CCAS Series on Interdisciplinarity Session #4: Interdisciplinary Research & Graduate Programs

Steve Elliott, Arizona State University

Fred Gould, NC State University

Teresa Mangum, University of Iowa

Jeff Braden, NC State University (CCAS moderator)

Overview

- Steve Elliott, ASU: Advancing Interdisciplinary Research
  - steve_elliott@asu.edu
- Fred Gould, NC State: Genetic Engineering & Society
  - fgould@ncsu.edu
- Teresa Mangum, U of Iowa: Humanities for the 21st Century
  - teresa-mangum@uiowa.edu
- Q & A

As they present, think of/listen for…

- Considerations for students?
- Challenges for faculty?
- Issues for deans?
- Novel approaches and structures?

Advancing Interdisciplinary Research:
Grand Challenges, Design Imperatives, & Partnerships to Train Next Generation of Researchers

STEPHEN N. ELLIOTT, PHD

MICKELSON FOUNDATION PROFESSOR

ARIZONA STATE UNIVERSITY

Introduction: My Background

- I am an **educational psychologist** with an interest in measuring human performance. (Have been trained and worked in a multidisciplinary and interdisciplinary world for 40 years).

- I have been involved in the development and leadership of 3 Learning Sciences Institutes to foster **interdisciplinary collaboration** among educators and social scientists. Over the past 15 years, these interdisciplinary research enterprises at Wisconsin-Madison, Vanderbilt, and Arizona State collectively have won more than $250 million worth of competitive grants and supported more than 300 grad students and 35 post-docs. (**Research is teaching & offers a good ROI**).

Introduction: My Background

- My **academic home** is a highly multidisciplinary and in some cases interdisciplinary unit (*Sanford School of Social and Family Dynamics*) comprised of sociologists, developmental psychologists, and educational psychologists at the New American University. (**Proximity & shared space is important to initiate collaborative work.)**
- Currently serve on the Executive Committee for ETS' Survey Assessment and Innovation Lab, helping to design the next generation NAEP. Supported by IBM Innovations Collaboration group. (**Interdisciplinary work is big in the private sector** – where many of my students want to work as well).

Innovations & the Knowledge Enterprise

- A research product or program can be defined as "**innovative**" if it (1) improves significantly on the current status quo and (2) ultimately reaches scale, thus serving a meaningful percentage and large numbers of the population over time.

- Many voices are calling for **innovations** that **impact** teaching, learning, and translate into measureable improvements in students' post-educational lives and the communities they live in.

Innovations & the Knowledge Enterprise

- Universities are knowledge enterprises that are expected to generate and transfer knowledge innovations. Today, more is needed from our top universities – **generate, transfer, translate, disseminate at scale, and evaluate** knowledge innovations. This requires administrative structures and reward systems that foster interdisciplinary teamwork!

Grand Challenges for Education: Some Examples

- Delivering math and science instruction that is engaging and advances deeper understanding for students with varying skills.
- Developing all students' social and communication skills to high levels within the constraints of a 1,200 hour school year.
- Managing learning time so all students spend at least 1,000 hours actively engaged in learning during the school year.

Grand Challenges for Education: Some Examples

- Creating and implementing instructionally relevant and embedded assessments that yield results that can be used intelligently tomorrow to guide instruction and document progress.

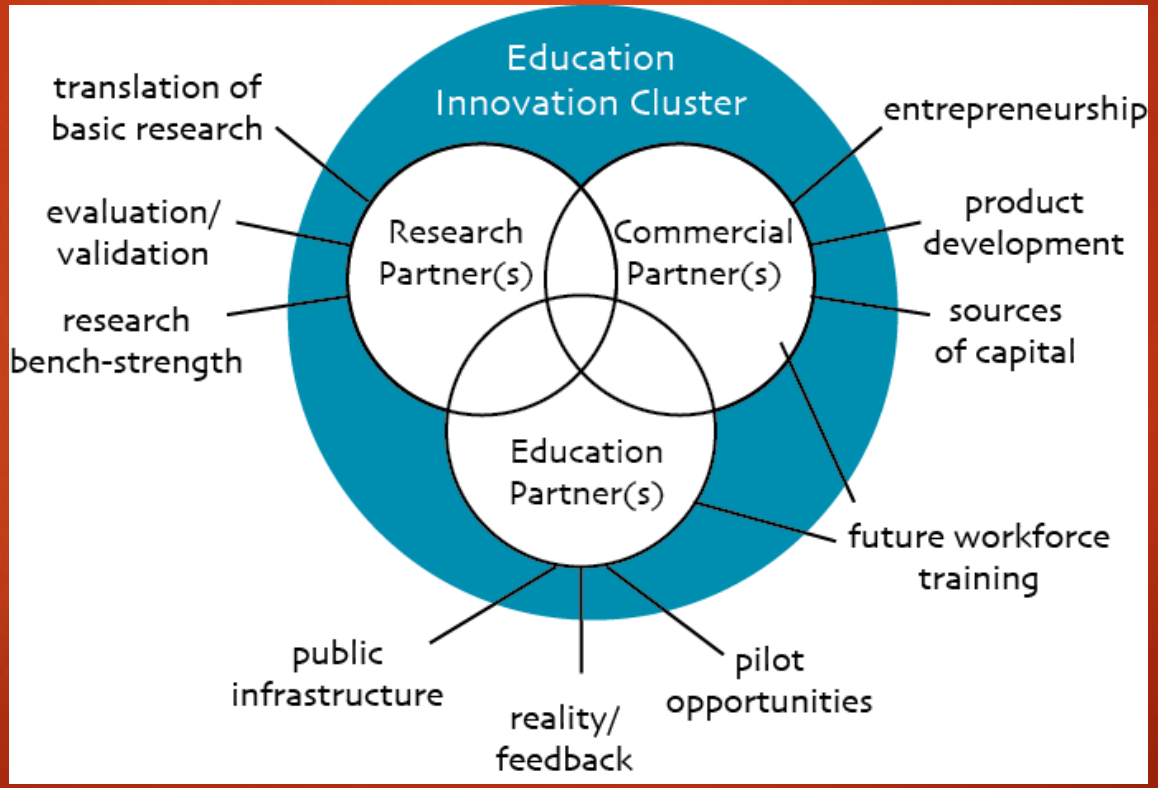
- Providing teachers training and job-embedded professional development so they can be highly effective users of technology that supports individualized instruction.

