Convergence research to actionable science at SESYNC

Dr. Carrie Hritz
Director of Research
National Socio-Environmental Synthesis Center (SESYNC)
University of Maryland

National Socio-Environmental Synthesis Center

- **MISSION:** ***dedicated to supporting synthetic, actionable science related to the structure, functioning, and sustainability of socio-environmental systems***

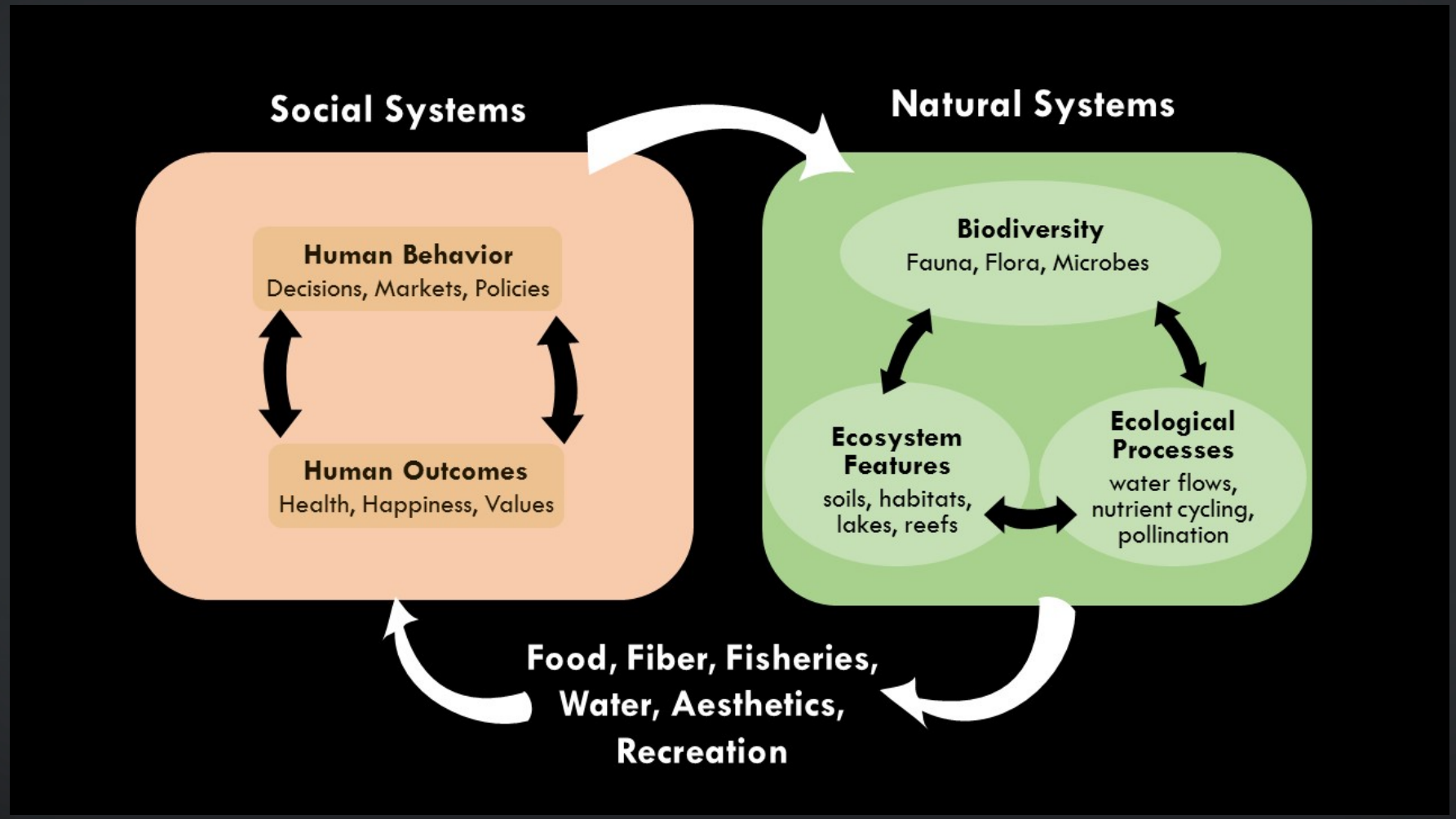
Brief History of SESYNC

- Launched in 2011 with funding from the National Science Foundation and a cooperative agreement with the University of Maryland
- Renewed in 2016 for additional 5 years
- Participants: 4,000 +
- Projects to date: 200+
- Publications: **500+**

SESYNC Core Objectives

- Build new communities
- Develop programs to enhance understanding of S-E systems
- Enhance the effectiveness of interdisciplinary collaborations
- Enhance computational capacity to perform S-E synthesis
- Enhance relevance of S-E research to decisions and behaviors by engaging knowledge users

