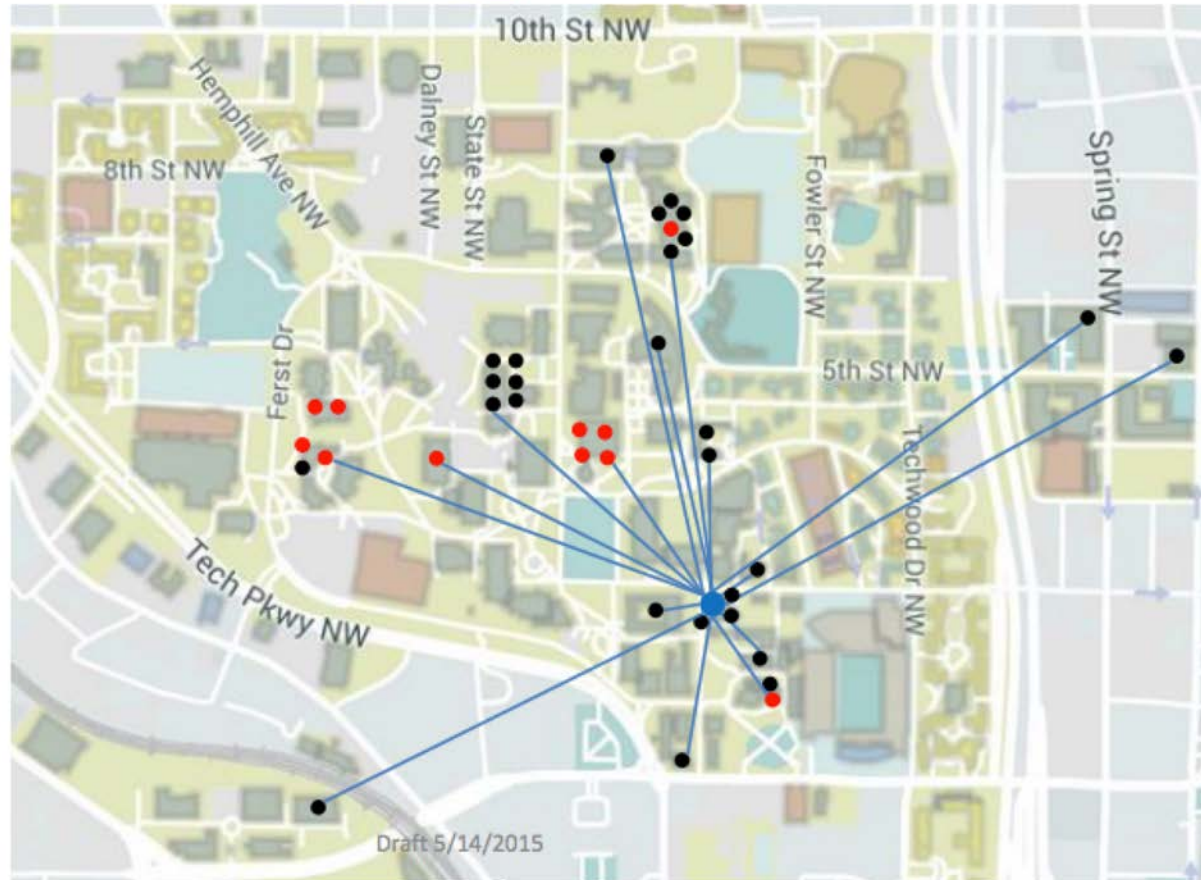
Black = proposal only
Red = award

Q: Where is Marilyn?
A: Probably walking on campus!

Draft 5/14/2015

SPP has strong ties across campus, in part because of the interdisciplinarity of its research….

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Water Intensity of the U.S. Energy System

