Modeling Science, Technology & Innovation Conference
WASHINGTON D.C. | MAY 17 - 18, 2016

Two Minute Flash Talks

Tuesday May 17th 1:30 PM – 2:00 PM

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First speaker, please come up.

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Matteo Convertino

University of Minnesota

Dr. Convertino, PI of the HumNat Lab, is involved in the promotion of complexity science and engineering design of natural and human systems for population health. In a broader perspective this effort is committed to the diagnosis, etiognosis and prognosis of diseases via smart and multiscale global system science and art-in-science. My deep interest is in the identification of the fundamental factor interactions ("processes") leading to observed patterns by integrating system biology/ecology (with particular focus on the environmental dynamics — e.g. ecohydrological dynamics — in systemic macro-epidemiology) and in the translation of that knowledge to applications for stakeholders via decision science and engineering methods. The quest for universalities, system states and state transitions via tipping points is a key in the research of Dr. Convertino. Theories and models that have been developed are: Optimal Transmission Networks, Morphological Effective Systemic Epigraph, Information-theory based Global Sensitivity and Uncertainty Analysis, MaxEnt Model in geomorphology and epidemiology, Portfolio Decision Models for Enhanced Adaptive Management, Reverse Engineering Traceback Model, and Game-based Mental Modeling. The conversion of these models to software (STEM and DECERNS) is ongoing as well as "science as art" initiatives. Fun fact: How did Dr. Convertino got interested into this? His hometown: Venice! He started to be interested in the design of bridges, the dynamics of water ecosystems, and later on in people dynamics and how that can be analyzed by combining methods used to design bridges and water ecosystems. In one word: connectomics (!), i.e. how everything is connected to everything.

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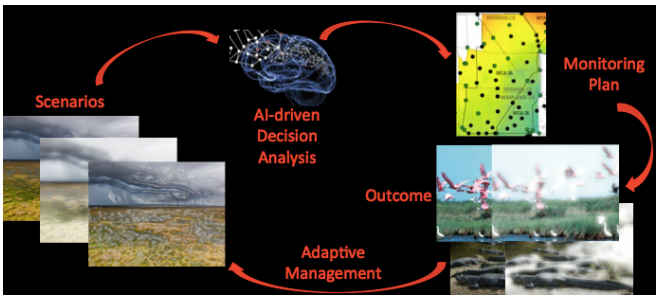
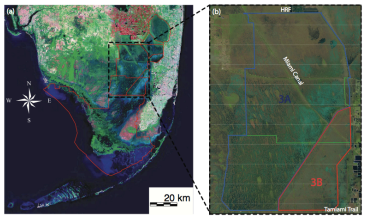
Enhanced Adaptive Management for Population Health: Integrating Ecosystem Dynamics and Stakeholder Mental Models

The *Science* is the Ecosystem Dynamics (i.e. the Everglades in this case)

The *Technology* is reflected by incorporating technological/engineering solutions that affect ecosystem dynamics (engineering infrastructure and automated monitoring systems). The technology is also related to the model itself.

The *Innovation* is related to the explicit incorporation of a decision making process that is the basis of a rational public policy. The innovation reflected also by capturing stakeholder mental models reflect the evolution of people mental models (knowledge, preferences, biases). Innovation is also about the methods themselves.





- Park et al (2012), *Risk Analysis*
- Convertino et al., (2013), Enhanced Adaptive Management: Application to the Everglades Ecosystem, *Nature Climate Change*
- Convertino et al, (2015), *SERRA*
- Convertino et al, (2016), *SERRA*

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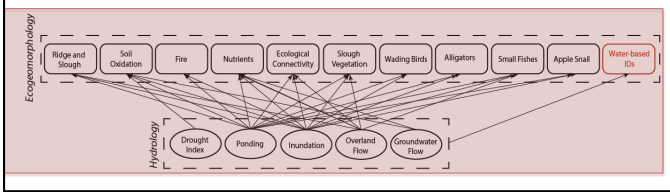
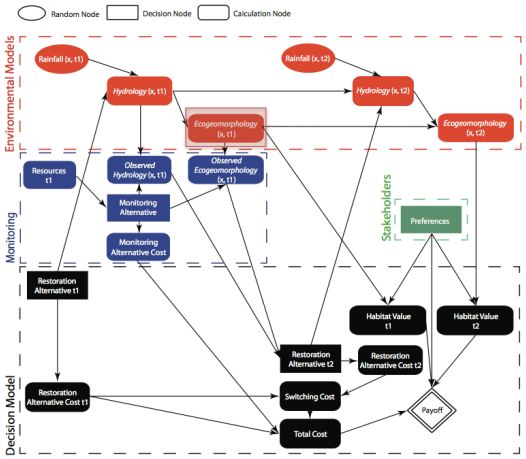
Entropy-based machine learning of data dependencies and AI implementation of the decision model as ecosystem computational infrastructure

Health as an ecosystem service. In terms of diseases we particularly look into waterborne and water-based diseases (Zika, Dengue Chickengunya, West Nile and Yellow Fever).

Health as an ecosystem service and public good that cannot be discounted. Ecosystem service that depends on both structure and function which can be captures by the non-linear analysis of information to predict a systemic payoff function





- Convertino et al., (2013), Enhanced Adaptive Management: Application to the Everglades Ecosystem, *Nature Climate Change*
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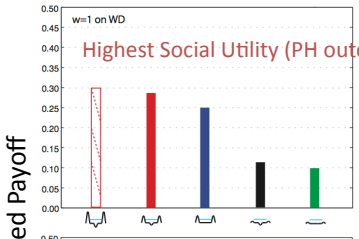
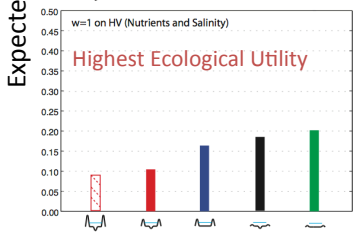
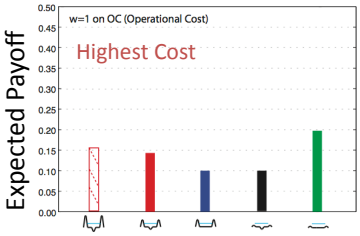
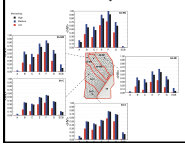


Changing weights change drastically the decision based on the expected payoff.





Alternatives designed to reconstruct the pre-drainage flow *may have a positive ecological and animal health impact, but may also have high operational costs and only marginally contribute to meeting other objectives such as reduction of flooding* that has catastrophic human impact and morbidities in terms of deaths and infectious disease symptoms.



Spatio-temporal explicit model that considers the full uncertainty and dependence of drivers.

- Convertino et al., (2013), Enhanced Adaptive Management: Application to the Everglades Ecosystem, *Nature Climate Change*
- Convertino et al, (2015), *SERRA*

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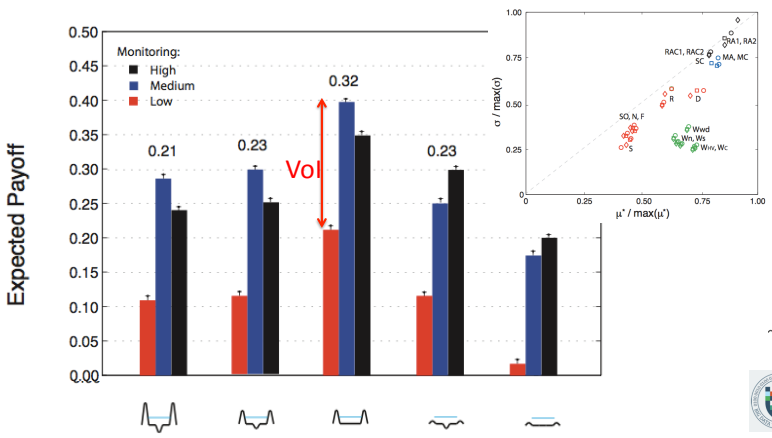

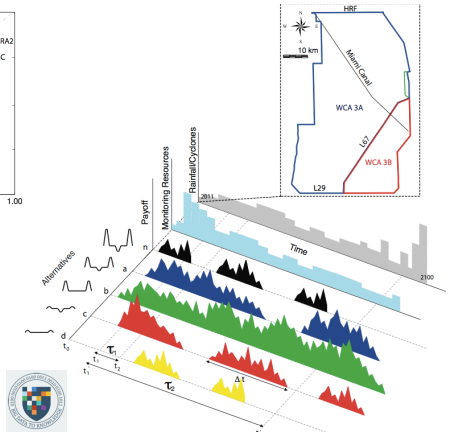

The model allows decision makers to explore the full landscape of possible scenarios before taking decisions and to dynamically design the system considering stakeholder values, economical and political constraints, ecosystem dynamics and surprises. Any possible state and tipping points can be identified. Reverse engineering use of the model/cyberinfrastructure.

Sustainable Healthy Cities

Epidemic Prediction Initiative
Moving forecasting from research to decisions.

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Please thank the speaker, applause!

Next speaker, please come up.

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Maria Larenas

National Institutes of Health

Maria I. Larenas has strong expertise in the analysis and management of complex data sets as well as a solid understanding of the theoretical issues in areas of labor economics and economics of education. She had worked as a research economist in different organizations such as the research group of the Nobel Laureate James Heckman, RCF Economic and Financial Consulting in Chicago, SENDA (Chilean government agency of prevention and rehabilitation of alcohol and drugs abuse), and International institutions (IADB and World Bank). Maria holds a B.A and Master Degree in Economics from her native country (Chile) and a Master in Public Policy from the University of Maryland. Her area of interest is the analysis and policy implications of school-to work transitions and their impacts on long-term outcomes.

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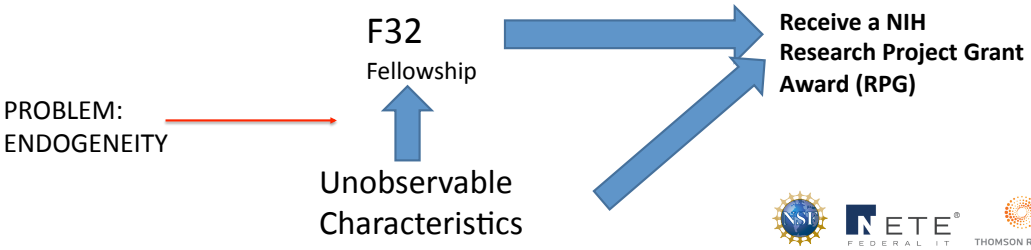
Does a *F32 award* have an effect on the *research career progression* of biomedical researchers *towards independent NIH funding*?

