Some Thoughts on Transdisciplinary Discovery Convergence

APLU Presentation

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Some Simple Definitions…
(Courtesy of Wikipedia and NASEM)

**Multi**disciplinary Research (MDR): The involvement of more than one discipline around problem solving...

**Inter**disciplinary Research (IDR): Combining two or more disciplines into *something new* that *crosses boundaries*...

**Trans**disciplinary Research (TDR): A research strategy that crosses (*spans?*) *many disciplinary boundaries* to create a *holistic approach*, especially around a *new field of discovery*...

**Con**vergence (CON): Facilitating transdisciplinary integration of life sciences, physical sciences, engineering, and beyond...
Conceptually...

**MDR** is simple, but important interaction focused towards a solution, with no cross-boundary discovery...

**IDR** collaboration is rich interaction towards a new approach to problem solving involving cross-boundary reinvention; basically resulting in new permanent disciplines...

**TDR** and **CON** collaborations result in profound reinvention, usually at the frontiers of discovery; resulting in new holistic fields that span many disparate disciplines...
Some recommendations:
- Undergraduates should seek out IDR
- Graduate students should broaden their disciplinary expertise
- Researchers and faculty members should embrace IDR
- Educators should facilitate IDR
- Academic institutions should adapt policies and procedures to enhance IDR

http://www.nap.edu/catalog.php?record_id=11153#description
2011 American Association for the Advancement of Science IDR & Education Practice Guide

Some findings:
- The imperative for IDR
- Creating an IDR culture
- Ensuring diversity in IDR and education
- Processes for creating an IDR team
- IDR education
- Supporting and sustaining IDR
- Measuring the outcomes of IDR

http://www.aaas.org/cspsp/interdisciplinary/guide/
2011 MIT White Paper on IDR

Recommendations:
- Ensure federal support for agencies
- Establish convergent ecosystems
- Reform peer review
- Balance large scale and small scale investments
- Improve IDR within the federal agencies
- Educate, expand and support the next generation of convergent researchers

2012 American Academy of Arts & Sciences Report on TDR:

Goal 1: Move from IDR to TDR:
- Develop and foster massive knowledge networks
- Expand educational paradigms to model transdisciplinary approaches
- Expand support for shared core facilities
- Ensure that appointment and promotion policies recognize transdisciplinary collaboration
- Revamp administrative policies to encourage transdisciplinary collaboration

http://www.amacad.org/arise2/
Goal 2: Promote cooperative, synergistic interactions among academic, government and private sectors throughout the discovery and development process:

- Establish “grand challenges”
- Develop new models for research alliances
- Enhance permeability between industry and academia
- Reinvent technology transfer
- Develop policies around university and academic common interests
- Increase coordination between government, university and industry

http://www.amacad.org/arise2/
The Internal Dialogue: What Faculty Say in Listening Sessions---

“We would like a Community of Scholars around...”

“Would you help us organize a new group to do ______ across _____ boundaries?”

“I am from ____ and I good at _____, how can I join this MDR/IDR/TDR effort?”

“Tell us more about the NSF INSPIRE Program...”

“The ____ Foundation is interested in this MDR/IDR/TDR disciplinary approach. I want to know more...”
The Internal Dialogue: What Graduate Students Say in Listening Sessions---

“The world is increasingly collaborative...”

“We want our learning to prepare us for the world”

“Our best classes involve cohort learning...”

“In my mentor’s lab group, undergraduates, graduate students and senior researchers all collaborate while crossing disciplinary boundaries”

“In my summer internship, I worked with engineers, policy analysts and social scientists as a team...”
Research and Engagement Academy at UNH

Research and Engagement Academy

Welcome to the Research and Engagement Academy. The Academy is designed to advance and support the scholarly careers and success of faculty members by strengthening the quality and quantity of grant proposals submitted to federal agencies and foundations and by increasing the diversity of faculty who are awarded funding. Academy scholars commit to submit a competitive grant proposal, to attend seven half-day workshops and to work closely with an assigned “scholarly coach.” Scholarly coaches are senior UNH faculty with established track records of external funding. This faculty professional development Academy is one of several programs offered by the Office of the Senior Vice Provost for Engagement and Academic Outreach to help support scholarship and engagement.

The 2016 Academy application period is open. Completed Dean’s Nomination forms and Faculty Online Applications due:

Monday, November 9th, 2015. Apply
Transdisciplinary Research Academy at TTU

- Faculty-focused...
- True interest at the intersections...
- Keen desire to collaborate...
- Serious desire to contribute...
- Year long academy
- Catalyze free ranging discussions
- Tangible outcomes (e.g., IGERTS, institutes, grad programs)
- Extensive hands-on learning:
  - Team building
  - Federal agencies
  - Foundations
  - State agencies
  - Corporate R&D
  - Grant writing experts
- Dean nominated individuals or self-assembled teams
- Mentoring by senior faculty
- Self-assembled topics or grand science challenge projects
- $10 to 20k support per group
Transdisciplinary Continuum at UT Knoxville

- Computational Social Sciences
- Computational Neuroscience
- Smart Composites
- Materials Genome
- Asthma and Rural Health
- Complex Systems Biology

Increasing Investment

Increasing Scale, Increasingly External
The Threes...

Three Key Issues or Impediments
- Academic credit without diminishing the role of disciplinary discovery
- Scale and external connectivity
- How best to cultivate locally, regionally, nationally

Three Specific Action Actions
- Support Kavli/NASEM effort
- Encourage federal investment
- Encourage G-U-I-F nexus

Three Guiding Questions
- How best to work this on your campus?
- How to share exemplary approaches?
- Regionalism to grand challenges?
Questions?

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