- How do we include **societal values** when weighing multiple criteria in project decisions?
- How flexible is the US **hydropower** system, given the context of intermittent renewables?
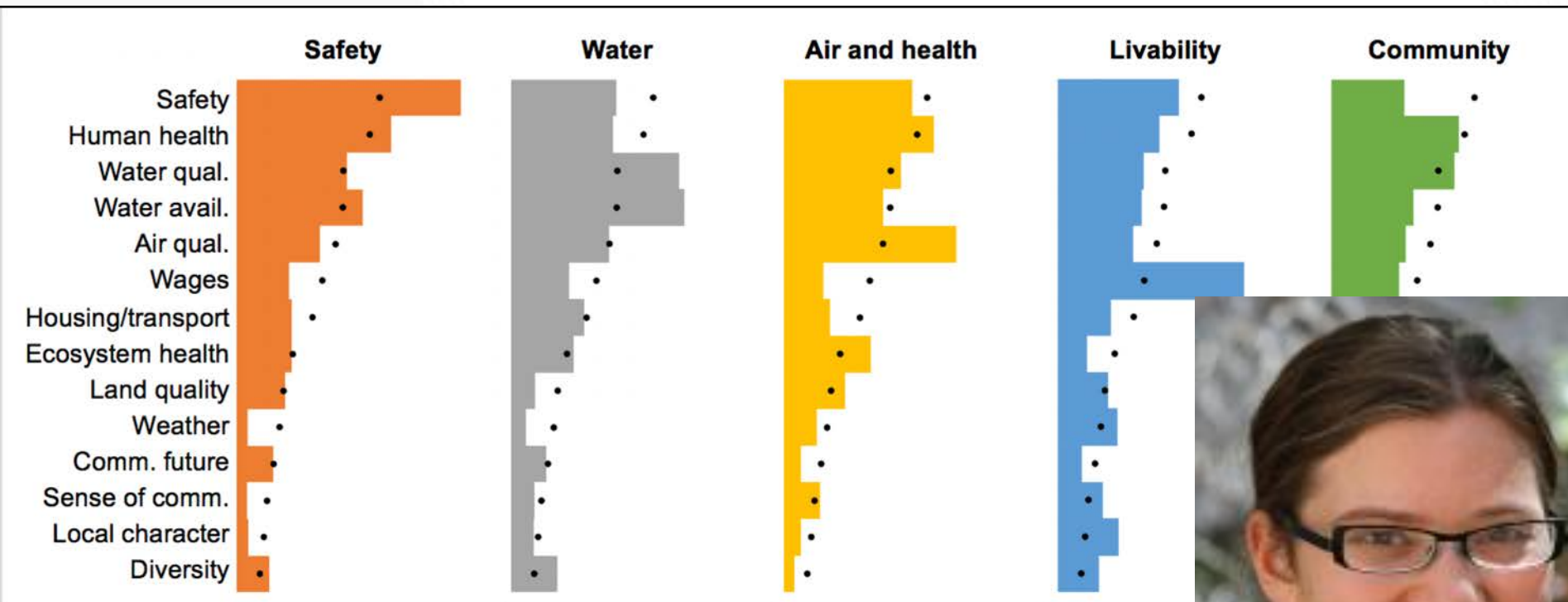

Emily Grubert (Civil & Environmental Engineering)

The Living Building

- The **Kendeda** Fund generously gave $30 million to fund the first Living Building in the Southeast – on Georgia Tech's campus.
- This building embodies the philosophy of the Living Building Challenge – to change how humans interact with the built environment.
- SPP is helping to apply principles and lessons well beyond the project's boundaries.
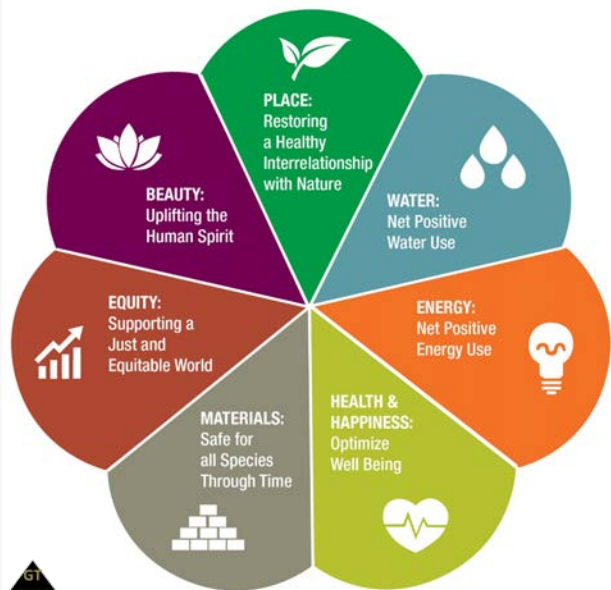
7 Petal Structure

How much PV is cost-effective?

Alice Favero and Dan Matisoff

Master & Certificate of Sustainable Energy and Environmental Management (MSEEM and CSEEM)

THE CURRICULUM

MSEEM can be completed either full time (4-4-2 courses in a single year) or part time (2-2-1 courses each year for 2 years). The graduate Certificate is offered as a stand-alone option or as part of the MSEEM curriculum. The programs are available either on-campus or online.

The Sustainable Energy and Environmental Management curriculum is a multi-disciplinary program with courses taught in schools across the Georgia Tech campus. These include Public Policy, Business, Industrial and Systems Engineering, City and Regional Planning, Civil and Environmental Engineering, and Economics among others.

Estimated Program Costs (Actual costs may vary):

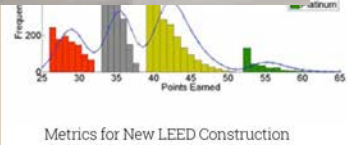|	MSEEM	CSEEM
In-state student participating on-campus:	$20,253	$8,101
Out-of-State student participating on-campus:	$38,729	$15,492
Online student:	$35,029	$13,190

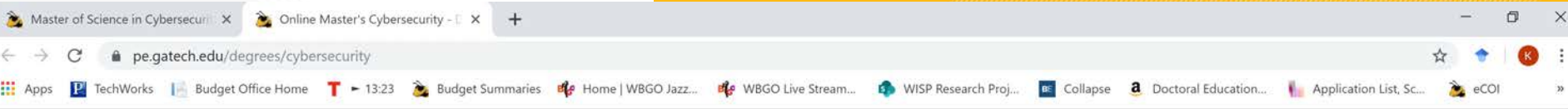Approximately 5 fully funded fellowships are available for on-campus MSEEM students

Admissions Deadlines:

Spring Enrollment: October 31

Fall Enrollment: June 15

Applications considered on a space-available basis after this date.