By **Maria Larenas, DBWR-NIH (Consultant)**
Misty Heggeness, U.S. Census Bureau
Frances Carter-Johnson, NSF
Donna Ginther, University of Kansas

Paper: Impact of F32-NIH Funded Postdoctoral Training on Future Career Outcomes

Two Steps F32 Award decision:

- *1. NIH Level:*
  - *Scientific merit based on a Priority Score (rating variable).*
- *2. NIH Institute and Center Level:*
  - *Needs and priorities of NIH Institutes restricted to the budget (Multiples Cutoffs).*



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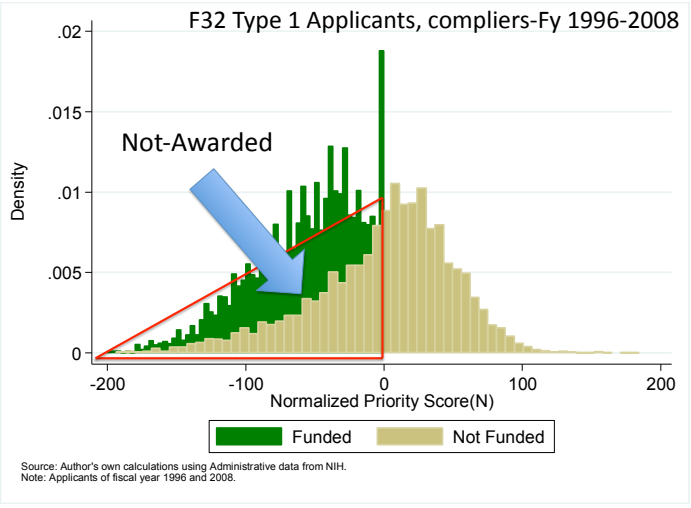
METHOD: Fuzzy Regression Discontinuity Design



- Method Developed to estimate treatment effects in non-experimental settings.
- Provides causal estimates of treatment effects.
- LATE: Local Average Treatment Effect
- Individuals cannot manipulate with precision their assignment variable.
- Individuals are comparable near the cutoff point
- Assignment is an IV for program participation
- Estimation using IV, Ivprobit, Biprobit

Conclusion

- The receipt of an NIH F32 postdoctoral fellowship at the margin increases the probability of receiving a RPG grant in about **6 percentage points**.

- Next Steps
  - Sensitivity analysis and inclusion of Academic Position as an outcome.
  - Compare fellowship with other forms of support for postdoctoral training.
  - Determine the effects of the F32 on the probability of receiving a major NIH research award (R01).

- Thanks to NIH- Division of Biomedical Research Workforce (DBRW) OEP/OER: Sherry Mills, Kay Lund, Ryan Pfirrmann-Powell, Jenifer Sutton, Ying Zeng, Wally Schaffer, Henry Khachaturian, Lisa Evans, Martha Faraday.

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Please thank the speaker, applause!

Next speaker, please come up.

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Jeroen Struben
McGill University

Jeroen Struben is Assistant Professor in the Strategy & Organization Area at the Desautels Faculty of Management Faculty and Fellow of the Marcel Desautels Institute for Integrated Management, McGill University. Jeroen received his PhD at MIT's Sloan School of Management. Jeroen is a social and systems scientist with research focused on the dynamics of market formation and transformation towards more sustainable pathways. Empirically Jeroen studies energy, alternative fuel vehicle, and nutrition markets. Jeroen is particularly interested in the question: How do alternative products, ideas, and practices successfully penetrate in the marketplace or society at large, rather than falter? To examine this, Jeroen's research focuses on how social processes and evolution of the built environment jointly condition the formation of self-sustaining markets. His research combines empirical, analytical, and systems science-based analysis, producing insights related to coordination, collective action and commitment across organizations, industries and governments.

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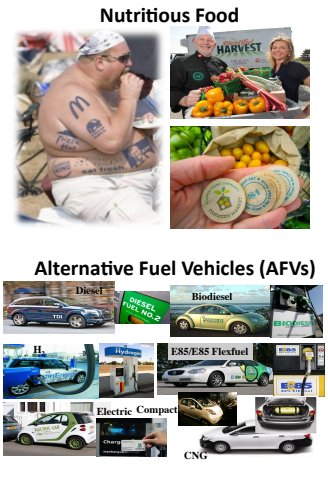
Sustainability Market Transformations: Modeling Equity-Oriented Healthful Food Innovation

Jeroen Struben
Assistant Professor, Desautels Faculty of Management, McGill University
Research Affiliate, McGill Centre for Health and Economic Convergence
Twitter: @JeroenStruben

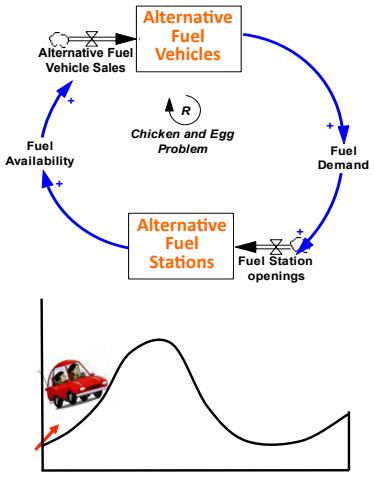
Many Sustainability Market Transformations Struggle or Fail



DESAUTELS Faculty of Management / Faculté de gestion
McGill Centre for the Convergence of Health and Economics

My Approach to Studying Market Formation Challenges

Successful policies must get new technologies over a tipping point



Research focus:

- Market formation processes, across socio-behavioural, physical, and economic realms
- Feedback interactions across actors
- The role of coordination

Methods and data:

- Computational modeling
- Econometric analysis
- Case analysis
- Large spatiotemporal data sets

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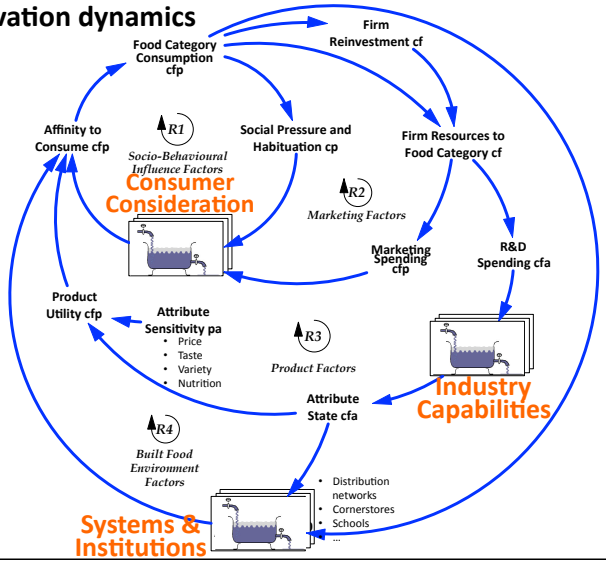
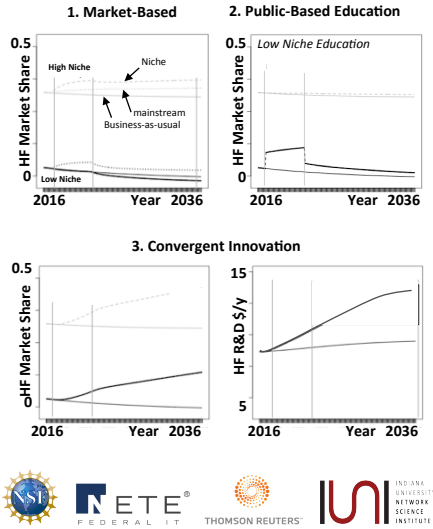
Example: Modeling Equity-Oriented Healthful Food Innovation

Main feedbacks underlying healthful food innovation dynamics



Simulation results



Example: Modeling Equity-Oriented Healthful Food Innovation

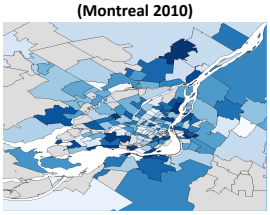
Preliminary findings

- Mainstreaming healthful food innovation requires cross-actor & -sector alignment
  - Absent joint commitment healthful food remains in low-equity niche
  - Private and public alignment and commitment exploits strong positive feedbacks, involving synergies across domains; increased returns on R&D, etc…

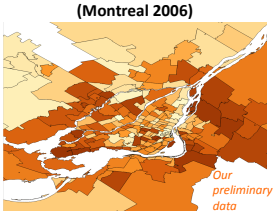
Current analysis

- Neighbourhood-level innovation activity and uptake using spatiotemporal data
  - 2007-2015 sales by product and outlet; nutritional quality information; demographics
  - Québec; 400 FSAs
  - New product introductions with sales across outlet- and neighbourhood-types as natural experiments

Sugar per Serving (Montreal 2010)



Median Household Income (Montreal 2006)



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Please thank the speaker, applause!

Next speaker, please come up.

Julie Mason

National Institutes of Health, National Cancer Institute, Center for Cancer Training

Dr. Julie Bronder Mason is the Associate Director of the National Cancer Institute (NCI) Center for Cancer Training (CCT), where she leads training program development and evaluation, workforce analysis, and strategic planning. Dr. Mason recently led a labor and skills gap analysis of the U.S. biomedical research workforce. She has over 12 years of experience at the NCI. Before joining CCT, she was a health science analyst in NCI's Office of Science Planning and Assessment, where she managed program evaluations and performance reporting. Dr. Mason earned a Ph.D. in Pharmacology and Toxicology from the Medical College of Virginia, and performed postdoctoral research in the NCI Laboratory of Molecular Pharmacology. Several notable awards Dr. Mason received include the NIH Plain Language Award, Award of Merit for service on the NIH American Recovery and Reinvestment Act committee, and the American Evaluation Association's Best Paper Award for her career development program outcome evaluation.

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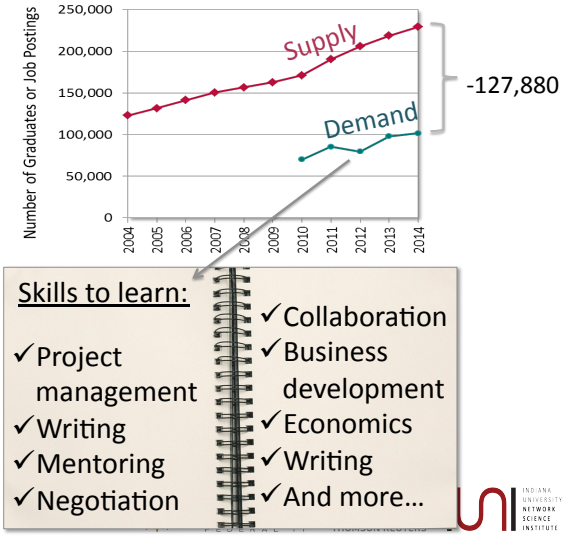
Labor and Skills Gap Analysis of the Biomedical Research Workforce

Julie L. Mason, Ph.D.
Center for Cancer Training
National Cancer Institute



Skills to learn:

- ✓Project management
- ✓Writing
- ✓Mentoring
- ✓Negotiation
- ✓Collaboration
- ✓Business development
- ✓Economics
- ✓Writing
- ✓And more…

Mason, J.L. et al. FASEB J, epub ahead of print, April 13, 2016

Findings also discussed in The Scientist, "Post-Grad Job Prospects," April 28, 2016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Please thank the speaker, applause!
Next speaker, please come up.


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Timothy Slaper
Indiana Business Research Center
Timothy Slaper {slay-per} leads a research team engaged in industry and workforce analysis, economic impact studies, regional economic analyses, demographic estimates and projections, trade and foreign investment analysis, measuring innovation and educational performance and the drivers of economic growth. The team is putting the final touches on The Innovation Index 2.0. National in scope, The Innovation Index is a county-based data set and web tool for economic development practitioners as well as policy makers and researchers to assess a region's innovative capacity and economic performance. All the work that Timothy oversees puts analytical tools and practical research into the hands of economic development practitioners to help them address the challenges of economic development in today's rapidly changing world. Before the IBRC, Timothy served as Senior Economist on the Joint Economic Committee of Congress. He cut his teeth as an economist at the U.S. Bureau of Economic Analysis.

