The Neglected Role of Ethics in Team Science

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Disclosures & context

- Principal Investigator, **NetEthics: Building Tools & Training to Advance Responsible Conduct in Complex Networks Pioneering Novel Technologies**, NSF Award #2220611 (Wolf, Roehrig, Pruett, Varma, Uygun, PIs)
  - Consortium NetEthics website
  - Online Ethics Center (OEC) website

- Lead, Ethics & Public Policy (EPP) Component, **NSF Engineering Research Center for Advanced Technologies for the Preservation of Biological Systems** (ATP-Bio^{SM}), NSF Grant #EEC 1941543
  - Consortium EPP website
  - ATP-Bio website

Disclosures & context

- Member, **NASEM Strategic Council for Research Excellence, Integrity, and Trust**
  - Strategic Council website
- Member, Planning Committee, "**On Leading a Lab: Strengthening Scientific Leadership in Responsible Research, A Workshop**"
  - Planning Committee website
  - On Leading a Lab workshop website

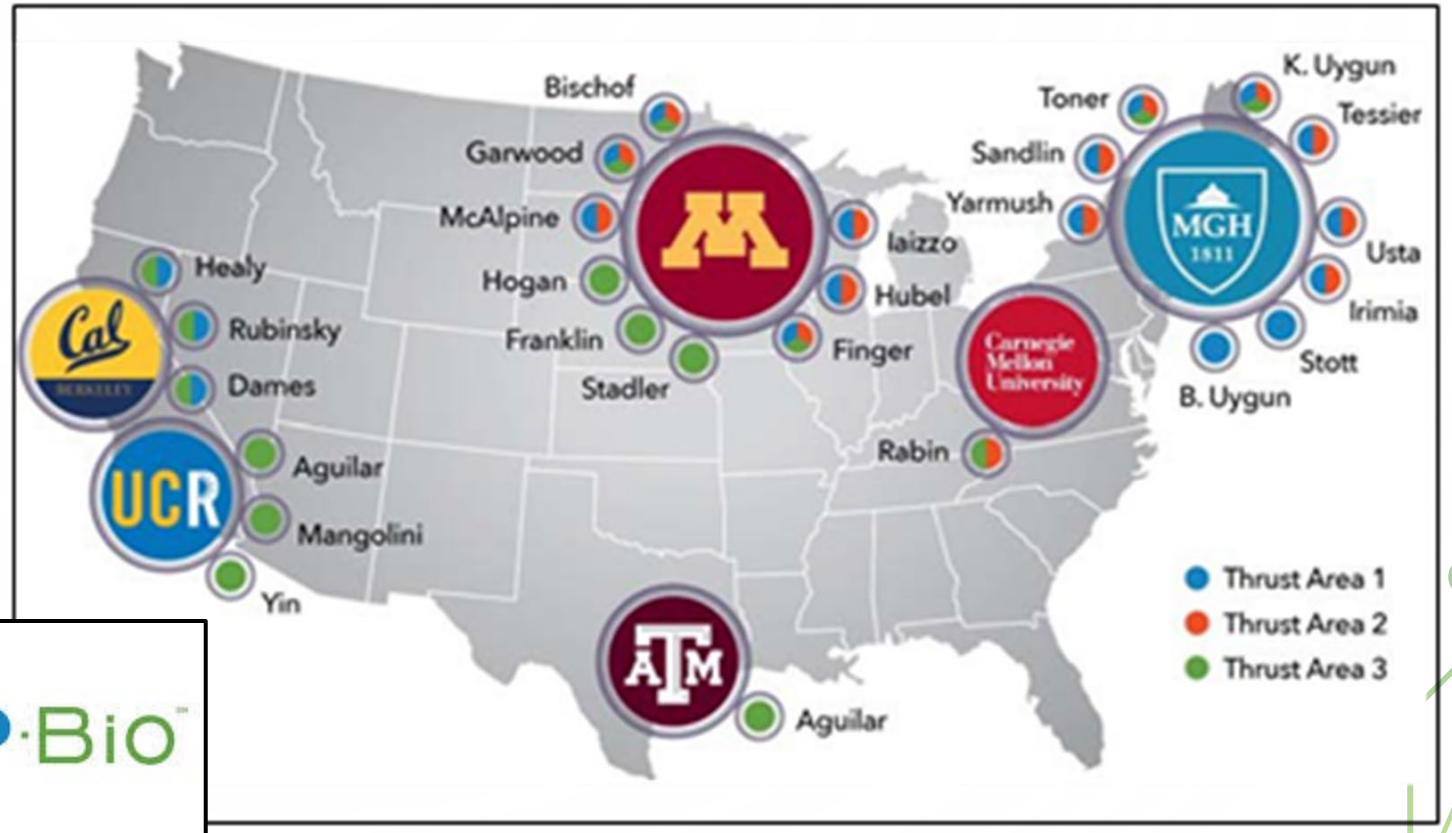
    Dec. 4-5, 2023

    proceedings forthcoming

Where did NetEthics come from?

In 2020, we began work on an NSF-funded Engineering Research Center (ERC) for Advanced Technologies for the Preservation of Biological Systems (**ATP-Bio**SM):

- a Gen-4 ERC
- crossing 6 institutions
- multiple labs
- multiple disciplines



NSF | ATP-Bio

ATP-Bio has an Ethics & Public Policy (EPP) component

Leads: Susan Wolf, JD & Timothy Pruett, MD

Ethics & Public Policy Panel (EP3): eminent ethicists familiar with complex networks

Evelyn Brister, PhD
Professor of Philosophy and Philosophy Prog. Dir.
Governing Board, Public Philosophy Network
Rochester Institute of Technology

Shawneequa Callier, JD, MA
Associate Professor
George Washington University
School of Medicine and Health Sciences

Alexander Morgan Capron, LLB