Conceptual Model of Socio-Environmental Systems



Socio-Environmental Synthesis Data Characteristics

- **inter- and trans-disciplinary**
- **integrates existing data, theories, and models**

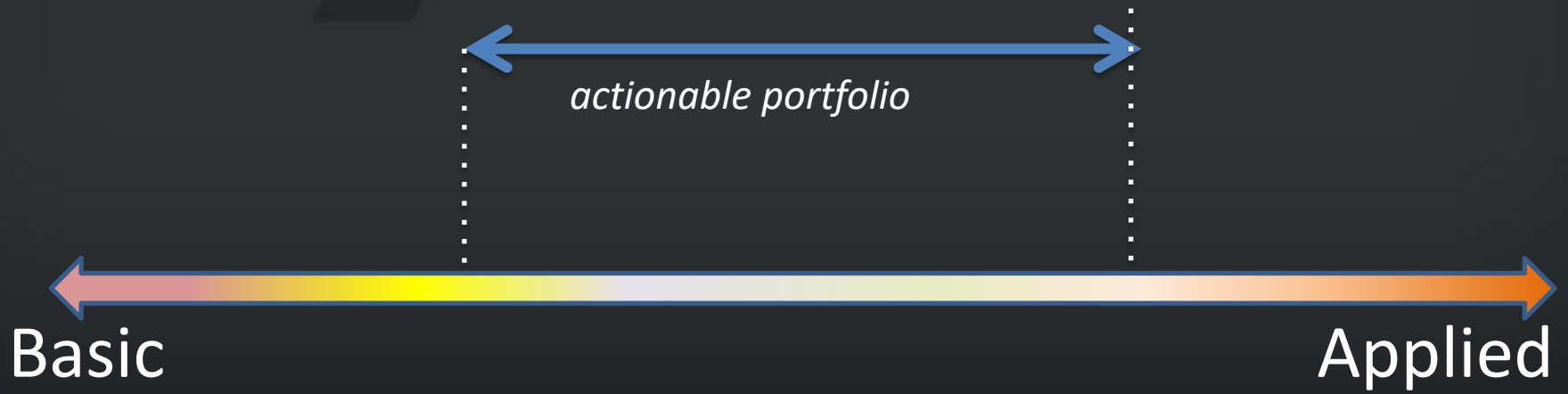
- Usually geospatially context dependent
- Usually cross-scale
- Highly heterogeneous data
- Often requires mixed methods analysis
- Sometimes critical analysis to evaluate arguments or interpret evidence

Convergence and Actionable Science

- Means of solving vexing research problems, in particular complex problems focusing on *societal needs*.
- It entails integrating knowledge, methods, and expertise from different disciplines and forming novel frameworks to catalyze scientific discovery and innovation.
- 2 characteristics:
  - Research driven by a specific and compelling problem
  - Deep integration across disciplines
- **Communication, conversation and coordination**

Actionable Science at SESYNC

- Research of interest to or co-developed by academic and non-academic (government, community, NGO, business) sectors
- Co-development increases relevance and spurs creativity
- *Fundamental* actionable research informs issues of global significant, to more applied research for specific decision contexts



Team research convergence depends not only on excellent researchers and needed skills …

but on conditions of the research environment

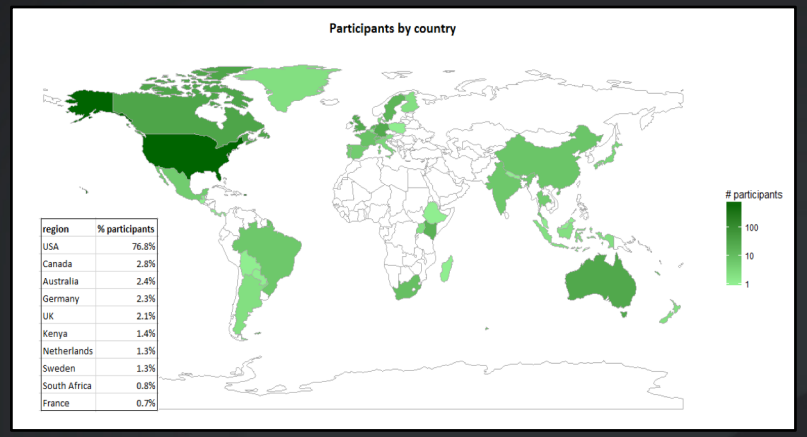
- structure of the organization
- processes employed (flexible and adaptive)
- team culture and engagement climate (cooperative, collaborative)
- leadership – active (not figure head), transparent, pays attention to team dynamics, is reflexive

