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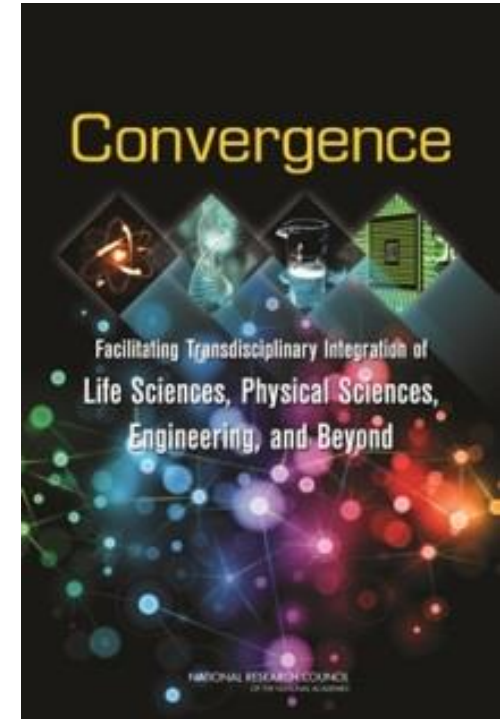
## BOARD ON LIFE SCIENCES

# Convergence: Building on the 2014 National Academies' report

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APLU Annual Meeting 2015

# Facilitating Transdisciplinary Integration of Life Sciences, Physical Sciences, Engineering, and Beyond (National Academies 2014)

- Approach to problem solving that integrates knowledge, tools, and ways of thinking from life and health sciences, physical, mathematical, and computational sciences, engineering disciplines, and beyond to form synthetic framework for tackling challenges at the interfaces of multiple fields.
- Explore barriers encountered in facilitating convergence & strategies to structure and sustain convergence programs
- Without systematic focus, convergence will continue to be a patchwork of isolated efforts



**Full report, “report in brief,” and short video available at  
[http://www.nap.edu/catalog.php?record\\_id=18722](http://www.nap.edu/catalog.php?record_id=18722)  
(or search convergence at [www.nap.edu](http://www.nap.edu))**

# Recommendations

1. Identify key problems whose solution requires convergence - catalyze new research directions and guide priorities
  2. Address barriers to effective convergence, including:
    - expand mechanisms for funding convergence efforts
    - support collaborative proposal review across funding partners
    - implement institutional seed funding to catalyze collaborations
  3. Review administrative structures, faculty recruitment and promotion practices, cost recovery models, and research support policies
  4. Include guidelines in hiring and promotion policies and evaluation criteria – support both convergent and disciplinary scholarship
  5. Identify evidence-based practices that have facilitated convergence - draw on economic, social, behavioral sciences, program management, and strategic planning
  5. Partner with colleagues in other organizations, especially in smaller institutions and institutions that serve traditionally underrepresented groups
  6. Collect, establish, and disseminate best practices on effective transfer of technologies from research organizations into the private sector.
  8. National coordination on convergence is needed to support the infrastructure to solve emerging problems that transcend traditional boundaries.
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## Convergence Summit, September 2015

- How does your institution's culture facilitate or hinder convergent research?
- How can researchers at your institution conduct projects across disciplines/departments/schools ?
- How does your institution address sticky issues such as budget sharing, indirect cost sharing and IP expectations
- How is space allocated to balance potentially competing needs of individual research, collaborative projects, departments, transdisciplinary centers, and shared core facilities?
- How are faculty hiring, promotion and tenure policies written and implemented to be supportive of convergence while continuing to support strong disciplinary scholarship?
- How can convergence projects be seeded?
- What institutional opportunities enable faculty, staff, and students to undertake convergence?
- How can engagement and enthusiasm about convergence be communicated?

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# Common Challenge Areas

- Establishing effective organizational cultures, structures, and governance
- Addressing faculty development and promotion needs
- Creating education and training programs
  - Role of students as “glue” bringing diverse faculty together
- Forming stakeholder partnerships
- Obtaining sustainable funding



# Examples of Strategies

- Organizing around a common theme or challenge
- Fostering opportunities to interact formally and informally
- Implementing supportive P&T processes and faculty reward systems
- Designing facilities and workspaces for convergent research
- Incorporating convergence in education and training programs
  - Integrating physical, mathematical, computational, and engineering concepts and examples into life science courses and vice versa
  - Providing opportunities at grad., postdoc. and faculty to learn fundamentals of new areas and foster common language
- Establishing partnerships across institutions
- Exploring sources of funding within and beyond government agencies
- Identifying evidence-based practices for facilitating convergence

# Ideas for Fostering Convergence

## “Steady State Budget”

- Encourage social events (coffee, pizza) for presentations and discussions
- Repurpose journal clubs to address convergence themes
- Foster informal faculty gatherings with shared interests in convergence problems
  - May assist discussions in advancing convergent candidates for faculty positions
- Establish mechanisms for faculty to hold joint appointments across departments/schools
- Undertake cluster hires
- Initiate executive-in-residence programs to bring insights from practitioners in industry
- Institute programs to encourage collaboration at a distance for faculty from different institutions and areas of science
- Provide opportunities for experimental courses, collaborative teaching, and “sabbaticals” to develop new courses. Consider joint sabbaticals to develop ideas
- Include examples in undergrad. and intro. classes that show how physics, chemistry, math, engineering, and biology are put into practice when dealing with current issues
- Implement flexible course requirements for grad students to fill knowledge gaps to undertake convergent projects and/or ability to name and shape their degrees

## Larger Budget Implications

- Initiate or expand institutional seed funding programs
- Provide institutional resources to bridge cost-sharing differences across schools
- Establish convergence-focused centers/institutes
  - Role of professional project management staff for complex collabs.
- Design or re-design buildings to maximize interactions
  - Concept of “pathway overlap”
  - Consider roles of shared core facilities

A web of faculty interactions has been created by Bio-X, Stanford University. Courtesy of Daniel McFarland, Stanford.