Energy Consumption

Total Cost of Ownership

Electric Urban Delivery Trucks: Energy Use, Greenhouse Gas Emissions, and Cost-Effectiveness

LIFE CYCLE ASSESSMENT
MANUFACTURING
USAGE
MATERIALS
DISPOSAL

Metrics for New LEED Construction

Master of Science in Cybersecurity × Online Master's Cybersecurity - D × +

← → C 🔒 pe.gatech.edu/degrees/cybersecurity ☆ ◆ K ⋮

⠿ Apps P TechWorks Budget Office Home T ⏵ 13:23 Budget Summaries Home | WBGO Jazz... WBGO Live Stream... WISP Research Proj... BE Collapse a Doctoral Education... Application List, Sc... eCOI »

Online Degree Overview

EARLY DECISION DEADLINE
Feb 1, 2020

**REGULAR DECISION
DEADLINE**
Mar 15, 2020

PROGRAM BEGINS
Aug 17, 2020

Request Information »

Attend Info Session »

On-Campus Program »

Apply Now »

Cybersecurity isn't just about keeping your individual computers and devices safe, it's about safeguarding our society and our world. Whether that's from rogue criminals and gangs who want to steal your money or identity, or nation states and terror groups who want to disrupt defense systems, elections, or cripple our energy infrastructure, the need for well-trained cybersecurity professionals who can stop these attacks has never been greater.

Georgia Tech's OMS Cybersecurity is the only interdisciplinary degree in cybersecurity from a *U.S. News & World Report* Top 10-ranked public university that you can earn online, on your own schedule, for a tuition less than $10,000.

The OMS Cybersecurity program provides the foundations so you can:

- Understand the nature of risks and pathways of threats to cyber and cyber-physical systems.
- Develop an awareness of vulnerabilities to software, networks, and computer systems.
- Comprehend methods and strategies for protecting data on networks, in software, as well as other cyber and cyber-physical systems.
- Examine the constraints and costs of cybercrime and espionage to privacy, communication, and use of technology.
- Investigate the role that government, corporate, and coalition policies can have towards slowing and stopping cybercrime and surveillance.

Type here to search

11:37 PM
9/15/2019

- Study of the Georgia Institute of Technology's **Online M.S. in Computer Science**, the earliest model to combine the inexpensive nature of online education with a highly-ranked degree program.

- Regression discontinuity estimates exploiting an admissions threshold unknown to applicants show that access to this online option substantially increases overall enrollment in education, **expanding the pool of students rather than substituting for existing educational options**.

- **Demand for the online option is driven by mid-career Americans**. By satisfying large, previously unmet demand for mid-career training, this single program will boost annual production of American computer science master's degrees by about seven percent.

- More generally, these results suggest that **low-cost, high-quality online options may open opportunities for populations who would not otherwise pursue education**.

https://www.journals.uchicago.edu/doi/abs/10.1086/698895?journalCode=jole&

Julia Melkers

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Data Science

Omar Asensio's "big data" research team from the School of Public Policy is on the 12th floor of Coda, in the Institute for Data Engineering and Science (IDEaS) neighborhood—a networks of researchers who use machine learning tools, high-volume real-time data, and proprietary industry data.

Transformational research, which uses behavioral modeling to address **environmental and transportation policy questions**.

Asensio recently gave a keynote address at the GM IT Georgia Innovation Center's Geek Week. Recent publications are in *Nature Energy*,

Coda Data
755,000 sf
21 Stories
$375 million

Georgia's Smart Communities Challenge

Georgia Tech's initiative on Smart Cities and Inclusive Innovation will help shape resilient and sustainable communities.

- To spur smart community development throughout GA

- To position GA as a smart community leader

- To build a workforce familiar with advanced technologies

Winners

Gwinnett County
Connected Vehicle Technology Master Plan
Dr. Angshuman Guin, Civil Engineering

City of Chamblee
Shared Autonomus Vehicle Study
Ellen Dunham-Jones, Architecture

Chatham County
Smart Sea Level Tools for Emergency Planning and Response
Dr. Kim Cobb, Earth &Atmosphere Science

City of Albany
Housing Data Analytics and Visualization Initiative
Dr. Omar Isaac Assenio, Public Policy

Randomized Policy Experiments

Energy Conservation Randomized Controlled Trials (RCTs)

Smart Grid and Energy Efficiency Program Evaluation

Data Analytics and Smart Mobility

Machine Learning and Real-Time Intelligence in Electric Vehicle Infrastructure

Civic Data Science and Urban Sustainability

GT
Atlanta
Georgia
Southeast
Nation
Globe

Debra Lam & Omar Asensio

14

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Courses **led** by Public Policy faculty draw students from across many disciplines on campus.