National Socio-Environmental Synthesis Center

Links to Transdisciplinary Research on the Changing Arctic

Team based with mostly remote interactions

International in Scope

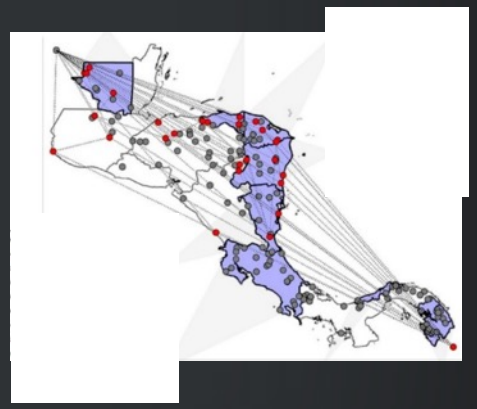


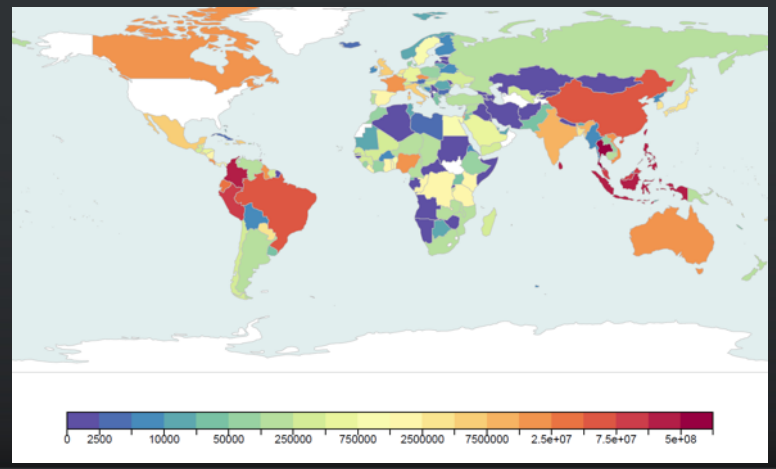
region	% participants
USA	76.8%
Canada	2.8%
Australia	2.4%
Germany	2.3%
UK	2.1%
Kenya	1.4%
Netherlands	1.3%
Sweden	1.3%
South Africa	0.8%
France	0.7%