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Driving Regional Performance: Theory and Measurement in Innovation

Innovation Index 2.0

A Resource for Research on Innovation and Regional Economic Performance

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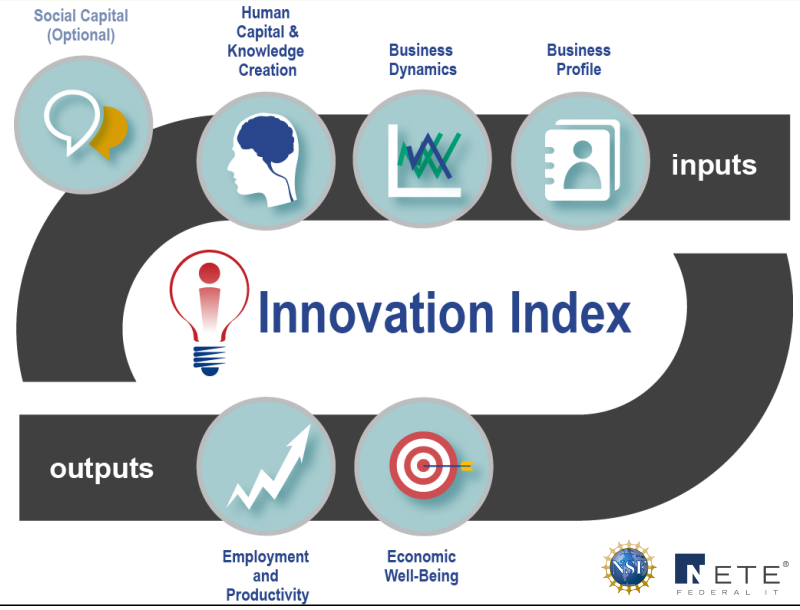

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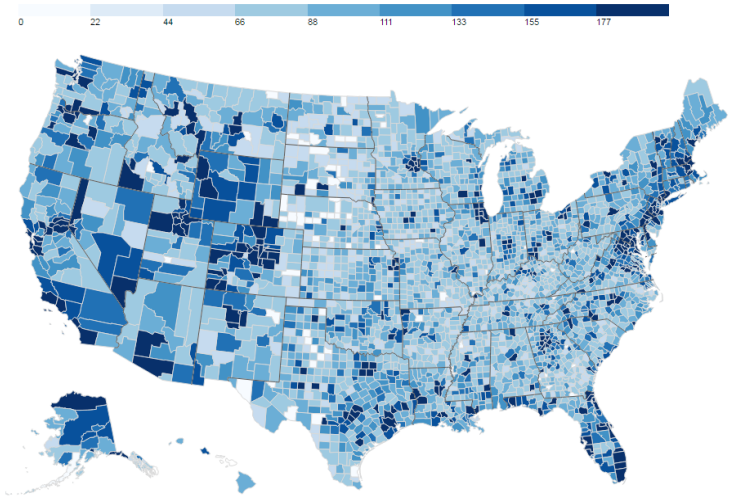
High-Tech, Early-in-Life-Cycle Establishment Ratio



Select a map to view:

Open all categories | Close all categories

- Innovation Index
- Human Capital and Knowledge Creation Index
- Business Dynamics Index
- Business Profile Index
  - *Foreign Direct Investment Attractiveness Core Index*
  - FDI Employment Index, Foreign Source
  - FDI Employment Index, National Source
  - FDI $ Investment Index, Foreign Source
  - FDI $ Investment Index, National Source
  - *Connectivity Core Index*
  - Residential High-Speed Connection Density
  - Farm Operators with Internet Access
  - *Dynamic Industry Profile Core Index*
  - Small Establishments (Average)
  - Large Establishments (Average)
  - High-Tech, Early-in-Life-Cycle Establishment Ratio
  - *Proprietorship Core Index*
  - Proprietorship Rate
  - Change in Proprietorship Rate
  - Proprietor Income to Total Wages and Salaries
  - Availability of Capital from All Banks
  - Availability of Capital from Local Banks
- Employment and Productivity Index
- Economic Well-Being Index

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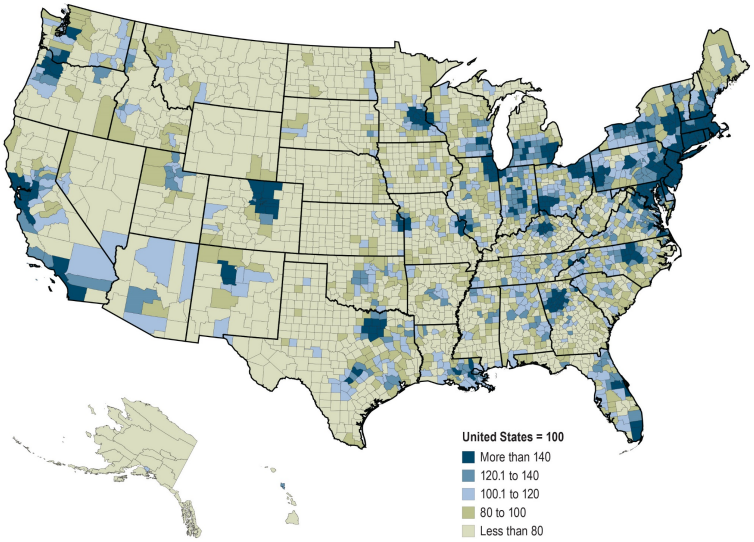
Knowledge Creation and Technology Diffusion by County



Wide array of data

Categories motivated by academic research:

Knowledge creation
Cluster growth
Patent technology diffusion
Human capital
STEM occupations
Creative-destruction
Entrepreneurship
Social Capital

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Innovation and Knowledge Spillovers

P *: patents*

I *: Industry R&D*

U *: University R&D*

H*K : Human Capital*

E*_ht : Employment in high tech*

VC *: Venture Capital*

C *: Other Regional Characteristics (proprietorship rates, firm size)*

Z *: Unobserved, including Knowledge Spillovers*

In terms of **university knowledge spillovers**, does distance matter?

Evaluated 50, 100 and 250 mile distances from Universities conducting S&E research

Distance Matters!

	Total Patents			Ratio: Patents to Workers		
	KSPL_50	KSPL_100	KSPL_250	KSPL_50	KSPL_100	KSPL_250
Nationwide	0.0079***	0.0037***	0.0013***	0.0020***	0.0010***	0.0003**
North East	0.0060**	0.0045***	0.0021***	0.001	0.0007	0.0002
Mid West	0.0187***	0.0074***	0.0027***	0.0057***	0.0019***	0.0006**

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$t = f(KC, KU, KE, KS, C, P, M, N, Ft, Ff)$

- KC: Knowledge creating entities
- KU: Knowledge using entities
- KH: Stock of knowledge (human capital)
- KS: Social capital
- Ft : Financial Resources, traditional
- Ff : Investment inflows, VC/FDI
- P: Legacy (path dependencies, including natural resources)
- C: Cultural attributes (e.g., risk taking, adaptability, labor force participation)
- M: Metabolism or churn (a.k.a. creative-destruction)
- N: Networks & connectivity
  - hard/internet
  - soft/collaboration

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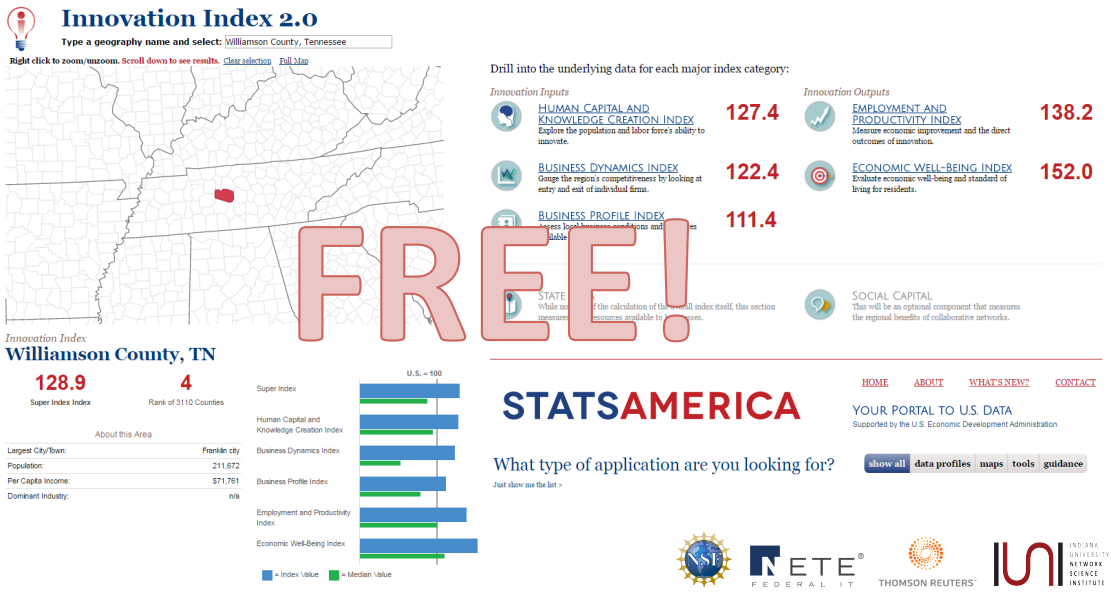

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Please thank the speaker, applause!

Next speaker, please come up.

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Kenneth Gibbs
National Institute of General Medical Sciences (NIGMS)

Kenneth (Kenny) Gibbs, Jr., Ph.D., is a Program Analyst in the Office of Program Planning, Analysis and Evaluation (OPAE) at the National Institute of General Medical Sciences (NIGMS). Prior to joining NIGMS, Dr. Gibbs was a Cancer Prevention Fellow at the National Cancer Institute, and an AAAS Science & Technology Policy Fellow at the National Science Foundation (NSF) in the Directorate for Education and Human Resources (EHR). Dr. Gibbs completed his Ph.D. in the Immunology program at Stanford University, and received his B.S. in biochemistry & molecular biology from the University of Maryland, Baltimore County.

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Utilizing a Systems Modeling Approach to Biomedical Workforce Diversity

Kenneth D. Gibbs, Jr., Ph.D., M.P.H.
Program Analyst
Office of Program Planning, Analysis and Evaluation
National Institute of General Medical Sciences/National Institute of Health

David Broniatowski, Ph.D.
Assistant Professor
Engineering Management and Systems Engineering
George Washington University

Workforce Diversity is Key to Scientific Advancement

- Diversity is essential to ensuring:
  - Continued adequate supply of domestic research workforce
  - Research enterprise meets needs of entire population

POLICYFORUM
SOCIOLOGY
Weaving a Richer Tapestry in Biomedical Science
Tabak and Collins, *Science* (2011)

National Institutes of Health addresses the science of diversity
Valantine and Collins, PNAS (2015)

- Scientists from certain racial/ethnic backgrounds (African-American/Black, Hispanic/Latino, Native American, Alaska Native, Native Hawaiian, Pacific Islander) are underrepresented in NIH investigator pool and professoriate
  - These groups are 32% of US population, but <5% of faculty and PIs on NIH RPGs
  - URM = underrepresented minority

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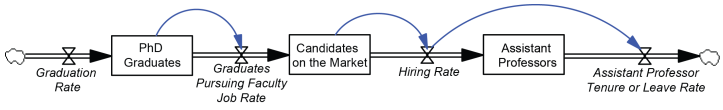
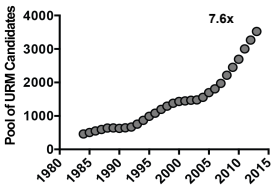
"Pipeline" Framing of Workforce Diversity Fails



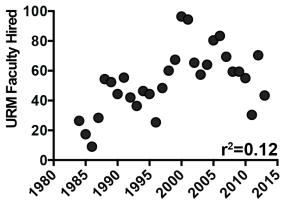
"Pipeline" framing: more minority Ph.D. graduates → more faculty

(A) URM Faculty Hiring Dynamics

(i) Pool of Potential Candidates



(ii) Number of Faculty Hired



Reality: size of URM talent pool not related to the number of assistant professors hired in basic science departments (1980-2013)

Source Data: NSF SED, AAMC Faculty Roster

Gibbs et al, *Under Review*

Faculty Diversity Requires More Than Building Talent Pool

- Constructed a systems dynamics model that assumed no bias in hiring (i.e. URM candidates hired proportionately to representation on market) that accounted for 79% of variance in assistant professor hiring
- Given current rates of transition from Ph.D. to assistant professor among URMs, faculty representation would remain below 8% in 2080 **even if there was an exponential growth in Ph.D. talent pool**
- Increasing workforce diversity requires greater linkage between URM talent pool and faculty hiring (i.e. more transition)
  - Attractive university environments, recruitment and retention (e.g. criteria for appointment, promotion, and tenure), funding mechanisms to promote independence, broader workforce issues

Gibbs et al, *Under Review*

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Please thank the speaker, applause!