$20 million NSF-Engineering Research Center

Objectives:

1. Understand patient experiences, perspectives, and concerns with CAR-T cell therapy

2. Identify key challenges facing industry stakeholders

3. Incorporate patient perspectives into supply chain modeling and manufacturing design

Supply Chain & P

Social Science

1) Crowd Fund

2) Qualitative
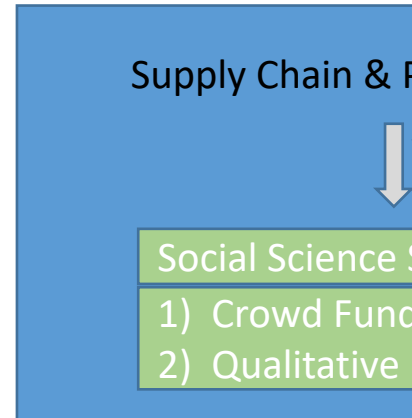
Embedded Social Sci

Aaron Levine

Supply chain and cell manufacturing design decisions have **ethical and societal implications**

- Cost
- Access
- Time to treatment
- Consistency

Graduate Education

Best Practices and Current Challenges in Cell Manufacturing

- Industry case studies
- Real world problems

Cell Manufacturing and Society

- **Ethics, policy and economics**
- **Regulatory pathways**

- **New courses required for all CMaT graduate students using synchronous virtual classroom**

- Research experiences to build technical skill set

- Internships and rich industry connections to build professional skill set

- International experiences to expand networks and foster new collaborations

- Access to optional short courses (e.g., regen med)

Ethics & Philosophy of Science & Technology
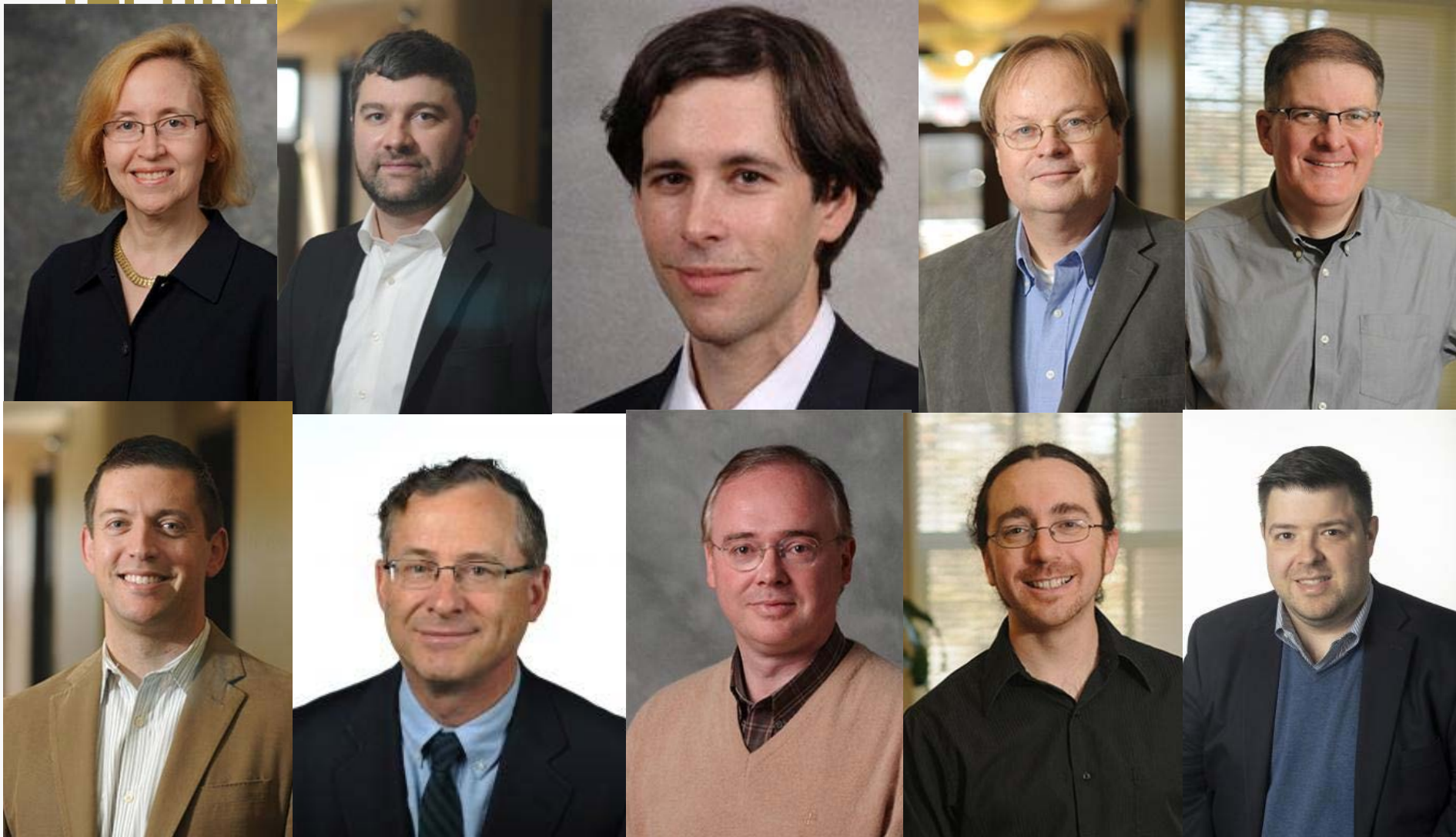
Topics: Artificial Intelligence, Bioethics, Bioscience, Biotechnology, Computer Supported Argument Visualization, Cybersecurity, Environmental, Health, "Hostile Design," Human-Machine Interaction, ICT, & Smart Cities.