Participants and Science

Urban Biodiversity

Impacts of Narco-Trafficking on Land Use & Land Cover





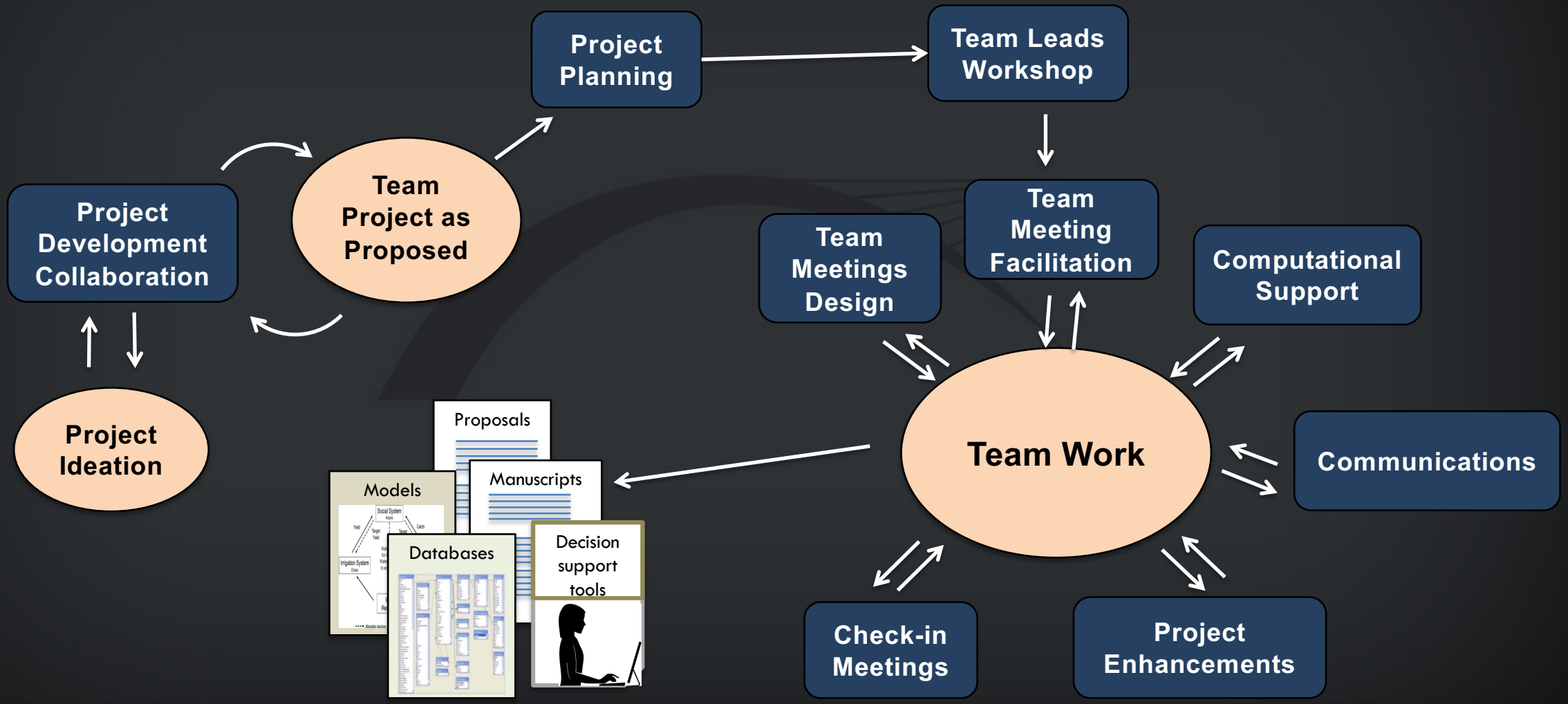
Global Wildlife Trade and Disease Risk

SEYNC Organizational Theory

1. Co-develop shared vision & goals
2. Identify challenges
3. Design, evaluate and adapt programs, processes and services to overcome challenges

the "Center as Experiment"

Set of linked practices



Building new teams

SESYNC: lessons learned

- Leadership must be actively involved in recruitment
- Recruit individuals with collaborative skills
- Seek diversity across multiple dimensions
- Engage stakeholders in the process

Sustaining teams

SESYNC: lessons learned

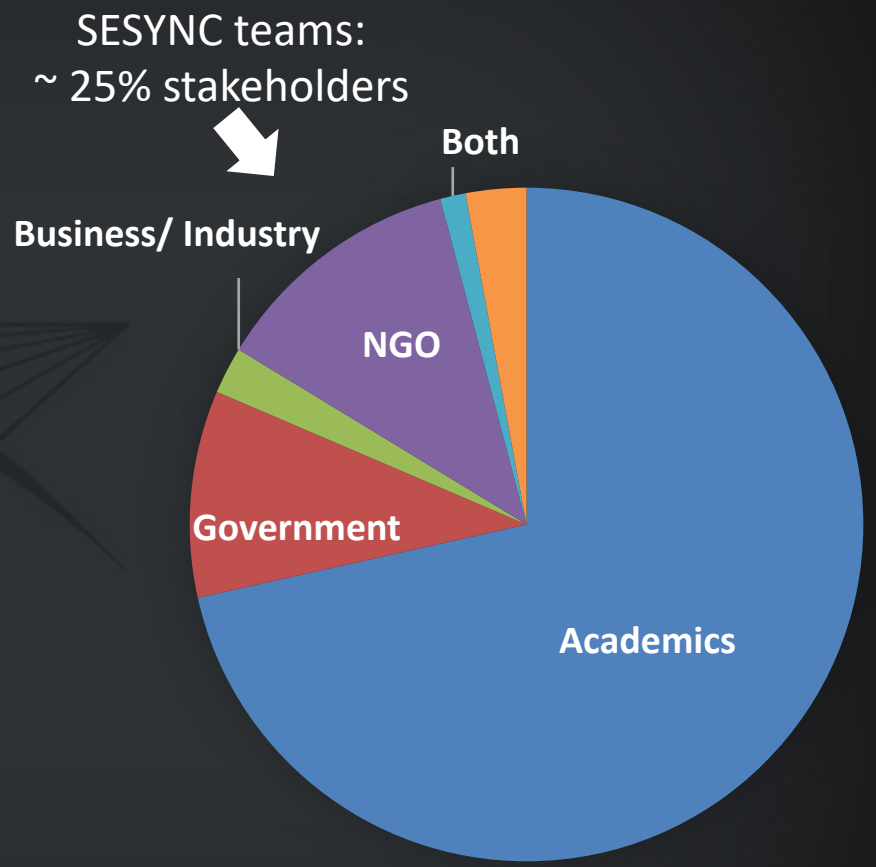
- Early face-to-face meeting
- Choose the simplest communication platform and process
- Social interactions (even remotely)
- Time for focus on each individual's contribution repeatedly
- Accountability of subgroups/individuals to entire group (scheduled!)
- Written and agreed upon 'rules' (revisit)
- One individual tasked with ensuring above