Next speaker, please come up.


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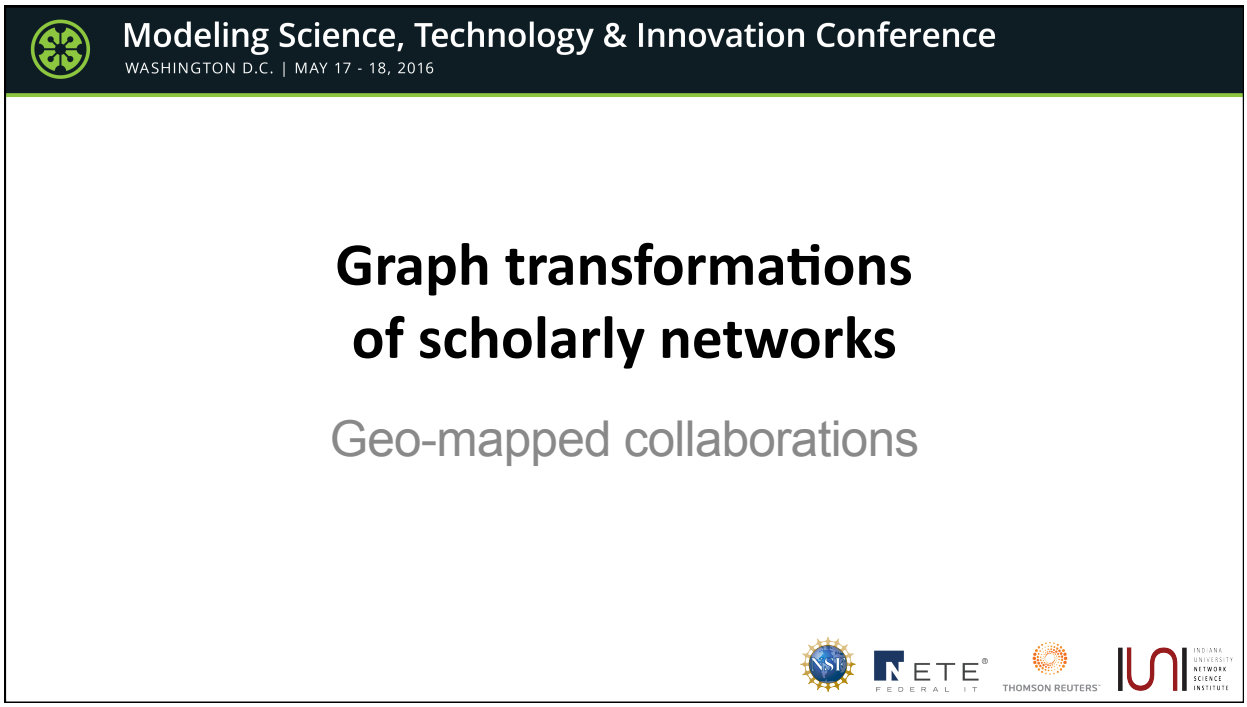
Xiaoran Yan
Indiana University
Xiaoran Yan is an Assistant Research Scientist at Indiana University Network Science Institute. His research concerns mathematical theories and models of networks, with a focus on community structures and dynamical processes on networks. He worked as a Postdoctoral Research Associate at Information Sciences Institute of University of Southern California. Before that, he was a graduate fellow at Santa Fe Institute. He received a Ph.D. in Computer Science at University of New Mexico.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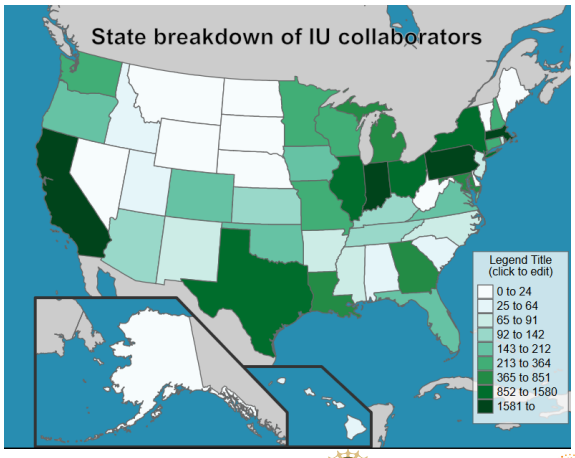
Graph transformations of scholarly networks
Geo-mapped collaborations

Geo-distance and collaborations

- 139255 Collaborations with IU email
- 2004~2013 WoS records with ZIP code



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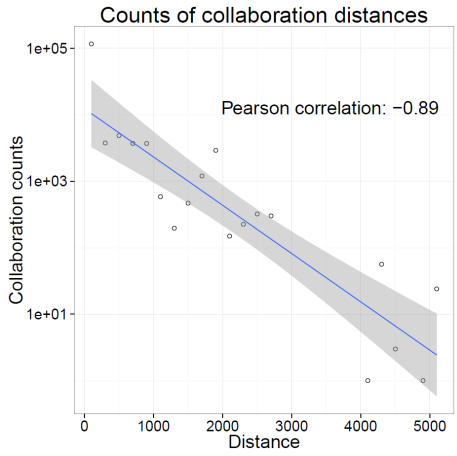
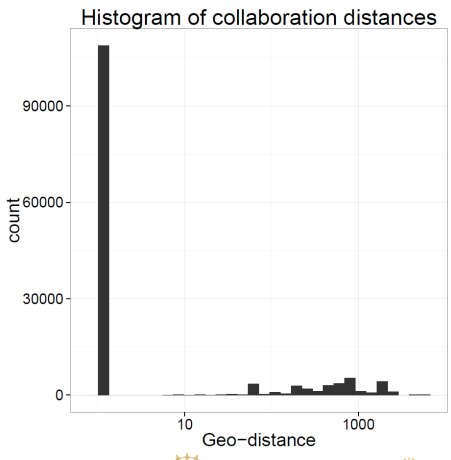
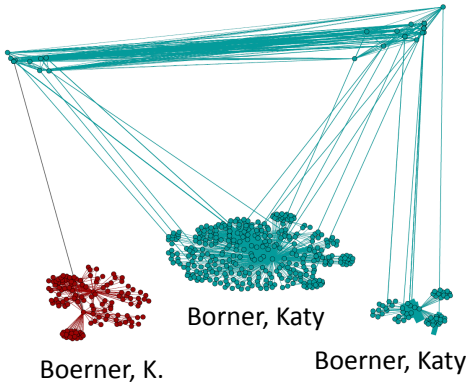
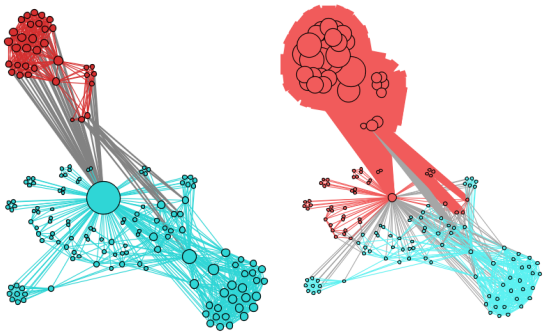
Geo-distance and collaborations





Transformations for resolution/prediction





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Please thank the speaker, applause!

Next speaker, please come up.

Bruce Hecht

Analog Devices

Bruce Hecht is a designer of sensors and signal processing systems for instrumentation and healthcare with 20 years experience in launching new products and technologies. Bruce is currently leading the New Product Design Quality initiative at Analog Devices and is Advanced Study Program Fellow at MIT in the areas of Engineering, Entrepreneurship and Innovation in Healthcare and Systems Design. He holds a BASc and MASc in EE from the University of Waterloo, was awarded 5 US Patents and is a Certified Six Sigma Black Belt. Bruce is active with the IEEE for the Future of Knowledge and Convening, leading Masterclasses and international conferences on design, engineering, and advanced fabrication in cities from Boston to Bordeaux, Milan & Singapore. In 2015, Bruce presented a TEDx talk on the power of Curiosity and Design at the National University of Singapore and produced TEDxBeaconStreet as a Curator and Founding Member of Ideas in Action. He serves as a mentor for programs on Hacking Medicine, Internet of Things, and with the Canadian Technology Accelerator in Boston.

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Framework for Scalable Sensors for the Internet of Things and People

Bruce Hecht
Global Operations & Technology
Analog Devices, Wilmington, MA

Washington, D.C., May 17, 2016

Bruce.Hecht@Analog.com

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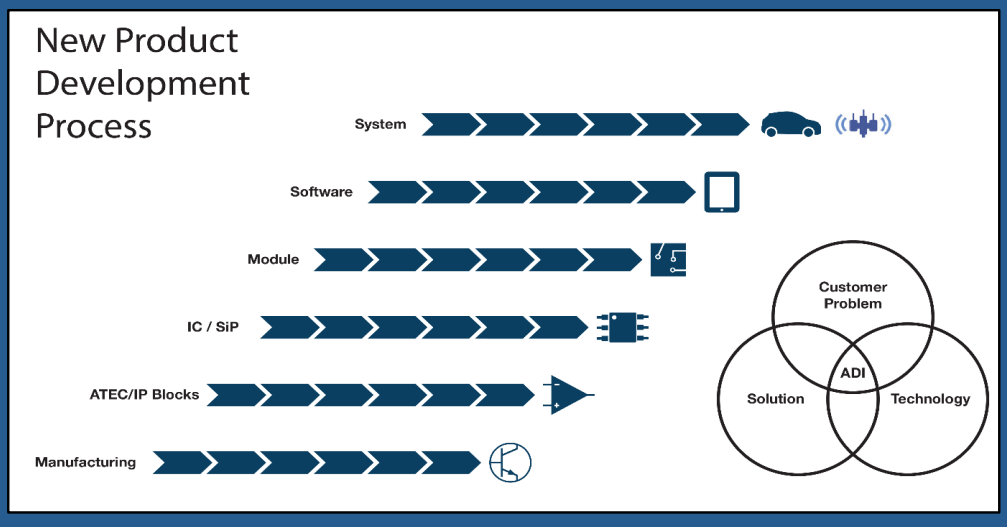
New Product Development Process