Need to Consider?

- Students
- Core competencies
- Partnerships across campus and institutions
- Leadership
- Funding mechanisms
  - Agency and foundation grants
  - Corporate funding
- Impacts
- Diversity, equity & inclusion

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Thank you!

khf@gatech.edu

APPENDIX

Learning Outcomes
Undergraduate & Graduate Programs

- Advocacy

- Analysis

- Civic Engagement

- Community Engagement

- Communications

- Data Analytics

- Diversity, Equity & Inclusion (DEI)

- Epistemology

- Ethics

- International

- Financial Management & Budgeting

- Logic & Argument Construction/Assessment

- Policy Formulation & Design

- Policy Implementation

- Politics of Policy

- Probability & Statistical Analyses

- Public Value Mapping

- Writing

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SPP Degree Programs (2019)

Degrees	Where are our graduates employed?

BSPP (with capstone "Policy Task Force")
• Minors/Certificates
  ○ Intellectual Property
  ○ Law, Science, and Technology/Pre-Law
  ○ Leadership Studies
  ○ Philosophy of Science and Technology
  ○ Political Science
  ○ Public Policy
• 5 Year BS/MS Degree
	• Assistant Professor of mathematics at Haverford College
	• Attorneys at King and Spalding, Covington & Burling, DC Court of Appeals, etc.
	• Budget analysts for CDC, City of San Jose CA, Georgia State Senate, etc.
	• Policy analyst, Federal Reserve Bank of Atlanta
	• Investment advisors, BBR Partners, Bridgewater Associates
	• Development officer, Community Affordable Housing Equity Corporation
	• Fulbright Fellow at the Royal Veterinary College (London), studying global public health
	• Chief education policy advisor, Governor of Georgia
	• Consultants for McKinsey, Deloitte, Capgemini, KPMG, etc.
	• Program manager at Cox Communications

MSPP (with capstone) • Certificate in Public Policy • Certificate in Science, Technology & Society • Dual Degree with School of City & Regional Planning • MS Cybersecurity Policy (joint with ECE and CoC, with capstone) • MS Cybersecurity Policy Online (joint with ECE and CoC, with capstone) • Master of Sustainable Energy & Environmental Management • Certificate of Sustainable Energy & Environmental Management	• Advanced Management Analyst, Georgia Department of Audits and Accounts • Consultant, Carbon Markets and Innovation Program – World Bank Group • Director of Communications, Georgia Early Education Alliance for Ready Students • Public Health Analyst, Office of the National Coordinator for Health Information Technology • Research Analyst, Chartwell • Research Associate, Chilean Institute of Municipal Studies • Senior Public Policy Specialist, Boston Consulting Group • Senior Research Associate, National Regulatory Research Institute • Technical Analyst, D+R International • City of Atlanta, Office of the Mayor • Security Agencies

PhD
• Concentrations include:
  ○ Economic Development Policy
  ○ Energy and Environmental Policy
  ○ Information and Communications Policy
  ○ Science and Technology Policy
	• Advisor to the Minster, Ministry of Economics of Latvia
	• Analyst, Michigan Energy Office
	• CEO, The Greenlink Group
	• Post-doctoral Fellow, Rotterdam School of Management, Erasmus University
	• Professors at: Fudan University; Lee Kuan Yew School of Public Policy, National University of Singapore; Stony Brook University; Iowa State University; Universidad de Concepción, Chile; Universidad del Externado, Colombia
	• Regulatory Director, Vote Solar
	• Research Fellow, University of Michigan
	• Senior Researcher, Tyndall Centre for Climate Change Research
	• Senior Data Scientist, American Institutes of Research
	• Centers for Disease Control & Prevention

PhD w/Georgia State University's Young School of Policy Studies	• Professors at: Jindal School of Government in Public Policy; University of Nebraska-Lincoln; DePaul University; Arizona State University; University of Baltimore

Areas of Expertise in SPP

1. Science, Technology and Innovation Policy
Innovation Ecosystem & Public Policy; TextMining & Data Analytics; Intellectual Property
Omar Asensio, Richard Barke, Susan Cozzens, Mary Frank Fox , Scott Ganz, Diana Hicks, Kaye Husbands Fealing, Cheryl Leggon, Aaron Levine, Alan Marco, Alan Porter, Juan Rogers, Philip Shapira, M. Zak Taylor, John Walsh, Jan Youtie

2. Energy, Climate & Environmental Policy
Energy Policy; Environmental Policy; Sustainability
Omar Asensio ,Marilyn Brown, Michael Elliott, Alice Favero, Scott Ganz, Emanuele Massetti, Dan Matisoff, Bryan Norton, Valerie Thomas

3. Information and Communications Technology Policy
Cybersecurity Policy; Internet policy; Technology & Disabilities
Paul Baker, Hans Klein, Helena Mitchell, Nathan Moon, Milton Mueller, Juan Rogers