- Developing school leaders who are applied learning scientists and outcome driven.

Grand Challenges of any discipline almost always benefits from an interdisciplinary problem solving approach.

Interdisciplinary Partnership

No single individual or group of researchers can successfully address key education challenges alone – interdisciplinary partnerships are needed!



Interdisciplinary Partnership

ASU is a knowledge generation and dissemination enterprise that is committed to creating new opportunities for researchers to collaborate and innovate. This commitment is evident in the form of guiding principles, cluster hires around a grand challenge, interdisciplinary research institutes, reward structures that value impact, etc.

Academic Culture

ASU DESIGN IMPERATIVE 3. A CULTURE OF ACADEMIC ENTERPRISE

"Enterprise takes many forms in the academy—it is the signal characteristic of the drive and passion that informs all groundbreaking scholarly and creative endeavor. Enterprise inspires inquiry, and fosters the originality and independence of mind that make new knowledge possible. Intellectual capital is the wellspring of a great university, and the source of its potential to transform our world. It is also the source of an institution's prosperity—those who conduct groundbreaking research, developing new knowledge and new products with commercial application, have the capacity to generate significant revenues for the university, and to encourage investment in our product. To the extent that we make an original contribution to our disciplines, or, indeed, break free from conventional disciplinary or organizational constraints, our work may be said to exhibit enterprise." *(Michael Crow, President of ASU, 2002)*

Organizing Principle

ASU DESIGN IMPERATIVE 6. INTELLECTUAL FUSION

"If we are to advance knowledge in the face of its rapidly changing nature, and come to terms with the explosion of new knowledge that characterizes the academy in recent decades, a new and more fluid organization is urgently needed. Intellectual fusion is the *cognitive* norm in scholarship, whereas the fragmentation imposed by disciplinary categories is an historical social construct, however useful. Knowledge does not fall within strict disciplinary categories, yet an institutional organization that derives from the medieval academy prevails.... Accordingly, the New American University encourages teaching and research that is *interdisciplinary, multidisciplinary, transdisciplinary, and post-disciplinary, leading, where appropriate, to a convergence of disciplines, an approach that might more accurately be described as intellectual fusion.* "

(Michael Crow, President of ASU, 2002)

Observations about Interdisciplinary Research Enterprises

- Threaten the status quo
- Pull don't push people – don't underestimate the *power of pull!*
- Review recognition & rewards procedures in a competitive environment – *sharing is essential!*
- Talent management - recruit at *junior & senior levels & recognize existing talent to create a team*!

Observations about Interdisciplinary Research Enterprises

- Leadership independent of but in collaboration with deans – *advisory board* makeup from multiple colleges
- Technology intensive
- Expansive boundaries – both internal and external; create affiliates and collaboratives associated with research initiatives.

Fostering Interdisciplinary Collaborations

Seven factors that matter in developing & sustaining interdisciplinary research collaborations:

1. Leadership,
2. Shared vision,
3. Mature faculty,
4. Time to grow and manage expectations,
5. Institutional sustainable support,
6. Divide the rewards, multiply the recognition, and
7. Commitment to training next generation researchers

Thank You for Listening!
I welcome your questions & reactions.

Stephen N. Elliott, PhD

Mickelson Foundation Professor

The Sanford School

Arizona State University

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Blending Sciences and Humanities Education at the Graduate Level: The Utility of Boundary Objects