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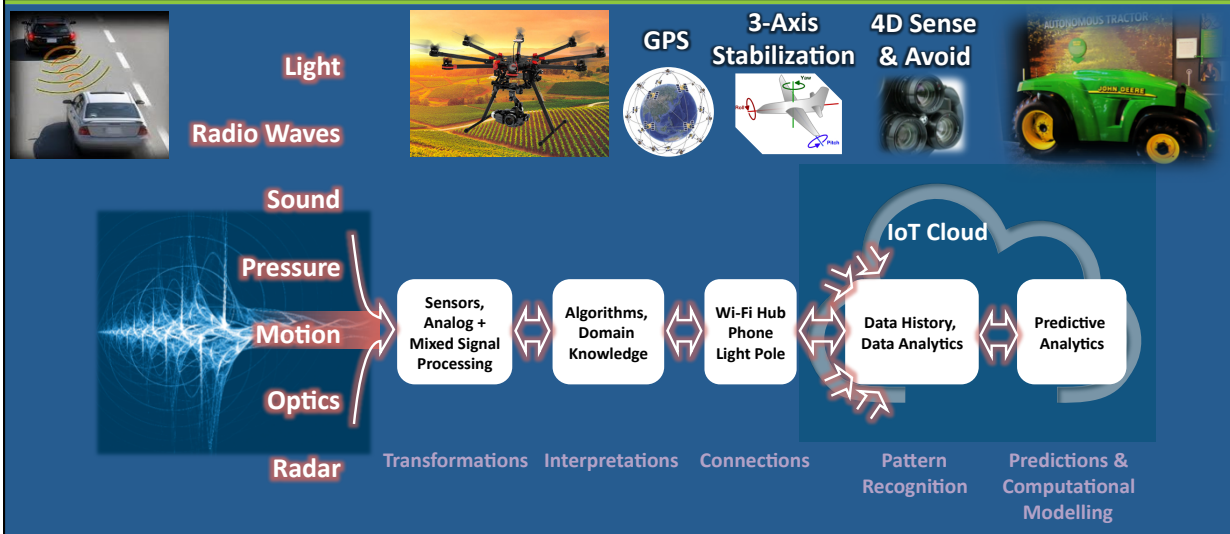

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INERTIAL MEASUREMENT UNIT SCALING

ADIS16350 (2007)
ADI First to Market with Industrial IMUs

ADIS16360 (2009)
2X Performance Increase

ADIS16480 (2011)
4X Performance Increase

ADIS16440 (2012)
50% Smaller; 10 Degrees of Freedom (DoF)

ADIS16460 (2016)
50% Smaller
Reduced Noise & Improved Stability

DIGITAL X-RAY TECHNOLOGY PLATFORM

Single Layer High Density System on Flex (SOF)
Enhanced Resolution
Reduced Radiation Dose to Patients

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Please thank the speaker, applause!

Next speaker, please come up.

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Masaru Yarime
University of Tokyo and University College London

Masaru Yarime is Project Associate Professor of Science, Technology, and Innovation Governance (STIG) at the Graduate School of Public Policy of the University of Tokyo, Japan. He also has an appointment as Honorary Reader in the Department of Science, Technology, Engineering and Public Policy (STEaPP) of University College London, United Kingdom. He has been awarded Abe Fellowship by the United States Social Science Research Council. His research interests focus on public policy, corporate strategy, and institutional design for promoting science, technology, and innovation for tackling societal or grand challenges, including energy, environment, and sustainability. He received B.Eng. and M.S. in Chemical Engineering from the University of Tokyo and the California Institute of Technology, respectively, and Ph.D. in Economics and Policy Studies of Technological Change from Maastricht University in the Netherlands. Previously he worked as Senior Research Fellow at the National Institute of Science and Technology Policy.

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Modeling Innovation Systems to Address Grand/ Societal Challenges: A Case of Smart Cities

Masaru Yarime
Graduate School of Public Policy (GraSPP), University of Tokyo &
Department of Science, Technology, Engineering and Public Policy (STEaPP), University College London

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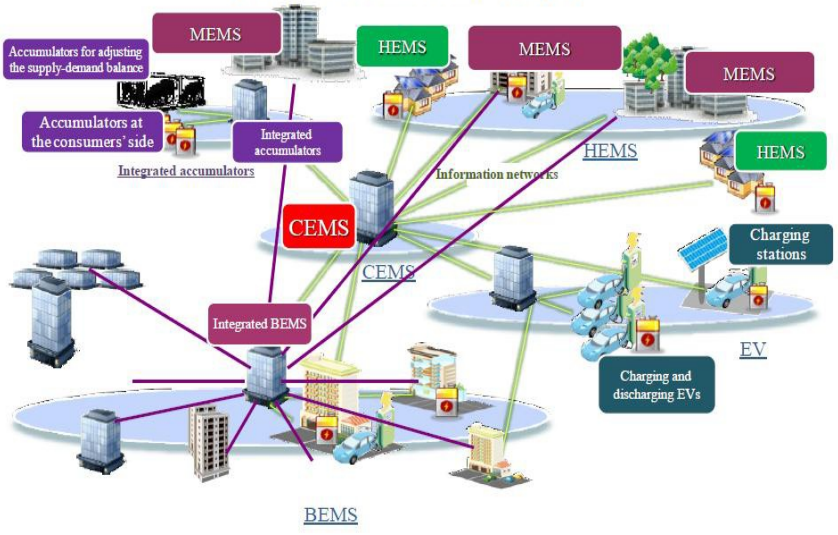

Smart City as a System of Incorporating Diversities

- Hardware as well as software for efficient and resilient energy supply and applications, involving a large amount of various kinds of data
- Actors involved, including energy generators, distributors, technology developers, system operator, local communities, consumers
- Interests and concerns, e.g., energy efficiency, economic costs, environmental impacts, resilience to external shocks and disasters, accessibility and inclusiveness to end users, privacy, cyber security
- Interpretation of the concept of smart cities and approaches to creating and implementing innovation on smart cities, depending on specific contexts

CEMS (Community Energy Management System), BEMS (Building EMS), HEMS (Home EMS), FEMS (Factory EMS), EV (Electric Vehicle), PV (Photovoltaics)

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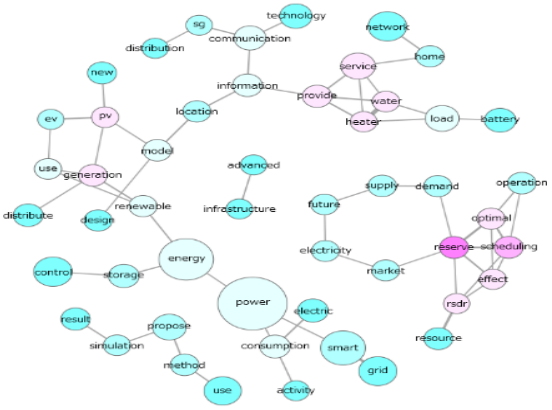
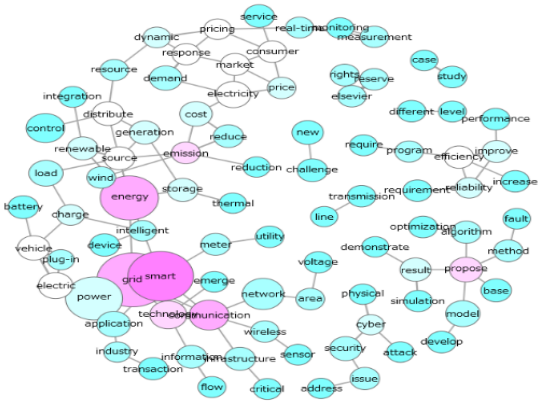
Semantic Analysis of Discourse



Japan's focus on improving sophistication of application technologies for extensive use of home appliances and electric vehicles



US focus on creating and maintaining security through improvement in resilience against physical as well as virtual threats

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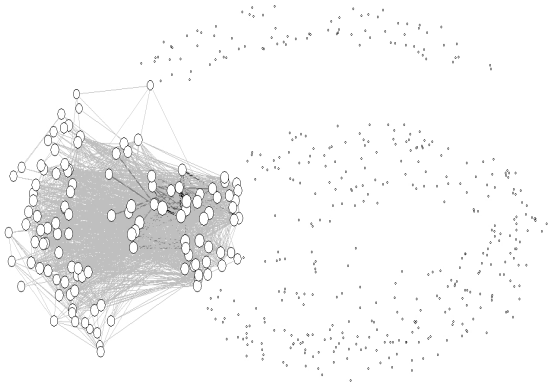
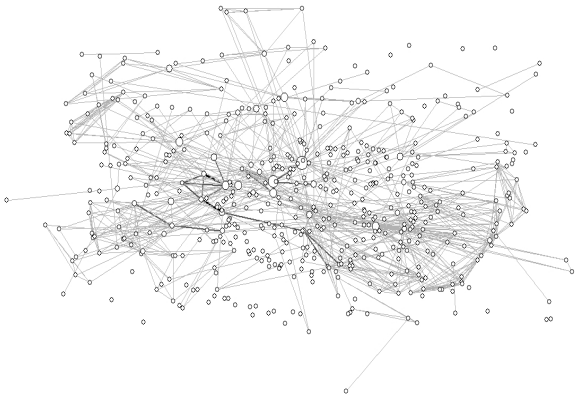
Network Analysis of Actors



Japan: concentrated structure dominated by a small number of large actors, including government organizations and electric & electronic companies



US: distributed structure with a large number of actors, including utilities and smart meter manufacturers

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Please thank the speaker, applause!

Next speaker, please come up.

Philip Beesley

School of Architecture, University of Waterloo

Philip Beesley is a practicing visual artist, architect, and Professor in Architecture at the University of Waterloo and Professor of Digital Design and Architecture & Urbanism at the European Graduate School. Beesley's work is widely cited in contemporary art and architecture, focused in the rapidly expanding technology and culture of responsive and interactive systems. Beesley was educated in visual art at Queen's University, in technology at Humber College, and in architecture at the University of Toronto. He serves as the Director for the Living Architecture Systems Group, and as Director for Riverside Architectural Press. His Toronto-based practice, Philip Beesley Architect Inc., combines the disciplines of professional architecture, science, engineering, and visual art. The studio's methods incorporate industrial design, digital prototyping, instrument making, and mechatronics engineering. His work was selected to represent Canada at the 2010 Venice Biennale for Architecture, and has received distinctions including the Prix de Rome, VIDA 11.0, FEIDAD, Azure AZ, and Architizer A+.