University Professor Emeritus
University of Southern California

James F. Childress, PhD
Professor Emeritus; University Professor
University of Virginia

Barbara J. Evans, JD, PhD, LLM
O'Connell Chair; Prof. of Law & Engineering
University of Florida

Michele Bratcher Goodwin, JD, LLM
Professor of Law; Co-Director, O'Neill Institute
Georgetown University

Insoo Hyun, PhD
Director, Center for Life Sciences & Public Learning
Boston Museum of Science

Rosario Isasi, JD, MPH
Associate Professor of Human Genetics
University of Miami Medical School

Gary Marchant, PhD, JD, MPP
Regents Professor of Law
Arizona State University

Andrew Maynard, PhD
Professor, School for the Future of Innov. in Society
Arizona State University

Kenneth Oye, PhD
Professor of Political Science
Professor of Data Systems & Society
Massachusetts Institute of Technology

Paul B. Thompson, PhD
Professor Emeritus
Kellogg Chair in Agricultural, Food & Community Ethics
Michigan State University

We found a gap

- Historical **rise of big team science & engineering research networks**
- But analysis of research ethics & RCR has not kept pace:
  - **Micro ethics** -- Rise of modern research ethics addressing duties of the investigator & immediate team – Nuremberg, Helsinki, Belmont Report, Common Rule…
  - **Macro ethics** – Development of methods to forecast and evaluate societal implications – responsible innovation, anticipatory governance…
  - **Largely missing: Meso ethics** at the **level of the research network**
- **Analysis of big team science instead has often focused on:**
  - Conditions for team effectiveness & success
  - Psychology of collaboration; role of conflict
  - Competencies ….
  - **Not the role of ethics**, ethical challenges in complex teams & how to optimize for ethics

Past work – where is network ethics?