4. Organization Design; STEM Education, Careers & Workforce
S&E Careers & STEM Education; Broadening Participation & Performance in STEM; Politics of Organizations
Susan Cozzens, Mary Frank Fox, Scott Ganz, Kaye Husbands Fealing, Gordon Kingsley, Cheryl Leggon, Julia Melkers, Georgia Persons, John Walsh

5. Ethics and Philosophy of Science and Technology
Engineering Ethics; Environmental Ethics; Biomedical Ethics
Roberta Berry, Justin Biddle, Jason Borenstein, Michael Hoffmann, Bob Kirkman, Hans Klein, Aaron Levine, Bryan Norton, Robert Rosenberger, Chad Slieper

6. Economic Development and Social Policy
Regional Innovation; Smart Cities; Health Policy & Management
Lindsey Bullinger, Michael Elliott, Nancey Green Leigh, Robert Rosenberger, Jan Youtie

7. Program Evaluation, Public Management & Administration
Susan Cozzens, Scott Ganz, Diana Hicks, Gordon Kingsley, Cheryl Leggon, Julia Melkers, Juan Rogers

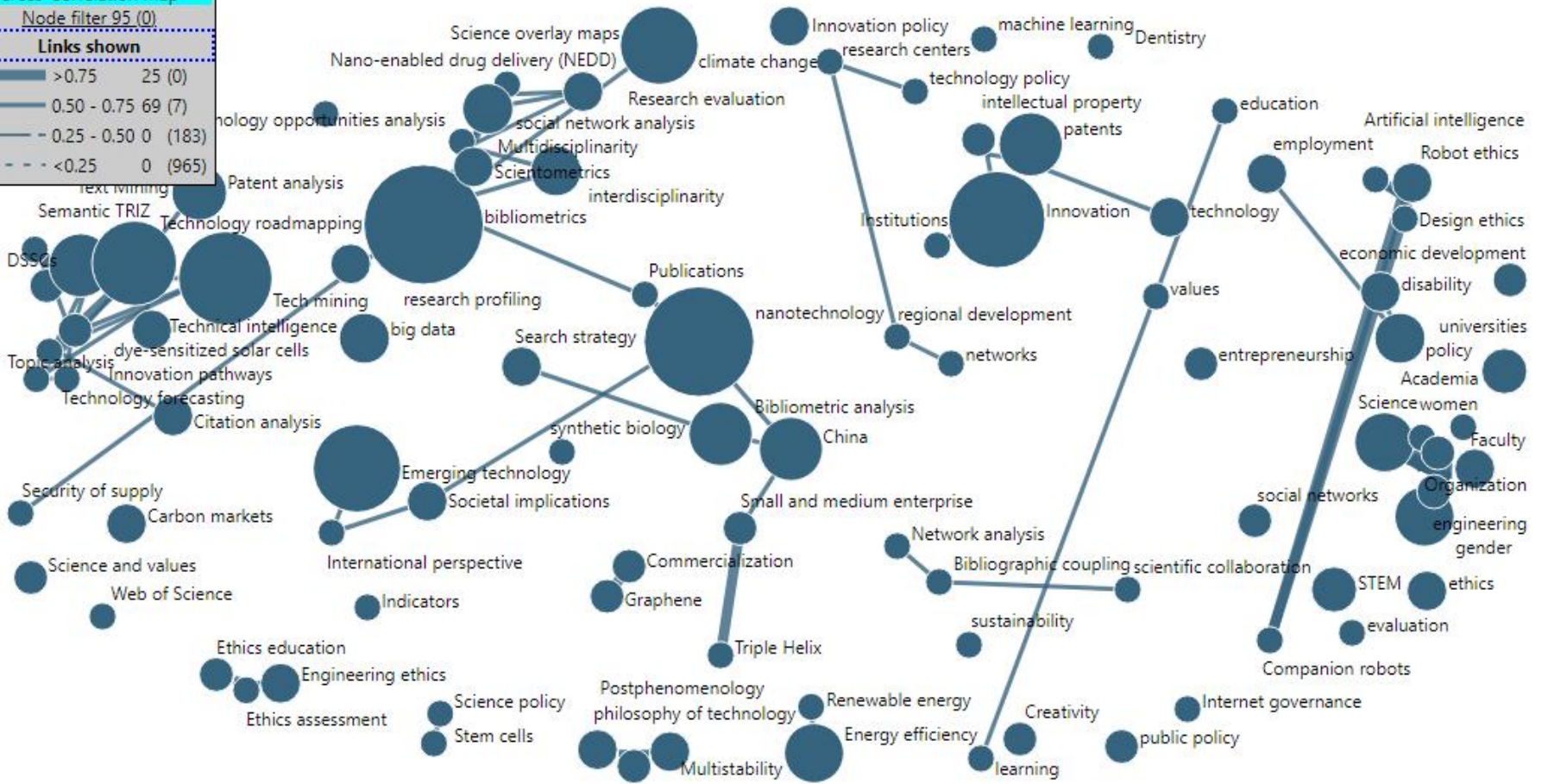**8. Policy Process, Leadership, & Pre-Law**
Richard Barke, Roberta Berry, Scott Ganz, Gordon Kingsley, Chad Slieper, M. Zak Taylor, Wes Wynens