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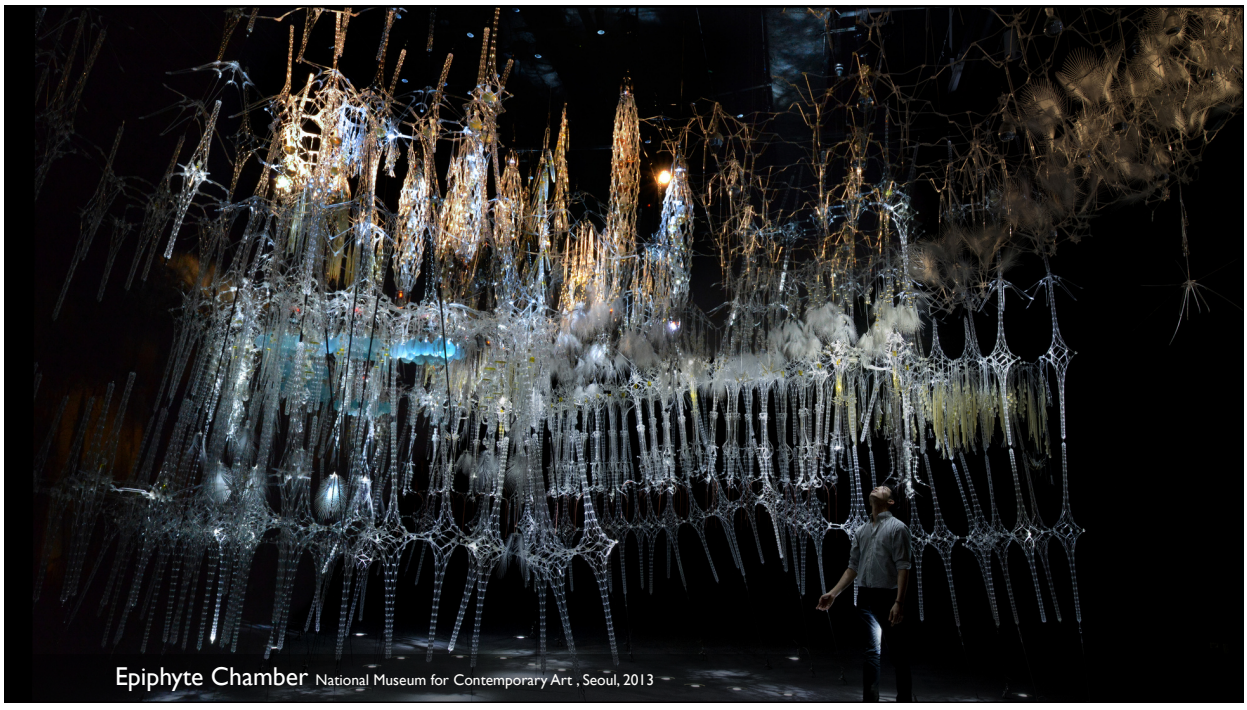
DISSIPATIVE SOIL

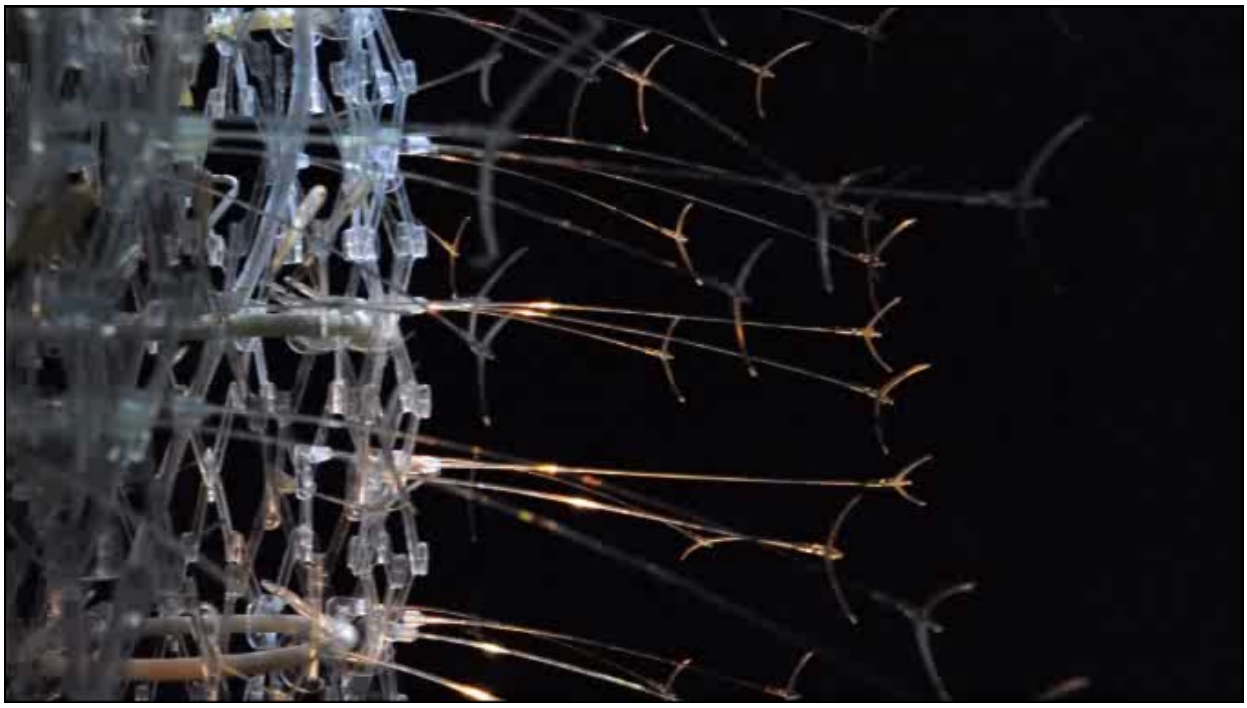
NEW PARADIGMS FOR ARCHITECTURE

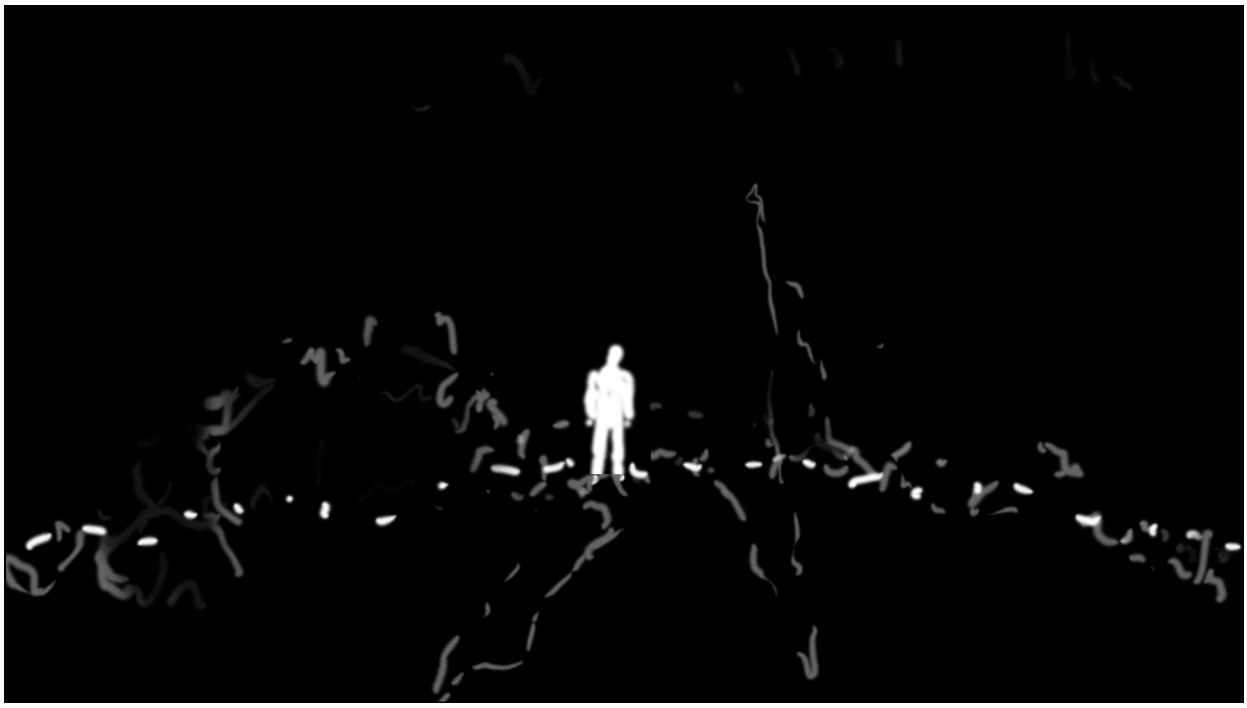
PHILIP BEESLEY
LIVING ARCHITECTURE SYSTEMS GROUP
UNIVERSITY OF WATERLOO
EUROPEAN GRADUATE SCHOOL

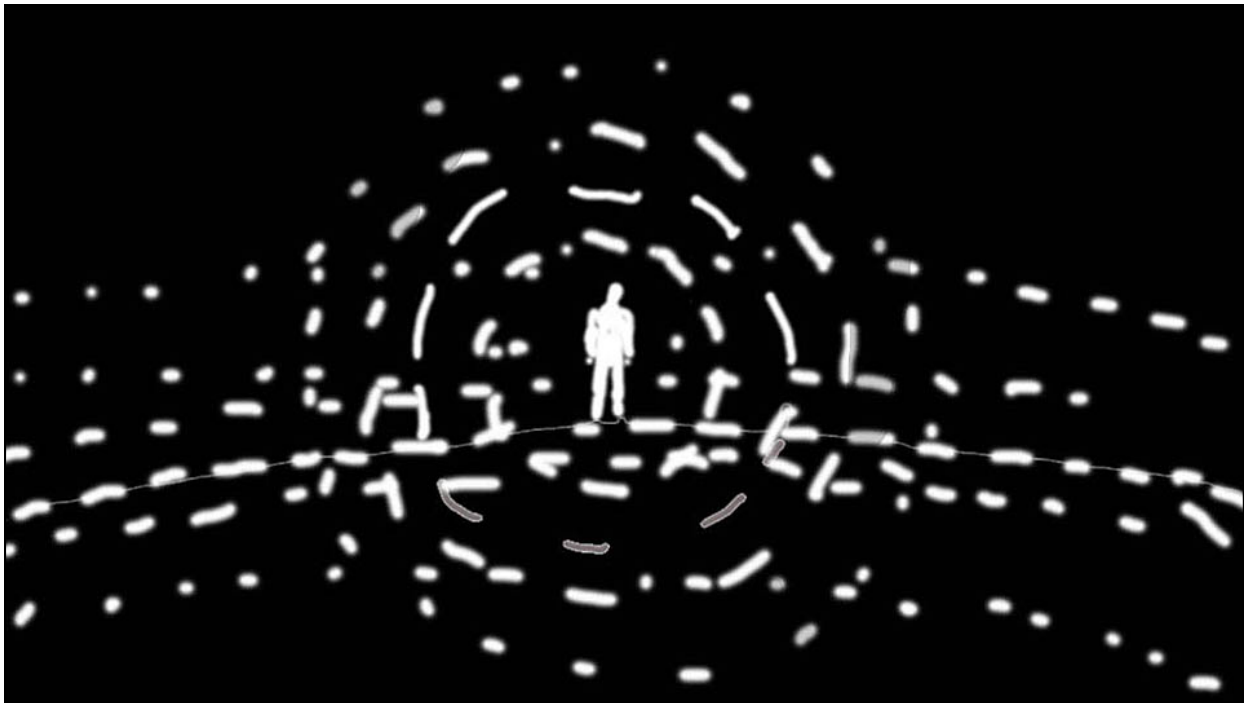

Hylozoic Ground
Venice Biennale for Architecture, 2010


Epiphyte Chamber
National Museum for Contemporary Art , Seoul, 2013

Epiphyte Chamber National Museum for Contemporary Art , Seoul, 2013





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Alina Lungeanu
Pennsylvania State University

Alina Lungeanu is a Research Scientist at Population Research Institute at Pennsylvania State University. Her research interests focuses on understanding the social dynamics of collaboration and its impact on performance in various contexts including science, health communities, and business. To address these issues, Alina uses computational social science approaches including advanced social network analytic techniques, agent based modeling, machine learning, and text analytics.