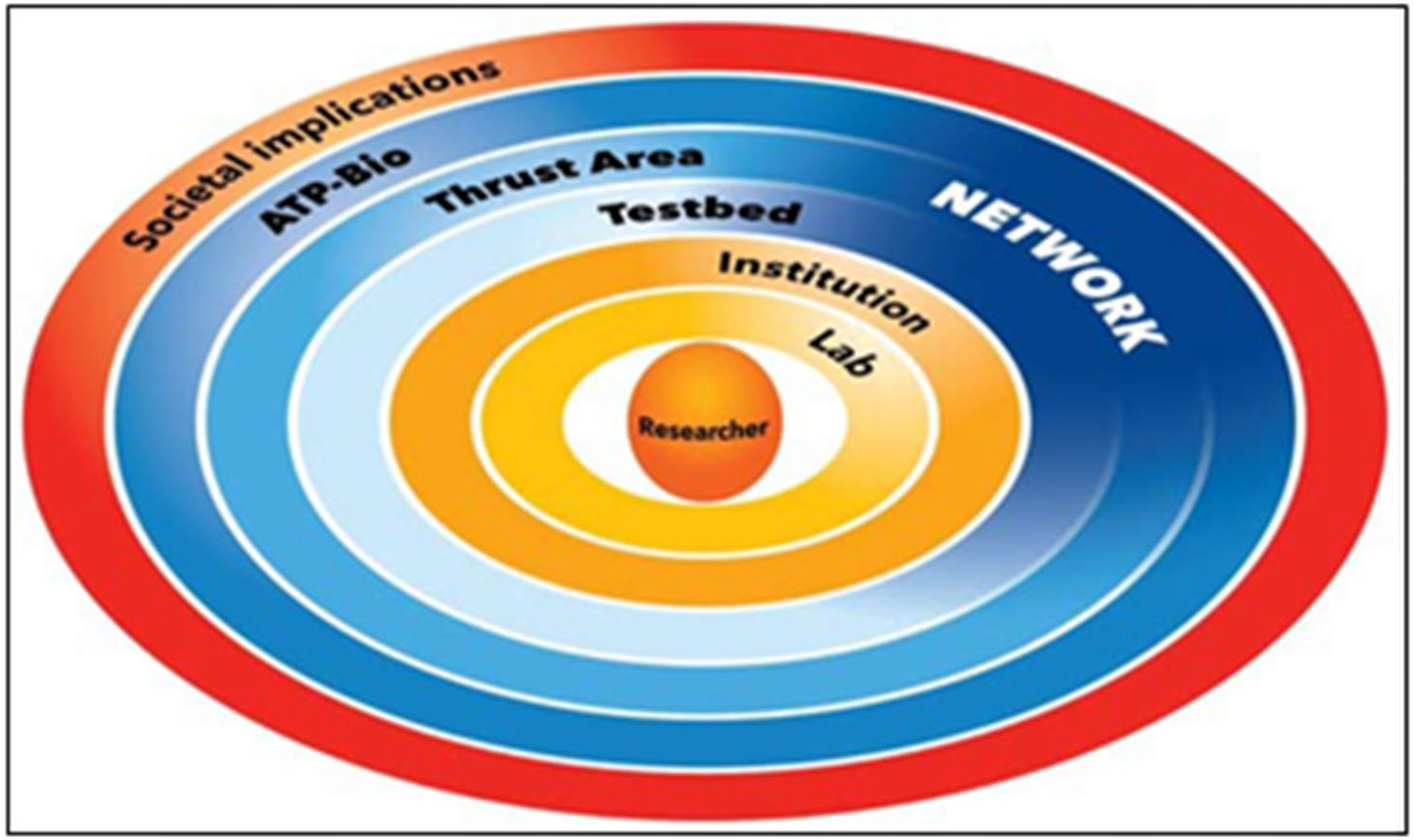
- NASEM. *Fostering Integrity in Research* (2017) -- 6 core **values** in research:
  - Objectivity
  - Honesty
  - Openness
  - Accountability
  - Fairness
  - Stewardship
- NRC. *Enhancing the Effectiveness of Team Science* (2015) – articulates practices to address key challenges facing team science, including:
  - **Leaders:** learn & apply team science, ensure team-science training for others, build shared terminology & work; manage faultlines, build consensus, manage conflict, evaluate using valid consensus measures.
  - **Researchers:** use team science & experts to evaluate & improve methods; “”Foster positive team processes.”
  - **Institutions:** partner with experts in team science, ensure sound evaluation of team science, reward collaboration, support virtual collaboration.
  - **Funders:** require proposals to address collaboration plans; encourage “leaders to plan not only for…[science] but also for… collaborative/interpersonal aspects”
  - **Overall:** specifies 21 **competencies** for team science, without calling out ethics (Table 5-2)