Cross-Correlation Map of Keywords (author's) (Cleaned) Crossed with Keywords (author's) (Cleaned)

Heatmap for Global SPP Collaboration

Low | High

JS map by amCharts

Georgia
Tech
CREATING THE NEXT
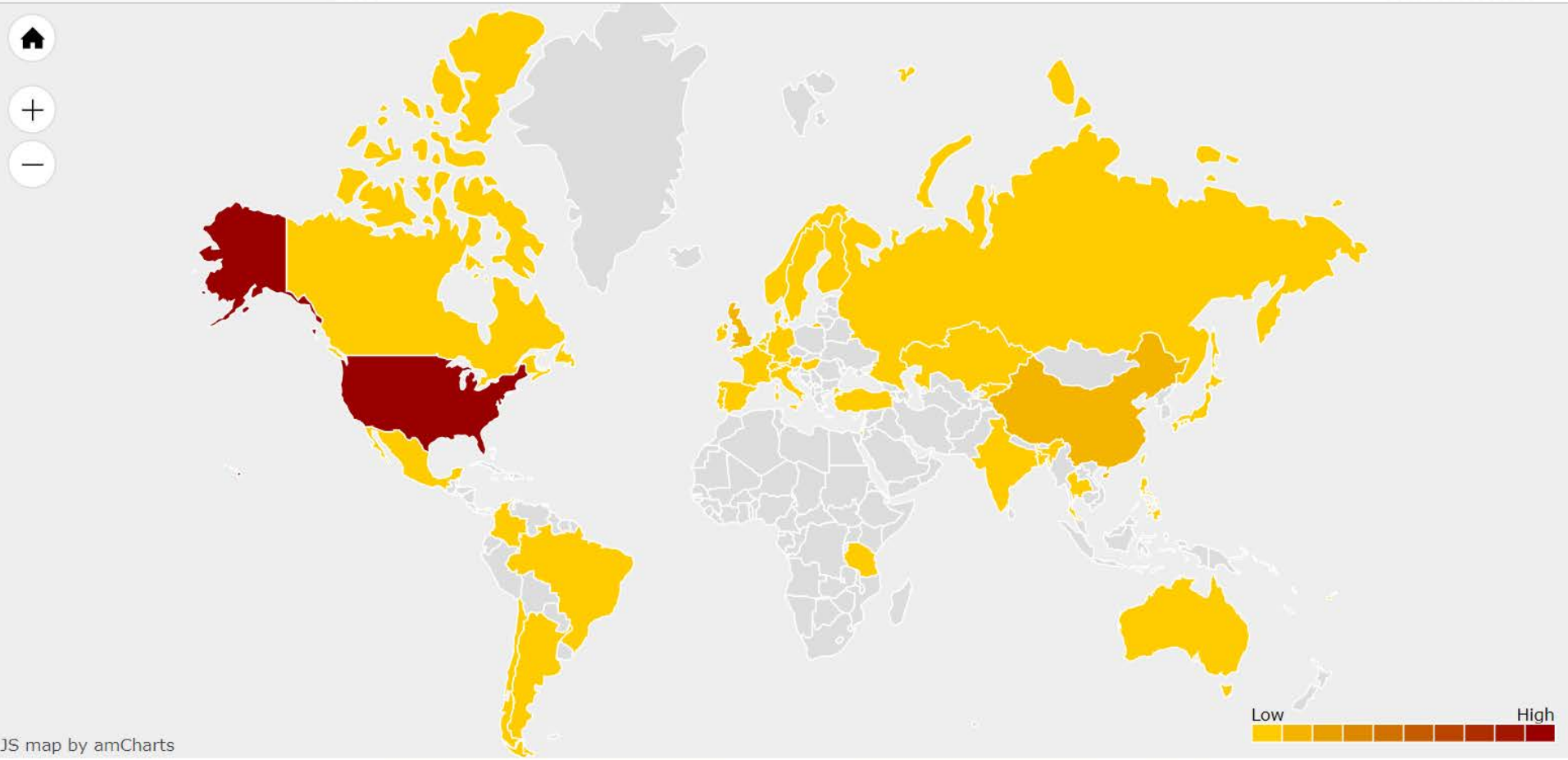
Where Are SPP's Collaborators?
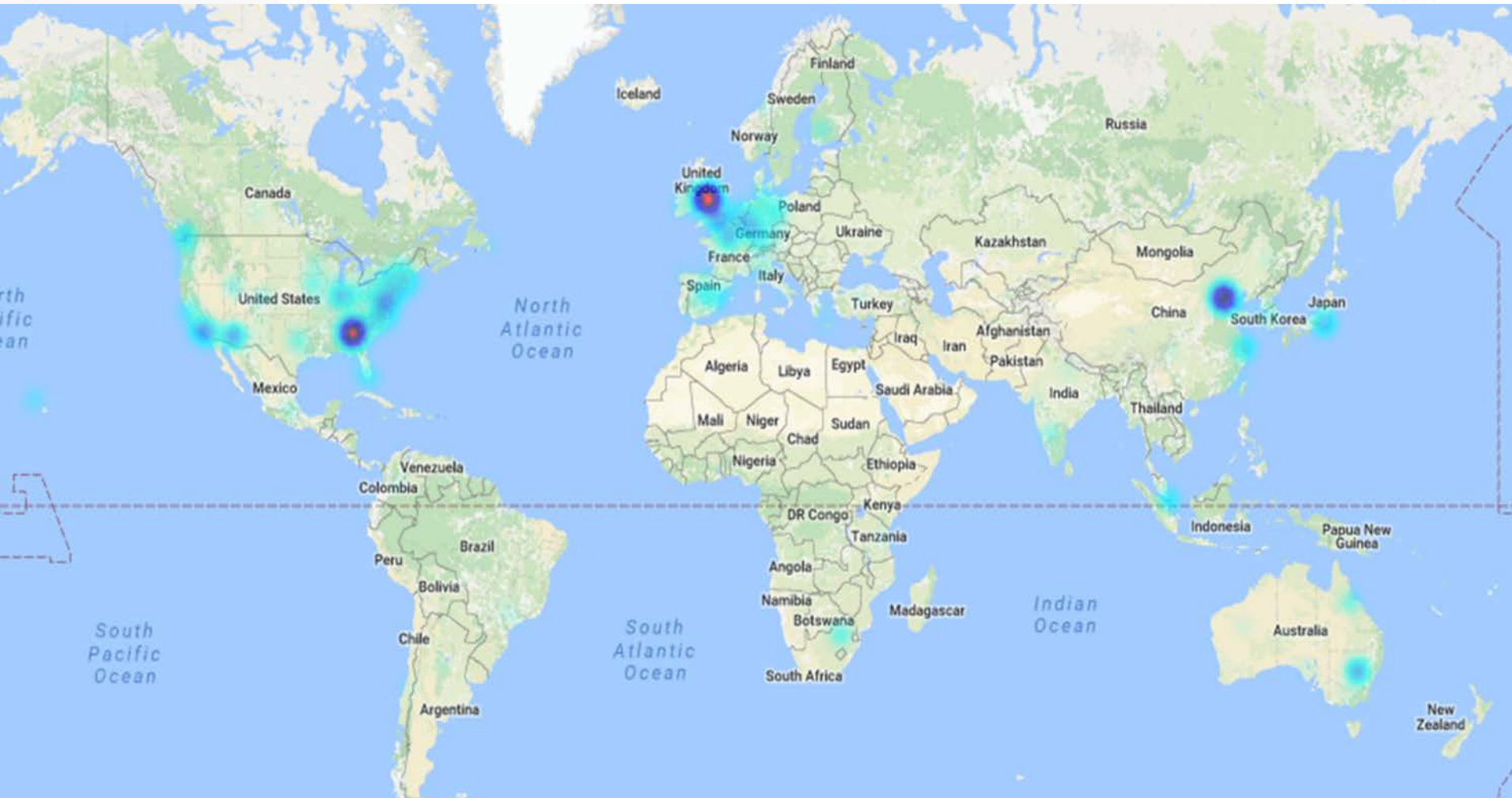
Data Source: Web of Science 2010-2017; does not include all peer-reviewed books. Significant collaborations and policy guidance also occur in **South America (Argentina, Chile, Columbia), Eastern Europe (Poland, Bulgaria), and the Middle East (UAE, Saudi Arabia)**.