Genetic Engineering & Society as a case study

Fred Gould, North Carolina State
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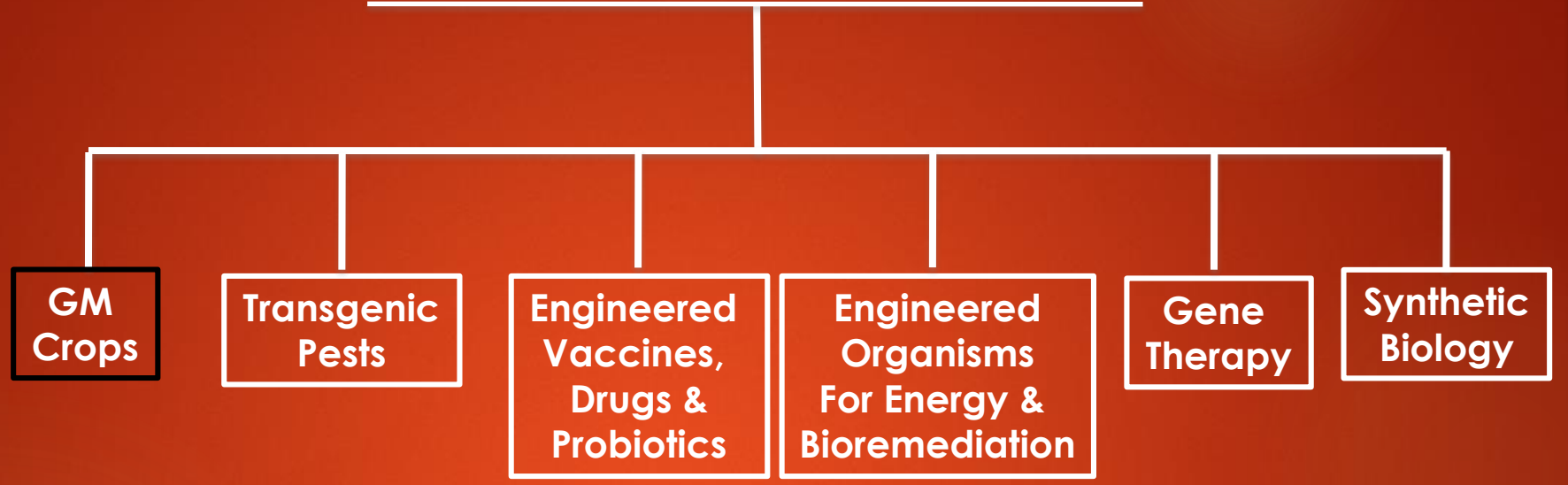
Standard Graduate Education Model

Interdisciplinary Graduate Education Model

Genetic Engineering and Society



Genetic Engineering and Society

Molecular Genetics & Transgenics

Ecology Pop. Gen. & Biomath

Ethics & History

Economics, Sociology & Anthropology

Rhetoric & Communication

Political Science, Policy Science, & Public Administration

Synthetic Biology

Gene Therapy

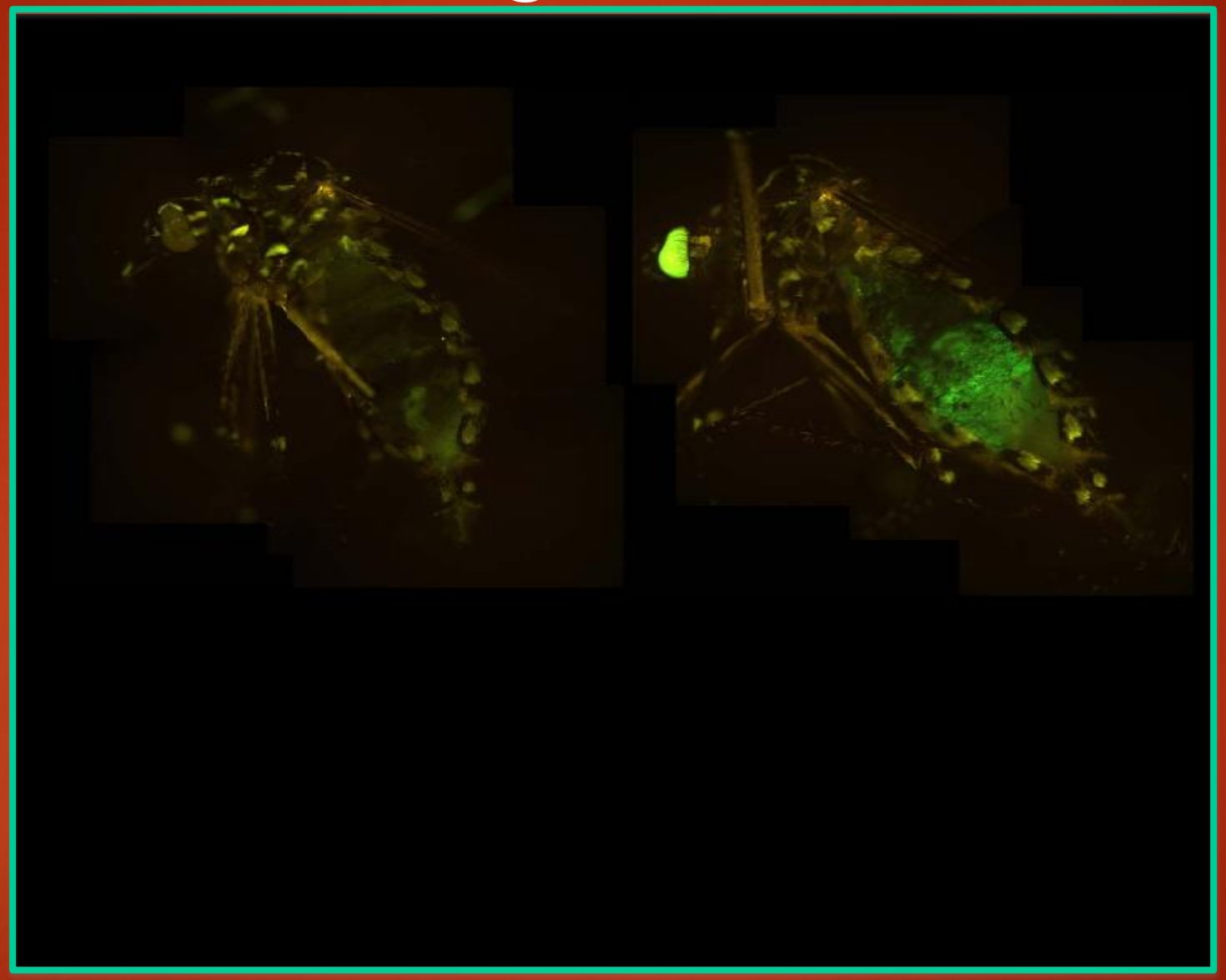
Engineered Organisms For Energy & Bioremediation