Actionable (convergence) Research

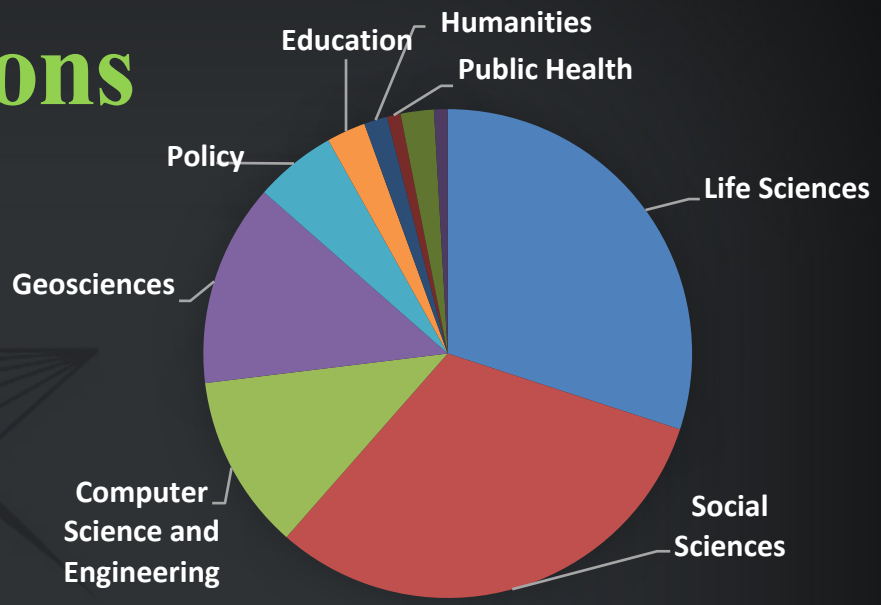
relevant societally

SESYNC: lessons learned

- Recognize there are diverse types of stakeholders
- Co-develop goals and vision with stakeholders
  (do not use "loading-dock model or engagement")
- The social impact of your work is its impact on stakeholders. Value propositions can and should reference stakeholder impacts



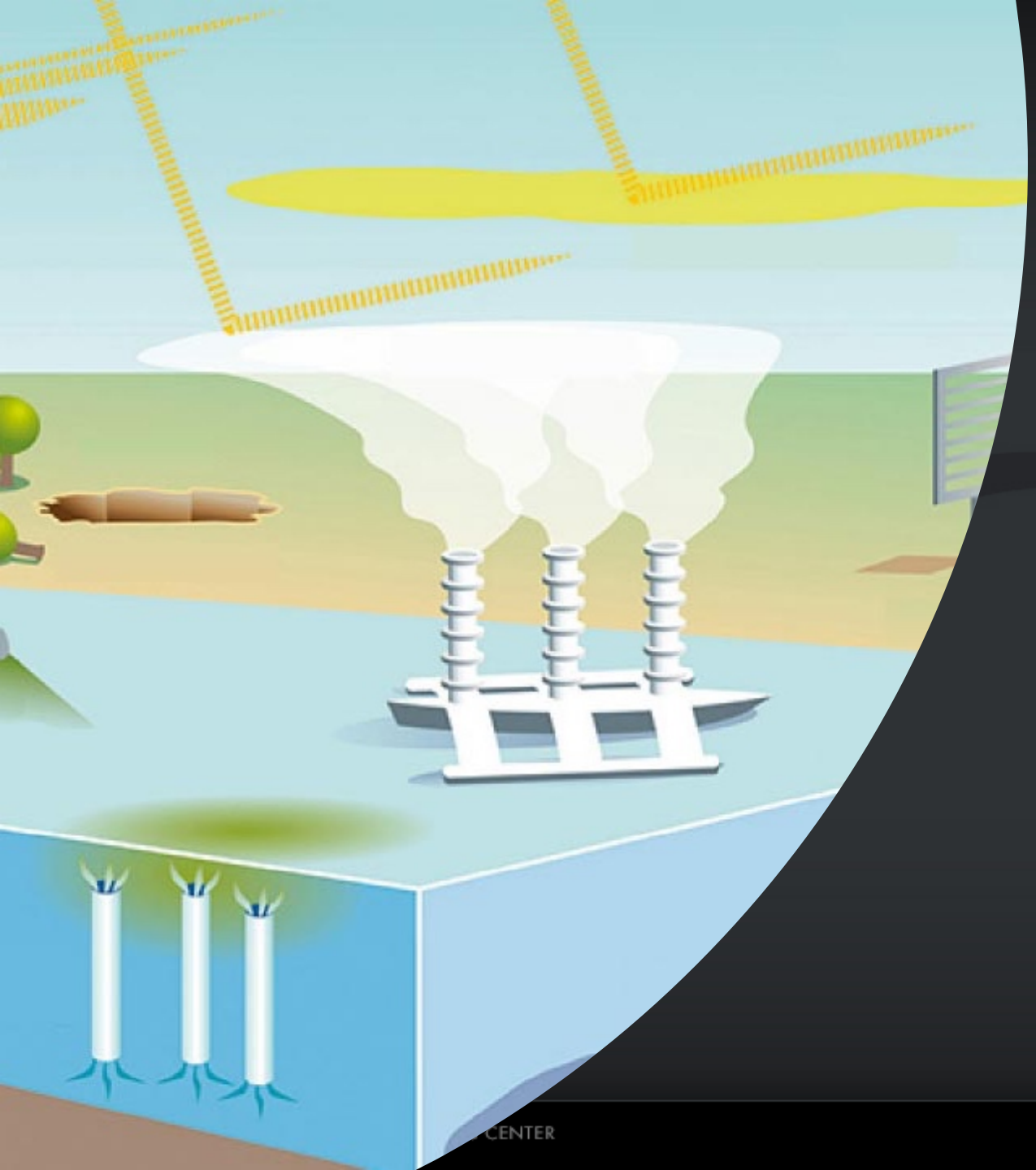
Enhance Effectiveness of Interdisciplinarity Collaborations