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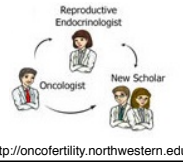
Team Assembly in New Emerging Fields: A Computational Modelling Approach

Alina Lungeanu
Pennsylvania State University



http://oncofertility.northwestern.edu

Methodological Approach

- Develop a theoretical model to explain assembly based on
  - compositional (attributes of the individuals)
  - relational (between individuals)
  - ecosystem (between teams) mechanisms

- Validate theoretical model and estimate best parameters
  - Hybrid Agent Based - System Dynamics computational model
  - Empirical setting: Oncofertility scientific field

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Findings

- Mechanisms for team assembly change after a scientific field is recognized as legitimate
- NIH's funding initiative to create a national Interdisciplinary Research Center (IRC) on Oncofertility:
  - intended consequence: facilitate team assembly among universities funded by the IRC
  - unintended consequence: slowing research collaborations within the larger community of oncofertility not funded by the IRC
- Modeling approach:
  - helps us better understand the challenges of interdisciplinary team assembly
  - offers policy implication for advancing scientific innovation

Lungeanu, A., Sullivan, S., Wilensky, U., & Contractor, N. S. (2015). *A computational model of team assembly in emerging scientific fields.* Proceedings of the 2015 Winter Simulation Conference.


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Ben Shneiderman
University of Maryland
Ben Shneiderman (http://www.cs.umd.edu/~ben) is a Distinguished University Professor in the Department of Computer Science, Founding Director (1983-2000) of the Human-Computer Interaction Laboratory (http://www.cs.umd.edu/hcil/), and a Member of the UM Institute for Advanced Computer Studies (UMIACS) at the University of Maryland. He is a Fellow of the AAAS, ACM, IEEE, and NAI, and a Member of the National Academy of Engineering, in recognition of his pioneering contributions to human-computer interaction and information visualization. Ben is the co-author with Catherine Plaisant of Designing the User Interface: Strategies for Effective Human-Computer Interaction (6th ed., 2016) http://www.awl.com/DTUI/. His latest book is The New ABCs of Research: Achieving Breakthrough Collaborations (Oxford, February 2016).
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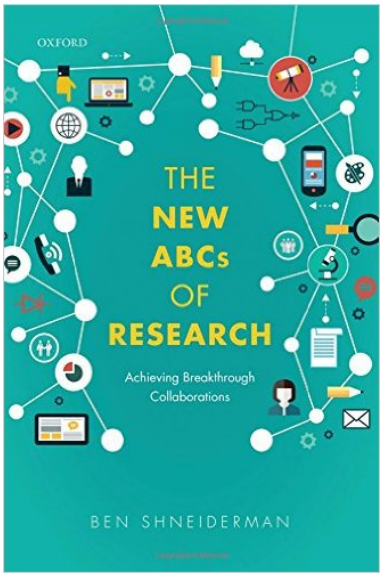

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Kalev Leetaru

GDELT Project

Kalev H. Leetaru is one of Foreign Policy Magazine's Top 100 Global Thinkers of 2013, Kalev is a Senior Fellow at the George Washington University Center for Cyber & Homeland Security and a member of its Counterterrorism and Intelligence Task Force, as well as being a 2015-2016 Google Developer Expert for Google Cloud Platform. From 2013-2014 he was the Yahoo! Fellow in Residence of International Values, Communications Technology & the Global Internet at Georgetown University's Edmund A. Walsh School of Foreign Service, where he was also an Adjunct Assistant Professor. His work has been profiled in Nature, the New York Times, The Economist, BBC, Discovery Channel and the presses of more than 100 nations, while he has been an invited speaker throughout the globe, from the United Nations to the Library of Congress, Harvard to Stanford, Sydney to Singapore. In 2011 The Economist selected his Culturomics 2.0 study as one of just five science discoveries deemed the most significant developments of 2011. Kalev's work focuses on how innovative applications of the world's largest datasets, computing platforms, algorithms and mind-sets can reimagine the way we understand and interact with our global world. More on his latest projects can be found on his website at http://www.kalevleetaru.com/ or http://blog.gdeltproject.org




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Quantifying, Visualizing, and Forecasting Global Human Society Through "Big Data"

What it Looks Like To Compute on the Entire Planet




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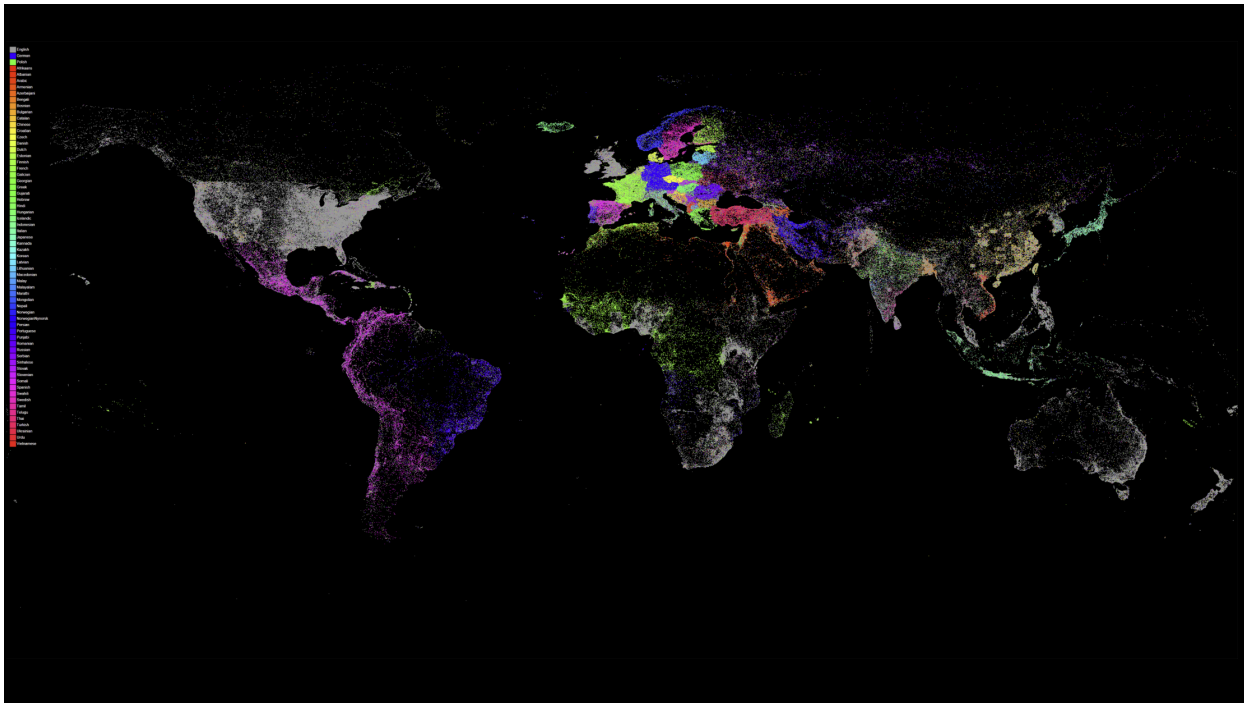
DATASETS

- **NEWS**: Worldwide local news coverage in 100 languages (65 live translated) – online news preserved via Internet Archive
- **TELEVISION**: Collaboration with the Internet Archive to process more than 100 television stations across the US, updating daily
- **ACADEMIC LITERATURE**: 21 billion words covering 70 years (JSTOR/ DTIC/CORE/CITESEER/IA)
- **BOOKS**: Collaboration with Internet Archive and HathiTrust to process 3.5 million books 1800-2015
- **HUMAN RIGHTS**: Half century of worldwide human rights reports
- **IMAGERY**: Large fraction of global news imagery processed via deep learning: objects/activities, OCR, logos, facial sentiment, geolocation



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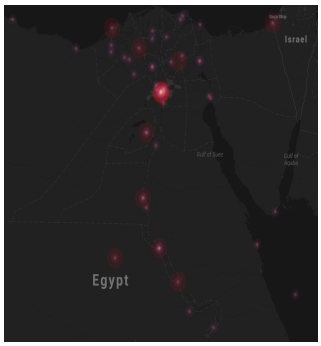
Global Event Database

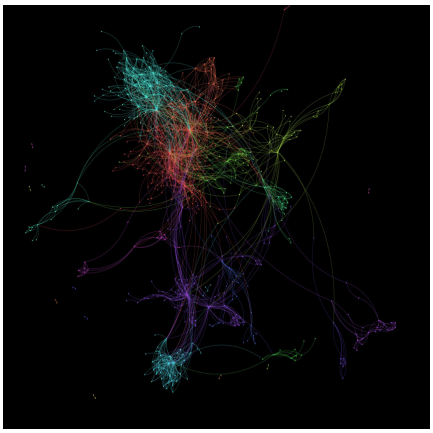
BAGHDAD. Iraqi leaders criticized Turkey on Monday for bombing Kurdish militants in northern Iraq with airstrikes that they said had left at least one woman dead.

Event Code: 111
Source: IRQ GOV
Target: TUR

Event Code: 223
Source: TUR
Target: IRQKRD REB



Global Knowledge Graph



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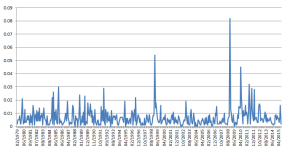
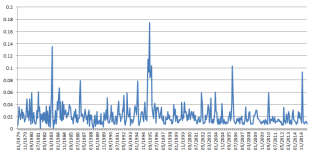
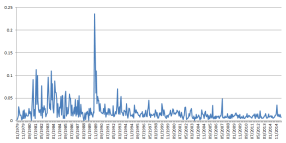
Greece



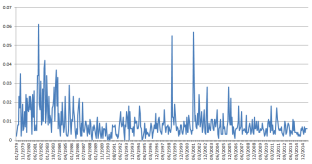
France



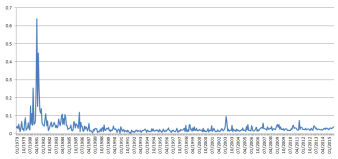
Germany



Italy



United Kingdom



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Burundi – 12/13/2015

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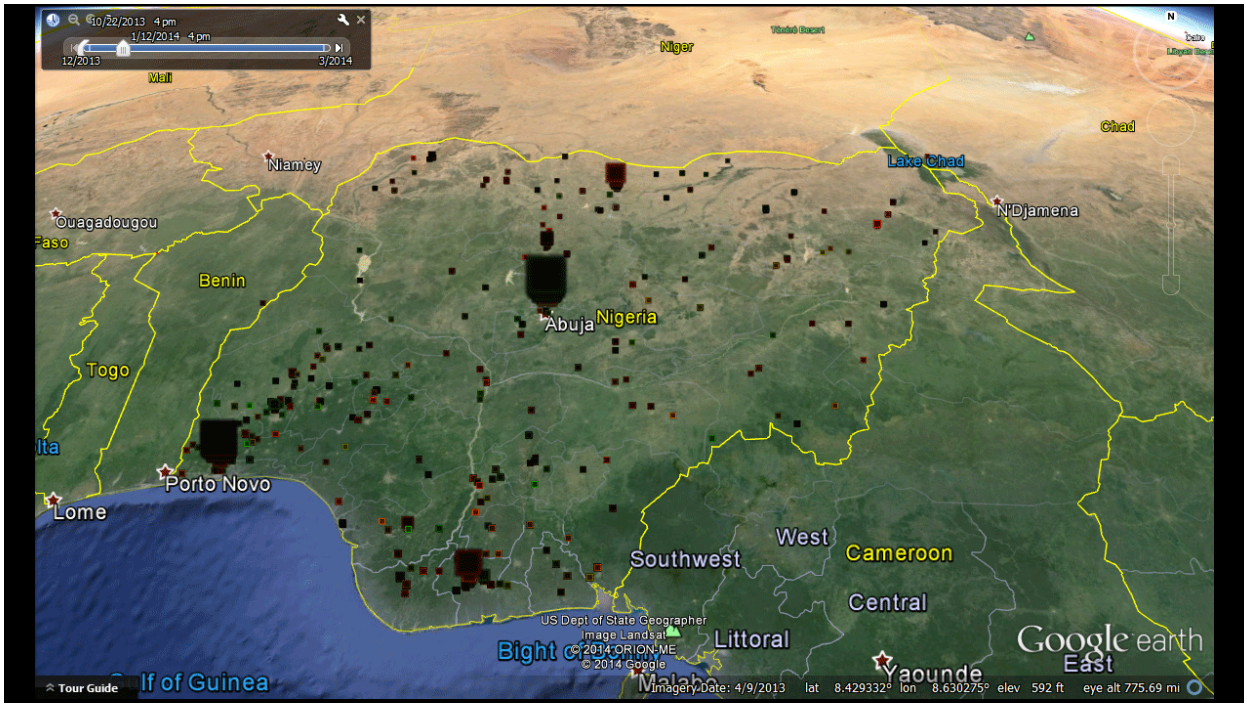