Engineered Vaccines, Drugs & Probiotics

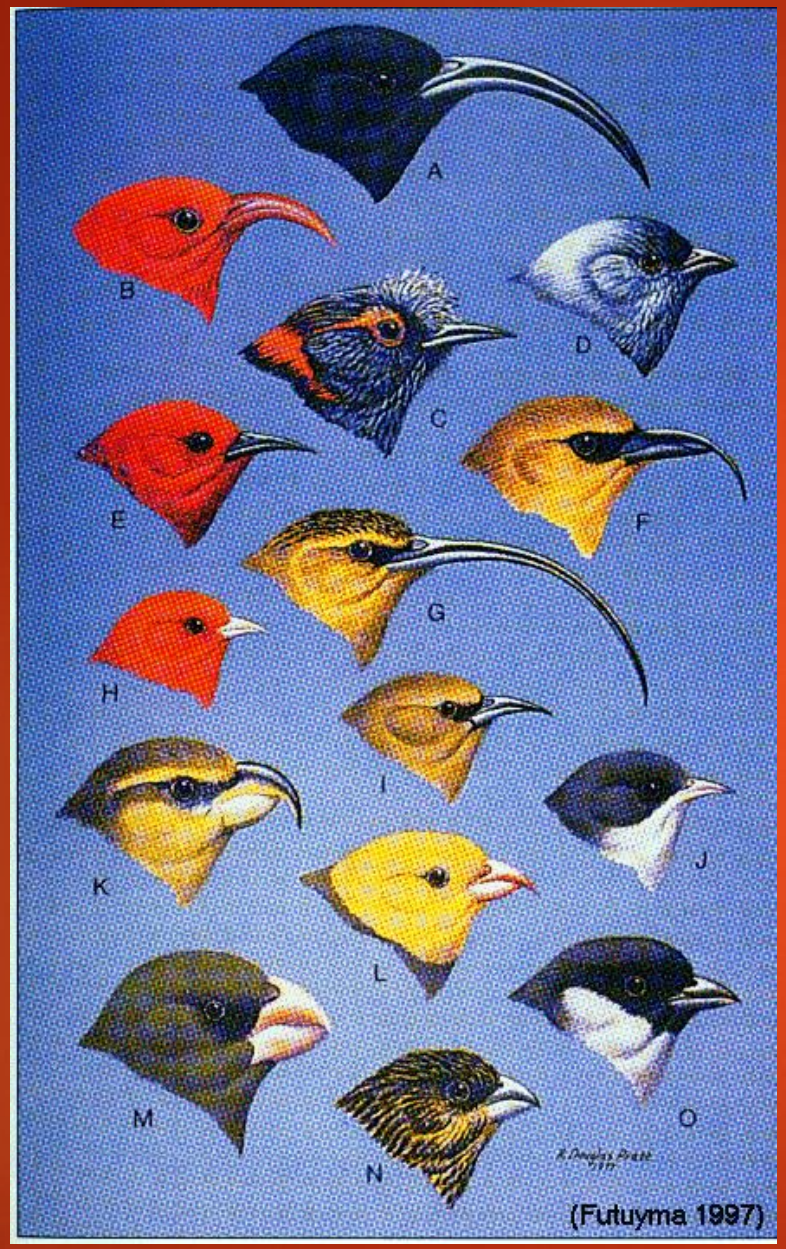
Transgenic Pests

GM Crops

Transgenic Pests



Hawaiian honeycreepers

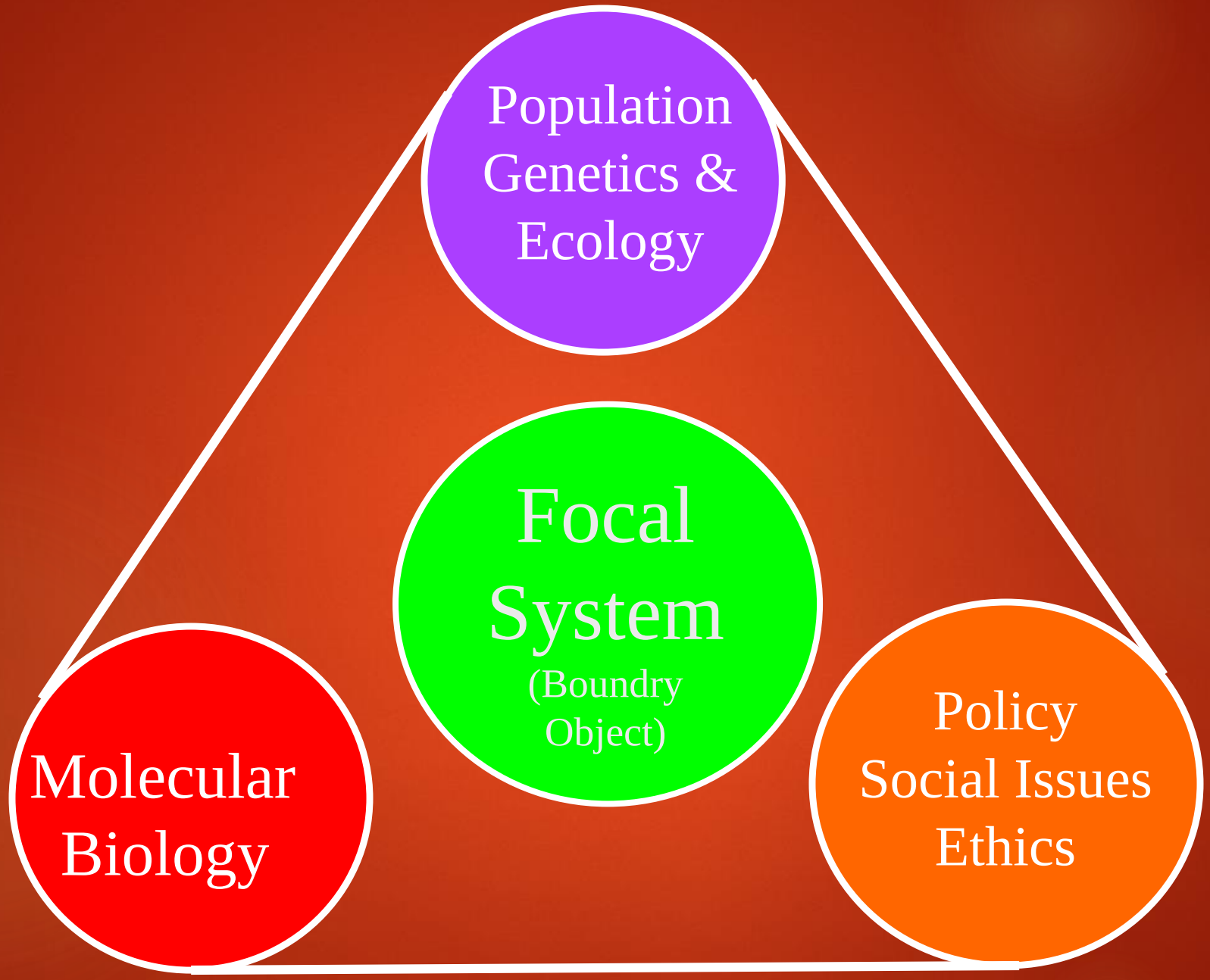


Culex quinquefaciatus

1) **Can a transgenic pest approach be used to address problem X?**

2) **Should a transgenic pest approach be used to address problem X?**