SESYNC: lessons learned

- Recognize & discuss epistemological differences
- Activity to develop shared conceptual model (for research question and methods)
- Be ready for micro-conflicts and have a process for resolving
- Facilitators useful at various stages
- Splitting into sub-teams by discipline a mistake! Integrate from the beginning

EXAMPLES OF CONVERGENT RESEARCH AT SESYNC



New Scenarios for Climate Geo-Engineering

Policy-relevant, socio-dynamic technology futures

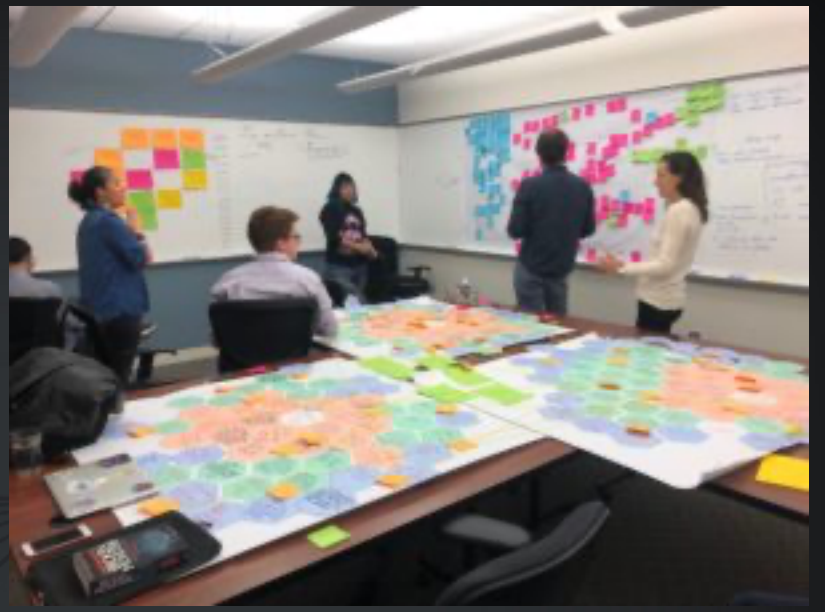
(Nicholson and Trisos)