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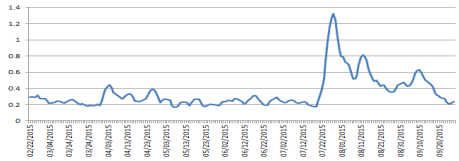
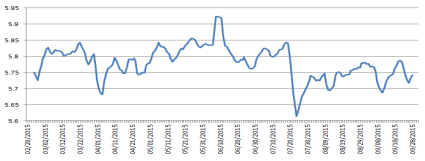
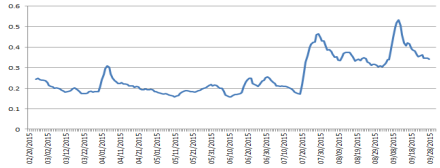
Turkey 2015



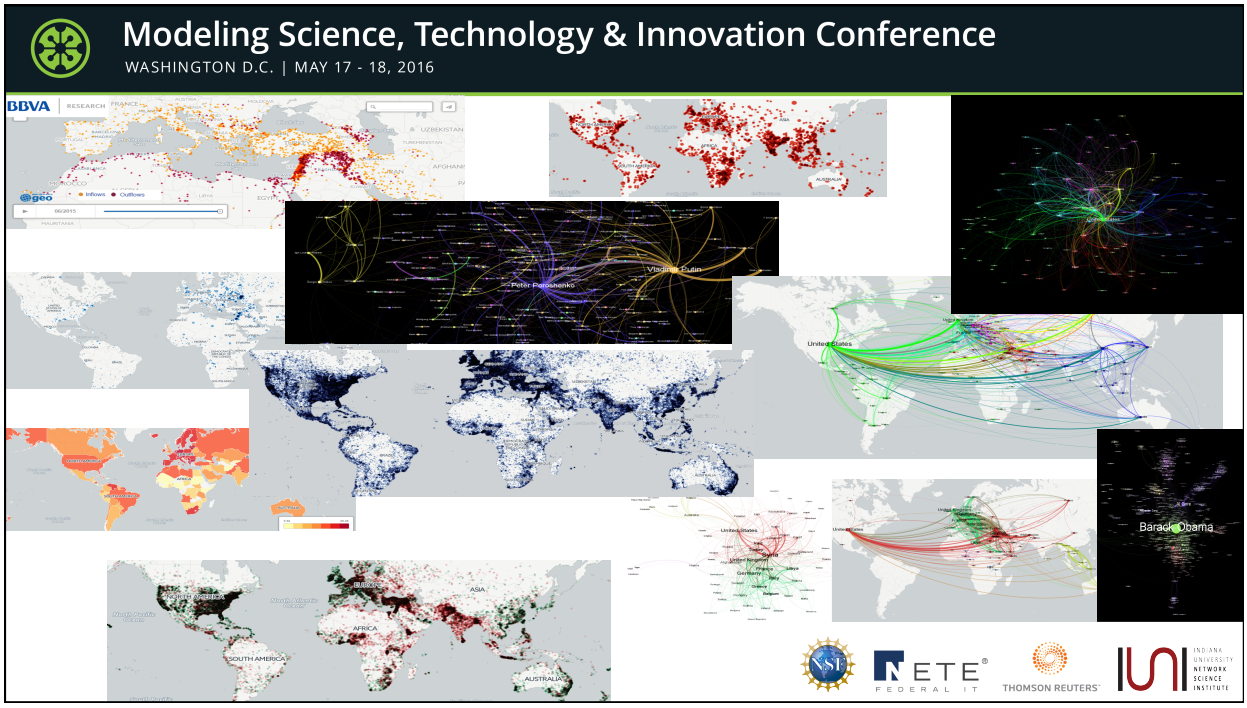
Physical Unrest



Positive/Negative: "Cautiously Optimistic" Trending



Anxiety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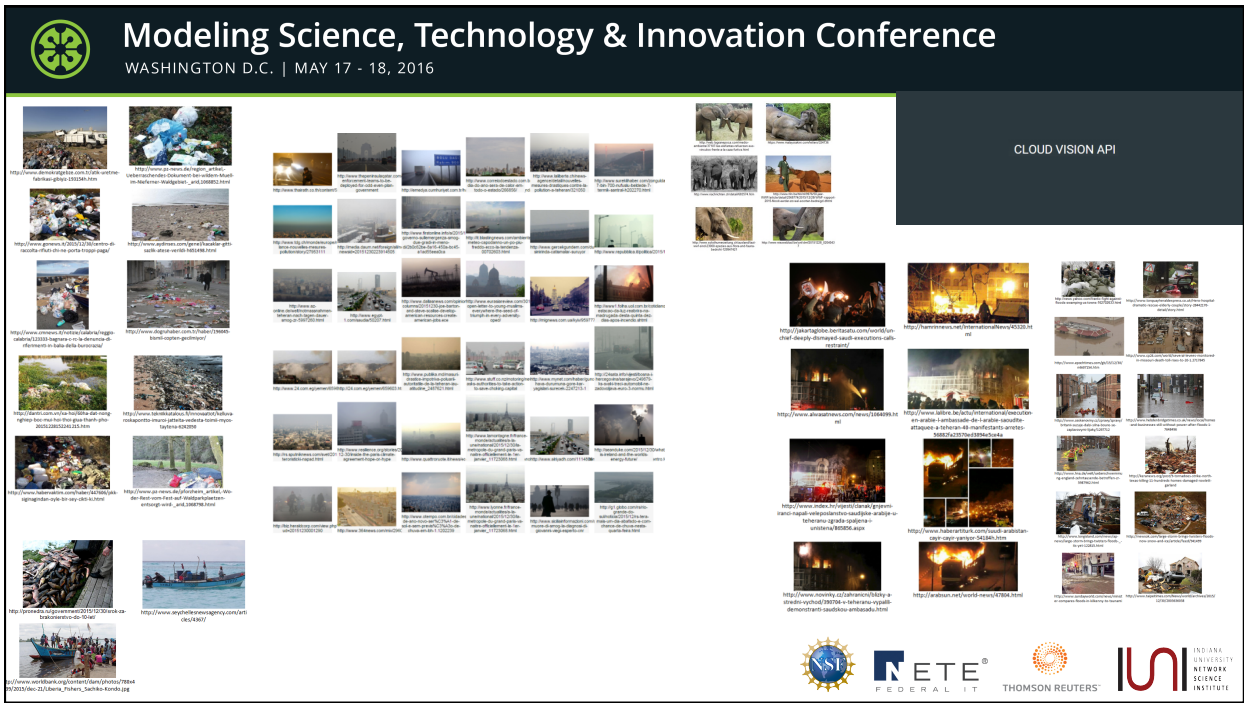
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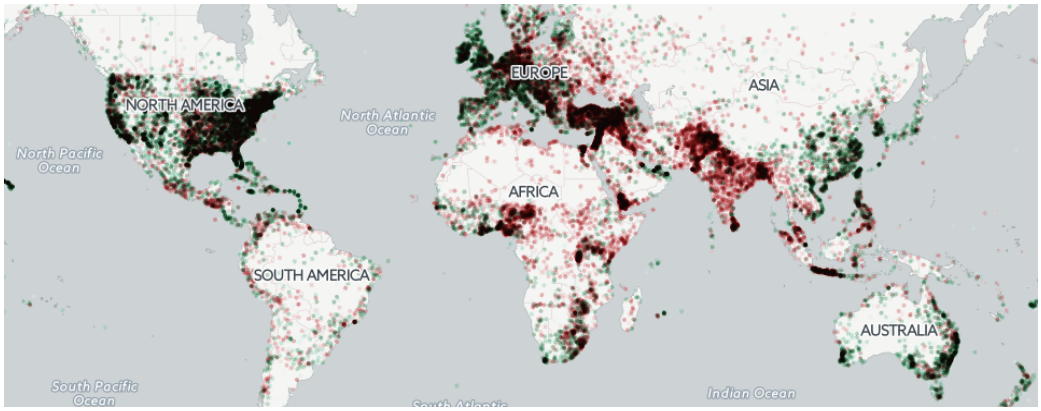
Global (News) Happiness In 2015



200M articles in 65 languages, 1.5 billion location mentions, 750 billion emotional measures

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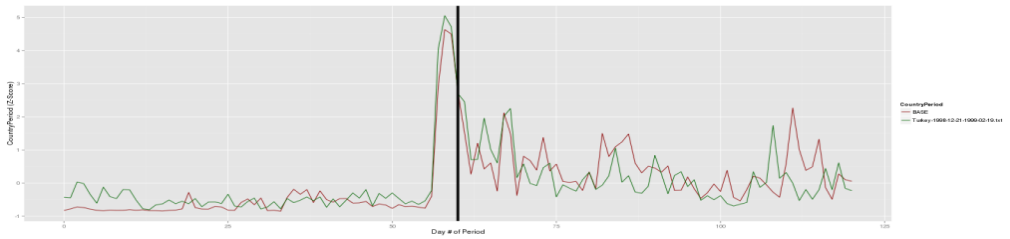
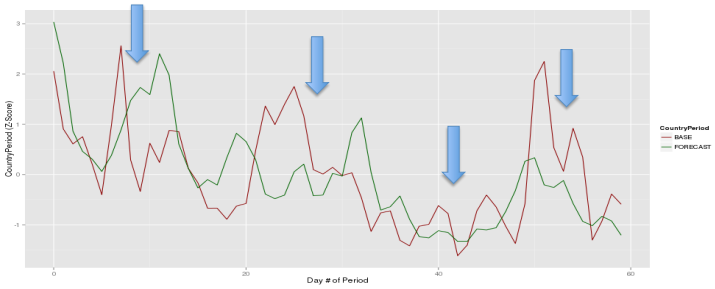


- **Red: Actual Ukraine**
- **Green:**
- **Avg Turkey (2/19/1999-4/20/1999) and Lebanon (3/24/2007-5/23/2007)**
- **(*r*=0.49)**



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