Public Administration, Entomology,
Genetics, Biology,
Biomathematics, Anthropology,
Economics,
Forestry and Environmental Resources,
Communication-Rhetoric-Digital-Media,

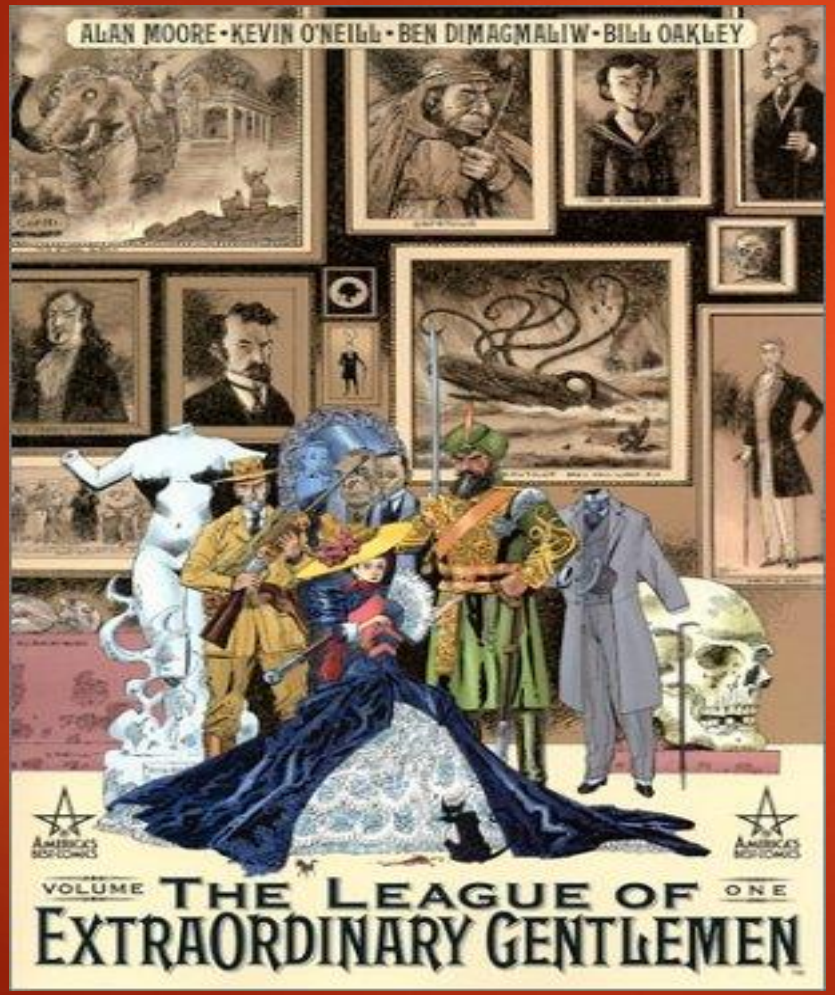

Population Genetics & Ecology
Focal System
(Boundry Object)
Molecular Biology
Policy
Social Issues
Ethics