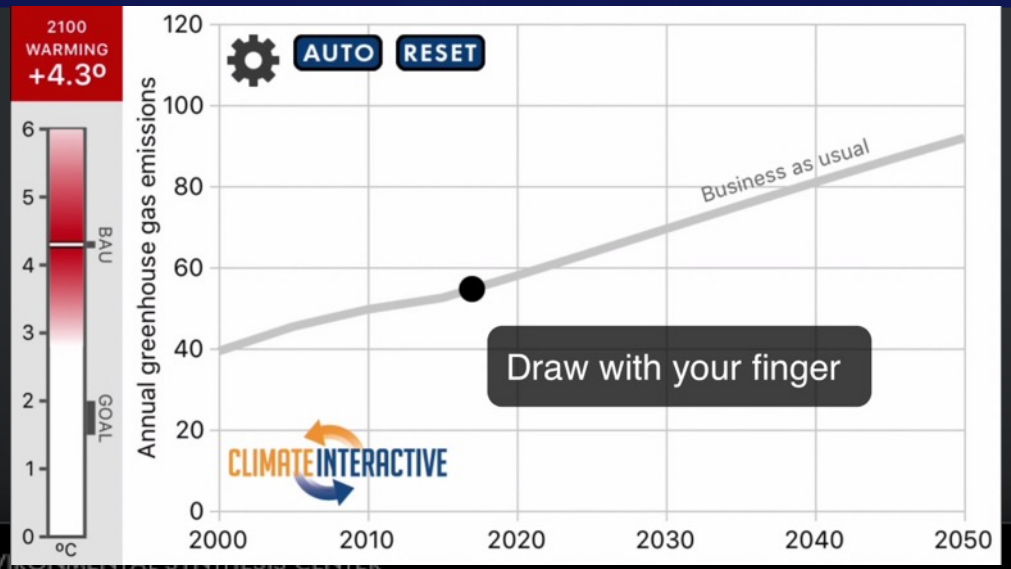
XPRIZE

CREDITS

FLOATING RUGS

WRITTEN BY **Mohale Mashigo**





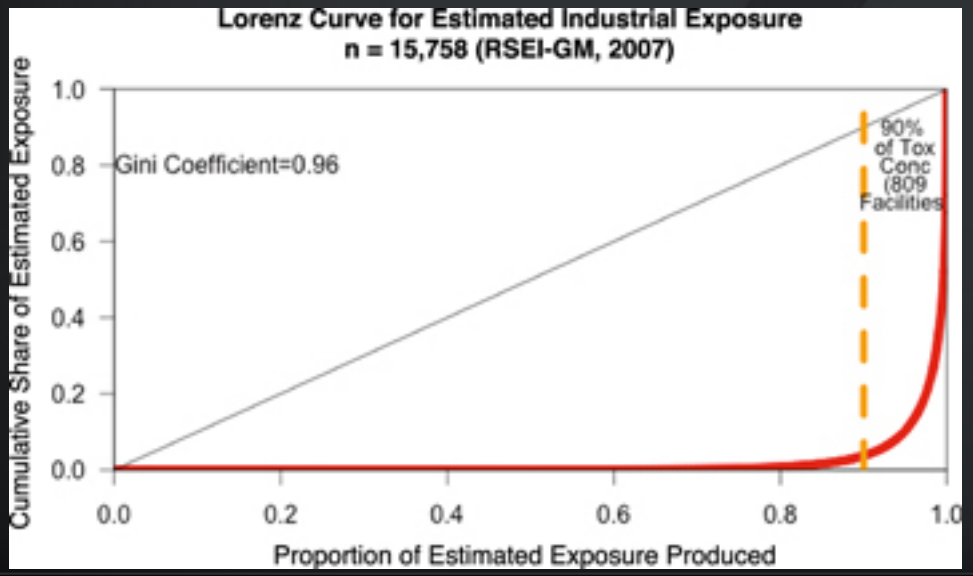
Interdiction of Plant-Borne Pest Invasions

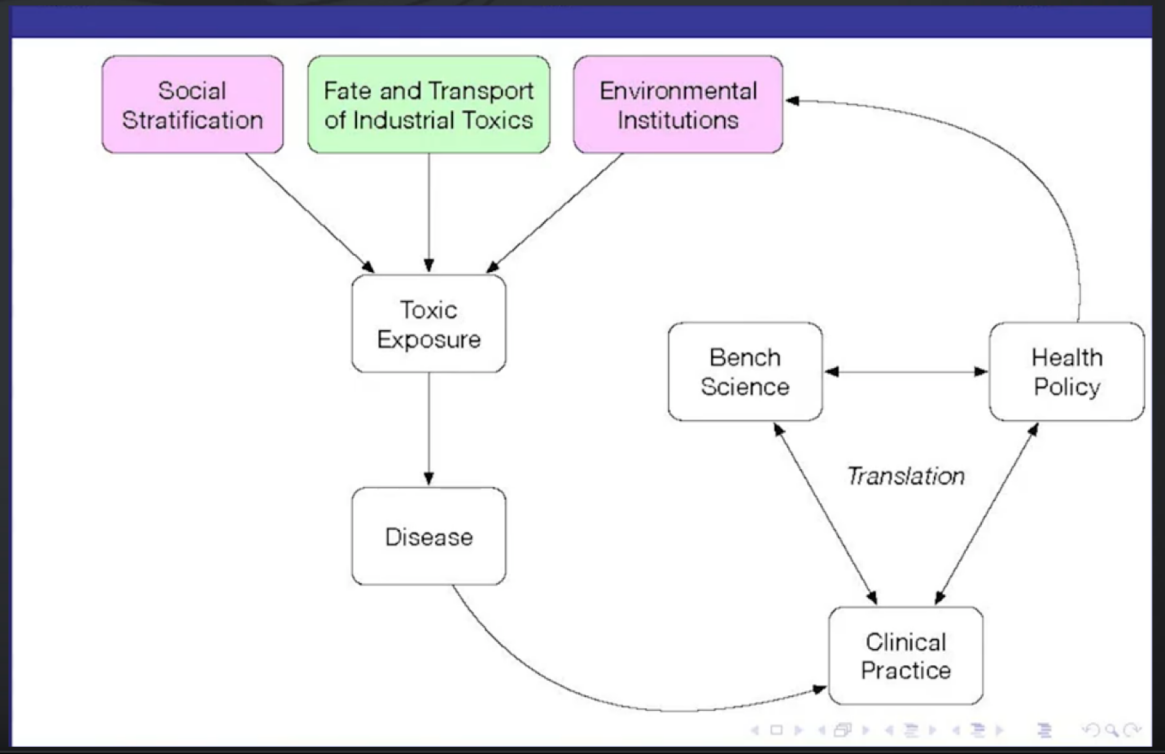
- **Household plant imports as invasion vectors, how best to target inspections and enforcement? (*Liebhold and Epanchin-Niell)***