NetEthics project – NSF-funded beginning 2022

- **Goal:** Advance ethics & RCR in large, complex engineering research projects (e.g., NSF-funded Engineering Research Centers)
  - "teams of teams" or "multiteam systems"
  - multi-lab, multi-institutional, multidisciplinary collaborations
- **Need:** Research ethics largely focuses on individual researchers (micro level) or societal issues (macro level).
  - The gap in the middle (at the meso level of the network) leaves little guidance for leaders of and investigators in complex research networks.
- **Issues:** Network leaders & investigators regularly face issues such as:
  - ensuring **consistent attention to ethics & RCR** across the network including in research with human participants & ethical treatment of animals
  - avoiding **misconduct**, minimizing **detrimental research practices** in the network
  - harmonizing **conflicting approaches to authorship & credit** across the network
  - fostering **pre-publication sharing** of data, tools, methods across labs (openness)
  - building a **network culture & climate** valuing ethical analysis & conduct
  - creating **network-wide processes** for addressing concerns & disputes on ethics

Network level in ATP-Bio^{SM}

Micro-level ethics = Gold rings
Meso-level ethics = Blue rings
Macro-level ethics = Red ring



3 levels: micro, meso, macro ethics

Ethics Level	Focus	Examples	Adequacy of literature & tools
Micro	Individual investigator working in lab	Avoid plagiarism; disclose & manage conflicts of interest; minimize detrimental research practices	Extensive literature; CITI training; other RCR training
Meso	**Multi-lab, multi-institutional research networks**, such as ERCs	Assess network challenges including differences in lab culture; promote cross-network transparency, collaboration, inclusion, and respect; create processes supporting a network approach to ethics and RCR issues	**Limited literature** on key network values; **need for tools** to assess networks **and training** materials to promote ethics and responsible network conduct
Macro	New technologies resulting from research	Analyze prospective risks & benefits to society; use anticipatory tools to achieve net societal benefit	Significant literature; tools include anticipatory governance, responsible innovation

NetEthics – 3-part approach

- **Study 1** – **Deductive** -- **identify key network ethics/RCR issues & values** through literature review and expert consensus processes;
- **Study 2** – **Inductive** -- **analyze perceived network issues & values**, conducting **semi-structured interviews** and **develop a network assessment tool** that can be used to identify cross-group differences that need to be addressed to advance ethical conduct and RCR in the network;
- **Study 3** – **Educational** -- **develop and pilot a set of 4-5 network ethics/RCR educational case studies** that can be used by other complex research networks, and whose design can serve as a model for networks developing their own case studies.
- **Deliverables:** publications, case studies, public conference early 2025

Consultation with experts including:

- **Stephen Fiore, PhD,** U. Central Florida (Philosophy)
- **Kara Hall, PhD,** National Cancer Institute, NIH (Dir., SciTS Program)
- **Michael O'Rourke, PhD,** Michigan State U. (Toolbox Dialogue Initiative)
- **Dena Plemmons, PhD,** UC Riverside (*Science & Engineering Ethics*)
- **Rosalyn Berne, PhD,** UVA (Engineering & Applied Ethics; Director, Online Ethics Center)
- **L. Michelle Bennett, PhD,** LMBennett Consulting
- **C.K. Gunsalus, JD,** U Illinois (Nat'l Center for Principled Leadership & Research Ethics)
- **Pri Shah, PhD,** U Minnesota (Business School)