Iquitos, Peru

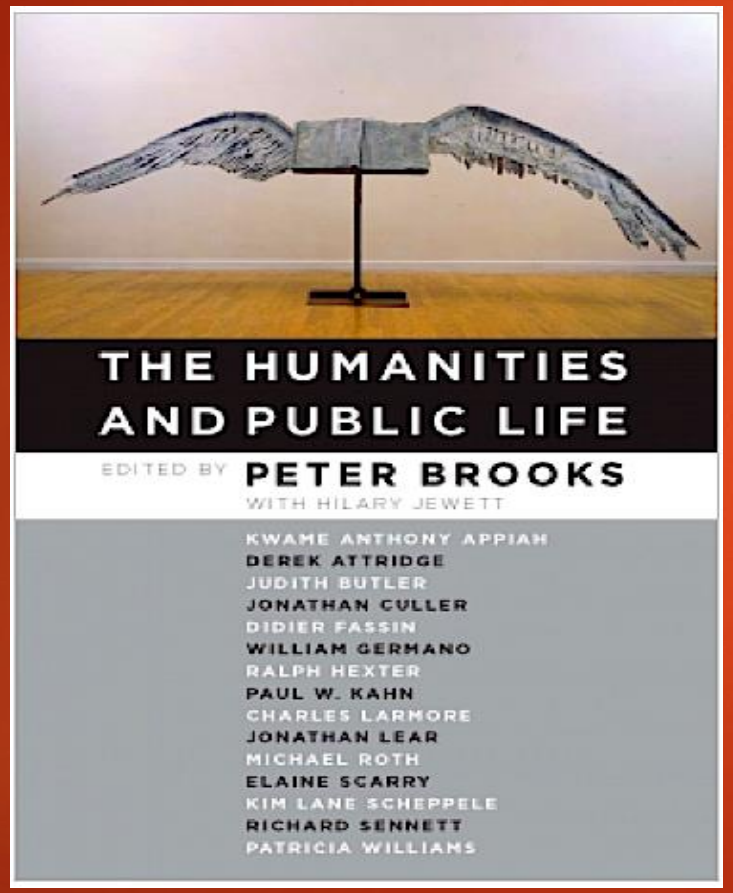
Santa Cruz Island
Catalina Island
Channel Islands of California
Channel Islands National Park
Valley Anchorage
Santa Catalina Island
Avalon
Google

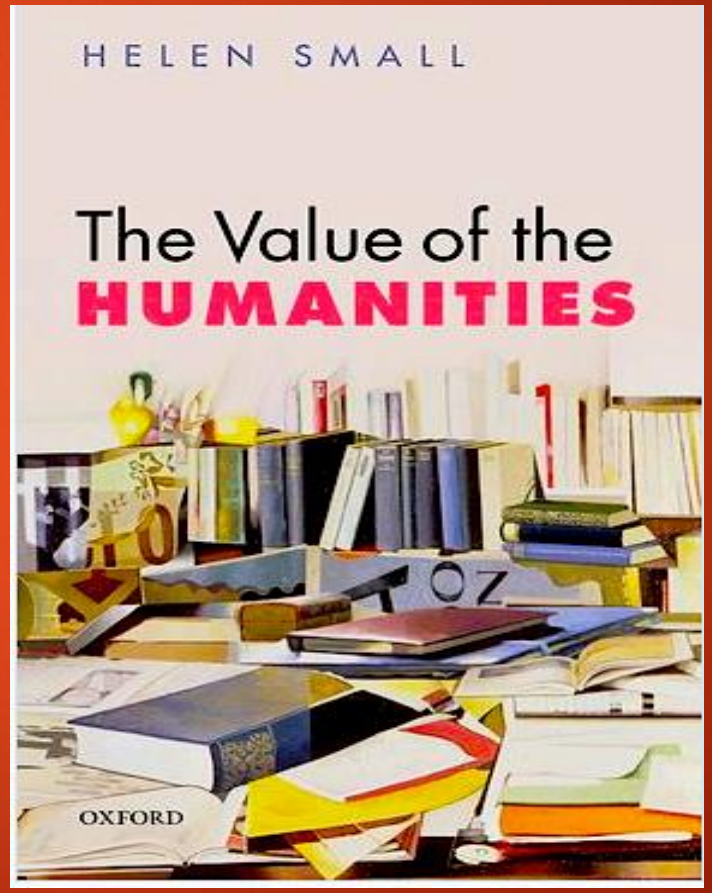
Humanities for the 21st Century

Teresa Mangum, Obermann Center for Advanced Studies, University of Iowa
teresa-mangum@uiowa.edu



The Humanities—In Crisis or In Transition?