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SPP's Affiliated Centers, Labs & Programs

- **Center for Advanced Communications Policy (CACP)** focuses on assessment of policy issues and production of regulatory filings, identification of future options for innovation, and articulation of a clearer vision of the ever-changing technology landscape.

- **Center for Ethics and Technology (CET)** is dedicated to fostering a culture of critical inquiry and deliberation about ethical issues that arise in relation to technological systems.

- **Center for the Study of Women, Science, & Technology (WST)** promotes the recruitment, retention, and advancement of female students and faculty in science, technology, engineering and, math (STEM) fields.

- **Center for Urban Innovation (CUI)** supports research that thinks globally, acts locally, and encourages researchers, students, and civic leaders to find innovative, interdisciplinary approaches to shaping sustainable cities.

- **Climate and Energy Policy Lab (CEPL)** conducts research on clean energy employment; financing, information and regulatory policies to promote energy-efficiency investments; renewable energy policies and trends in the U.S. South; smart grid policies; and demand response programs. It is involved in studies of climate mitigation under the Intergovernmental Panel on Climate Change, and our policy interests span the triad of mitigation, adaptation, and geo-engineering.

- **Internet Governance Project (IGP)** is a leading source of analysis of global Internet policy, Internet resource management, and cybersecurity policy.

- **Science, Technology, and Innovation Policy (STIP)** together with the **Innovation Co-Laboratory** engages researchers at Georgia Tech, University of Manchester, and Beijing Institute of Technology in mutually agreed research projects, exchange, training, and other related activities in the domain of science, technology, and innovation management and policy.

- **Technology, Policy, and Assessment Center (TPAC)** is a policy research team developing ways to shape innovation for global development.