Synergistic Consortium work

Consortium on Law and Values in Health, Environment & the Life Sciences

- Feb. 2024 – examining **research ethics in multiple team configurations** with research **participants, communities, companies**, including:
  - *All of Us* Research Program
  - African Ancestry Neuroscience Research Initiative
  - Research engaging the NIH Tribal Health Research Office (THRO)

Synergistic work at National Academies

- Past service on **COSEMPUP** (Committee on Science, Engineering, Medicine & Public Policy); prior ethics work under COSEMPUP's aegis includes:
  - *On Being a Scientist: A Guide to Responsible Conduct in Research* (3d ed. 2009)
  - *Fostering Integrity in Research* (2017)
  - *Reproducibility and Replicability in Science* (2019)
- Current service on **Strategic Council for Research Excellence, Integrity, and Trust** (established 2021)
  - Working Group re "On Leading a Lab" (Susan Wolf & Lyric Jorgenson, leads)
- Workshop re **"On Leading a Lab: Strengthening Scientific Leadership in Responsible Research"** (Dec. 2023)

“On Leading a Lab” Workshop – focus, speakers

- Focus on **scientific leadership at multiple scales** – not just the lab
- Focus on **scientific leadership for ethical & responsible research**
- Speakers included:
  - Maria Zuber, *Vice President for Research, MIT*
    Michael Witherell, *Director, Lawrence Berkeley National Laboratory*
    Gerald F. Goodwin, *Chief Scientist, U.S. Army Research Inst. for Behavioral & Social Science*
  - Michael O’Rourke, *Prof. of Philosophy, Michigan State Univ.*
    Catherine Lyall, *Prof. of Science & Public Policy, Univ. of Edinburgh*
    Tristan McIntosh, *Asst. Prof. of Medicine, Washington Univ. in St. Louis*
  - Kara Hall, *Program Director, NCI, NIH*
    Dragana Brzakovic, *Senior Staff Assoc., Office of Integrative Activities, NSF*
  - Brian Uzzi, *Prof. of Leadership, Northwestern Univ.*
    Maritza Salazar Campo, *Asst. Prof. of Business, UC Irvine*
  - C.K. Gunsalus, *Prof. Emerita, Univ. of Illinois, Urbana-Champaign*
    James DuBois, *Bander Prof. of Medical Ethics & Professionalism, Wash. Univ.*
    Lloyd Munjanja, *Senior Community Engagement Officer, MIT*

“On Leading a Lab” Workshop -- substance

- Wide agreement on **need for work and training** on **how to lead scientific teams at multiple scales to ensure ethical & responsible research**
- Exploration of developing new National Academies resources for scientific leaders and aspiring leaders – complementing “On Being a Scientist” book
- Excerpts from speakers’ posted slides:
  - Jason Borenstein (NSF): “Research questions of interest to the [ER2] program include...: …**Which organizational practices, contexts and incentives promote ethical and responsible STEM research** and why?”
  - Maritza Salazar Campo (UC Irvine): “A successful **lab leader needs to understand how to** make informed decisions, **protect the integrity of research data**, and maintain a responsible attitude towards the lab’s resources and members.”
  - Michael O’Rourke (Mich. State Univ.): “Providing **training in crossdisciplinary team science should be understood as an aspect of responsible research**….”
  - Tristan McIntosh (Wash. Univ.): “5 **Elements of Scientific Excellence:** Discovery and Impact; **Rigor, Reproducibility**, and Transparency; **Responsible Conduct of Research**; Diversity, Equity, and Inclusion, Mentoring”

Recommended Next Steps

- Build the **ethics literature on team science** in research networks – perceived ethical issues, ethics practices, normative analysis to develop ethics frameworks, training & tools
- Integrate ethics more deeply into literature/research on the **science of team science**
- Ensure robust attention to **ethics & RCR** in NASEM consensus study on "Research and Application in Team Science" – SOT includes:
  - "develop a contemporary understanding of **best practices** in team science"
  - "identify gaps in **resources and training** for team science"