Interdisciplinary/Multi-disciplinary/Cross-Sector Humanities Collaboration

Traditional

- Teaching/Learning
- Language based
- Close reading methodologies
- Individual and autonomous work practices
- Search engines, word processing, pen and paper, conversation, and [the inevitable] PPT
- Archives

Public and Digital Humanities

- Teaching/learning
- Text, image, sound
- Distant and close reading, coding, mapping, visualization, data bases
- Collaborative work with librarians, technologists, students, community partners, cultural organizations, government agencies
- Technologies, software
- Archives—material and virtual

Interdisciplinary/Multi-disciplinary/Cross-Sector Humanities Collaboration (continued)

Traditional

- Ideas as property
- Monograph and print publication as measure
- Peer review
- Focus on content/argument of finished project
- Book reviews

Public and Digital Humanities

- Open source
- Databases, Mapping, Digital Archives, Sound files, Exhibitions
- Crowdsourcing, evidence of usage, peer reviews, partner reviews
- Focus on process, evolving stages, "back end," usability, interaction, accessibility, dynamism, quality of collaboration, evidence of impact
- Feedback loops
- "Soft" skills

Anthony T. Grafton and Jim Grossman "No More Plan B" *CHE* (2011)

From "Outreach" to Public, Interdisciplinary Scholarship: The Engaged Humanities

"Public scholarship is scholarly or creative work integral to a faculty member's academic area. It is jointly planned, carried out, and reflected on by co-equal university and community partners. And it yields one or more public good products."

Imagining America: Artists and Scholars in public life

http://www.imaginingamerica.org/

Obermann Center for Advanced Studies
Graduate Institute on Engagement and the Academy

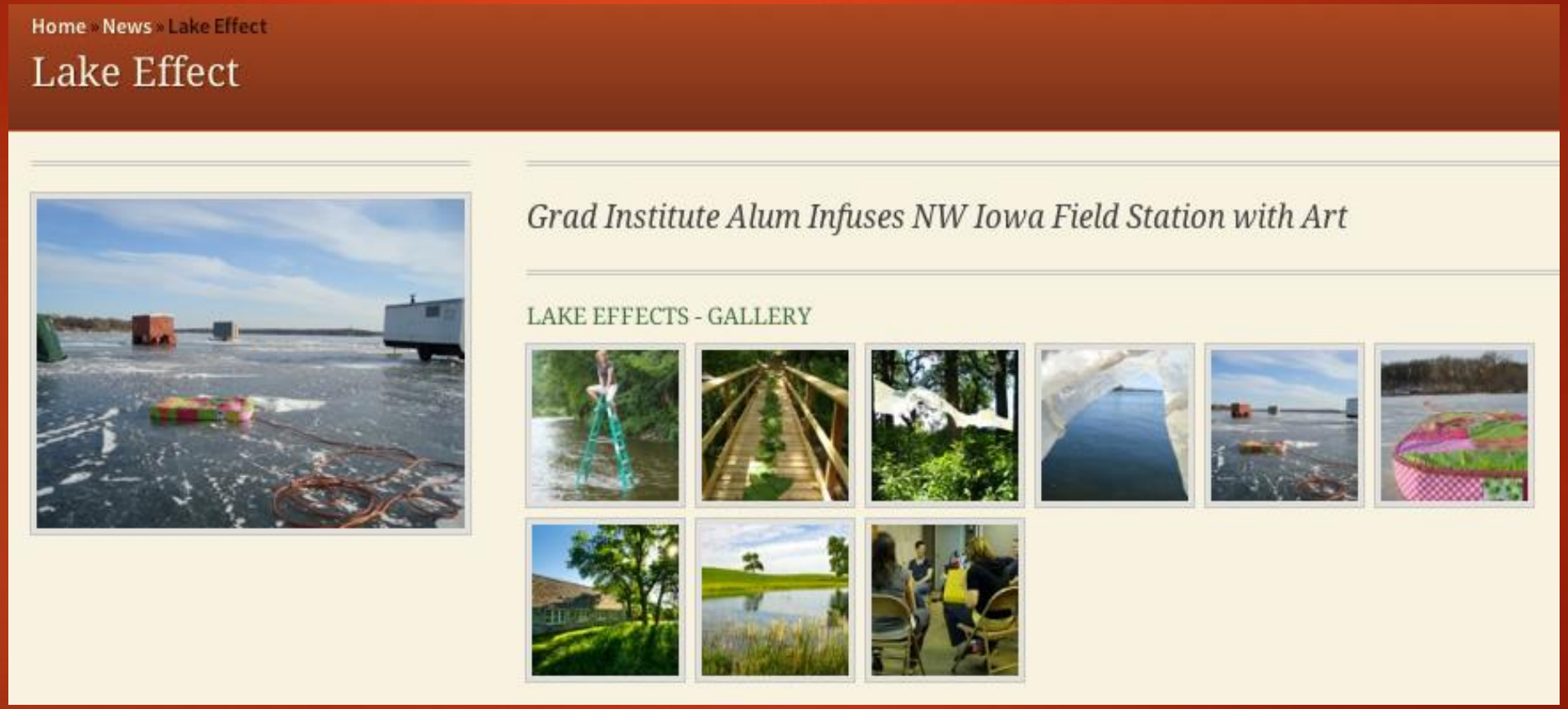
Objectives for the Institute

Participants. . .