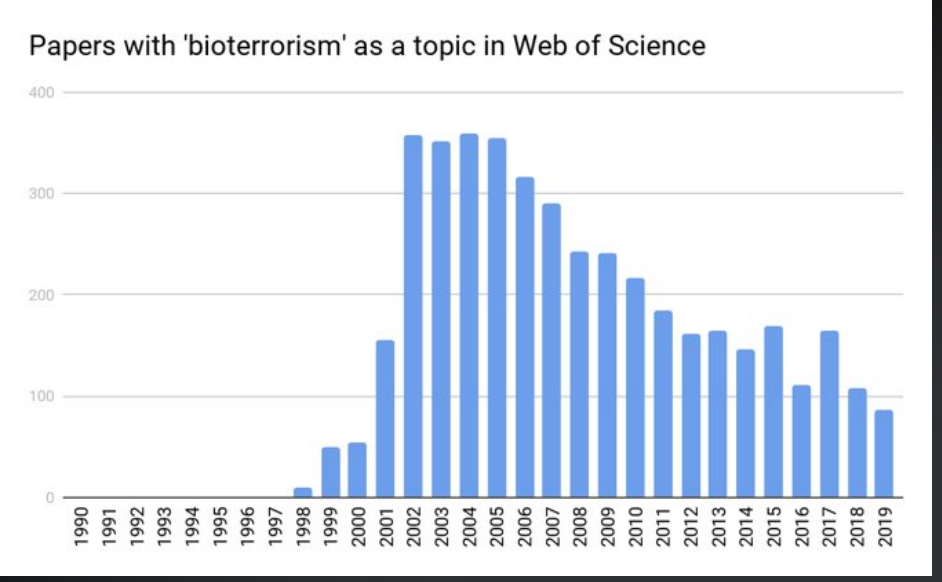
- ***New U.S. inspection/interdiction strategy based on group's work and data***

Connecting Exposure, Inequality, Disease and Health Policy

Engaging across health and environmental disciplines *(Collins former SESYNC Post-doc)*

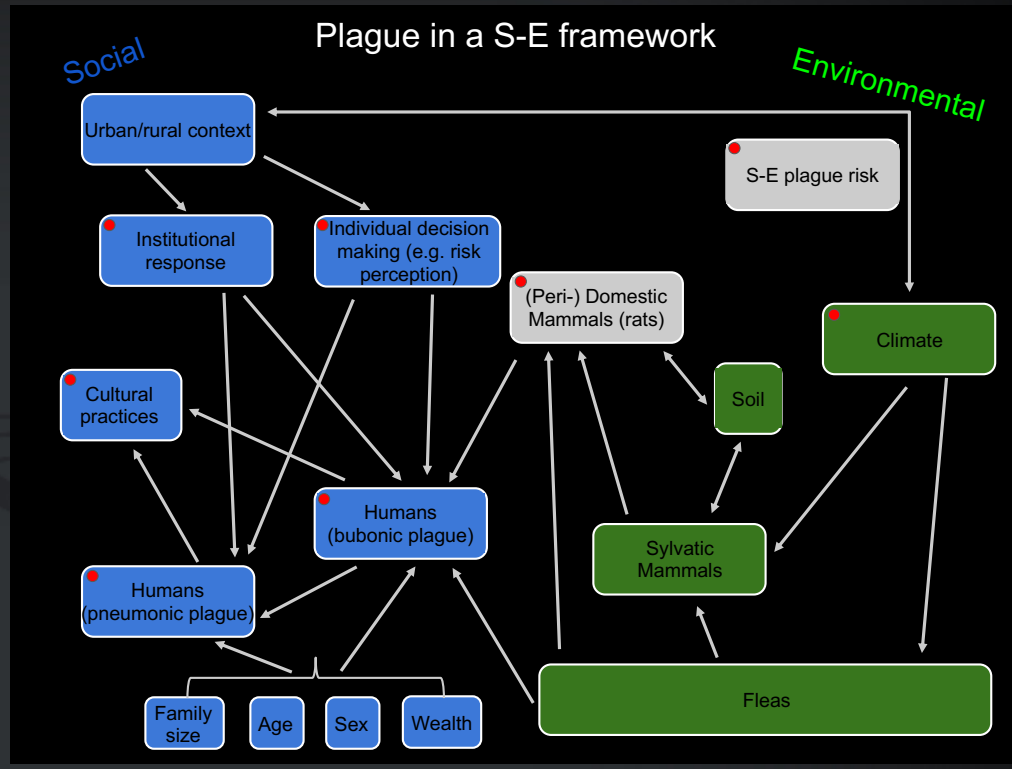






Deconstructing plague

(Mordechai—new project)



Emperor Justinian I (527-565)

Yersinia pestis, the bacterium that causes plague

How Climate Change and Plague Helped Bring Down the Roman Empire

We can learn crucial lessons by examining the natural forces that shaped Rome's rise and fall

Thank you!

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www.SESYNC.org