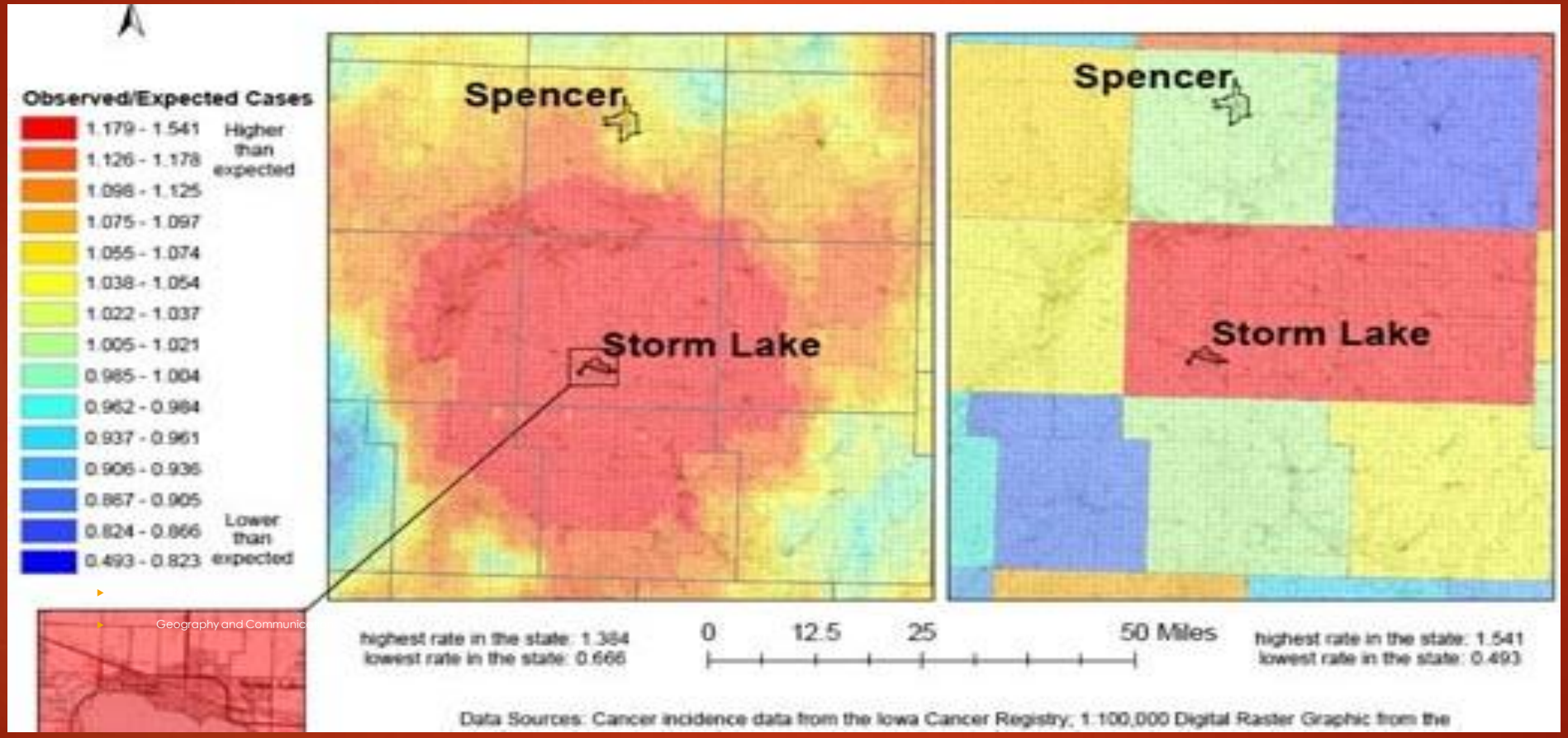
- Survey the theoretical landscape—the public potential of colleges and universities
- Encounter publicly engaged scholarship and teaching
- Discuss best practices for collaboration with community and civic leaders
- Develop projects that build public dimensions into their creative/scholarly work or their teaching
- Learn to present projects to partners and publics

Jonathan Rattner, MFA/PHD Film ~ The Iowa City Senior Center
THE LINN STREE COLLECTIVE
Assistant Professor, Vanderbilt University

Lisa Johnson, Environment and Arts, independent artist



Kirsten Byer, Public Health and Communications
Mapping Cancer for Community Engagement
Associate Professor, Medical College of Wisconsin



- Geography and Communic

- New Position:

Resources: Mellon-Funded Humanities Without Walls "Global Midwest" Consortium

call for applications: 2016 humanities without walls consortium pre-doctoral summer workshop

The Humanities Without Walls is a consortium of humanities centers and institutes at 15 major research universities throughout the Midwest and beyond. Based at the Illinois Program for Research in the Humanities at the University of Illinois at Urbana-Champaign (UIUC), the consortium is funded by a grant from the Andrew W. Mellon Foundation. Additional partners include the Chicago Humanities Festival office, and the Graduate School of Library and Information Science at UIUC. The consortium's initiatives include the creation of summer workshops for pre-doctoral students in the humanities who wish to explore careers outside the traditional tenure-track academic system.

Resources: National Endowment for the Humanities
http://www.neh.gov/commongood

Resources: Imagining America: Artists and Scholars in Public Life

Publicly Active Graduate Education PAGE Fellows

http://imaginingamerica.org/

Questions and Discussion