Interdisciplinarity in Uncertain Times: Research Centers

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The Interdisciplinarity Advantage

Evolving research problems are complex, we therefore need experts and tools from multiple fields. Surprisingly, we take for granted that carpenters, plumbers, electricians, and others work together to build houses (would you make an offer on a house that was built solely by a team of plumbers?), but our existing research structure remains highly compartmentalized and we seem insecure and somewhat inept in promoting interdisciplinarity. The simple fact remains – interdisciplinary approaches allow disruptive leaps forward, rather than incremental steps. They allow more complete solutions to the world’s complex problems. Interdisciplinary centers, if built thoughtfully, provide a means to realizing complete solutions.

The Challenges of Interdisciplinarity

The barriers to interdisciplinarity in a university setting are many. The typical university is configured in units and units naturally promote territorialism. Each unit has unit specific goals, and the unit leaders and members are generally quite familiar with the goals and the rewards system. Therefore, those activities not captured within goals or rewards are generally given significantly lower to no attention. Additionally, infrastructure is built to support the unit goals. Each unit, for example, has service infrastructure (e.g., human resources, sponsored programs, etc.), so creating initiatives that span units leads to logistical issues of knowing which service units to access and how those units will handle additional workload. The perceived incentives for faculty members to participate in interdisciplinary research is low. Tenure and promotion is discipline specific, while economic development and intellectual property is not uniformly valued across a university. Interdisciplinary units are inherently more difficult to manage, for a variety of reasons, and a high university investment is required. Importantly, the return on investment is ill-defined and, although potentially extremely high, very difficult to quantitate.

Interdisciplinary is a great buzzword, but is an exceedingly difficult activity to manage. The National Academies (2014) has released many position papers promoting and outlining the concept and has provided compelling rationale for striving to achieve interdisciplinarity. Indeed, according to Popper (1963) “we are not students of some subject matter, but students of problems. And problems may cut right across the borders of any subject matter or discipline”. A series of discipline related buzzwords has emerged over the years. Multi-disciplinary, for example, is a con-
vergence of people and ideas for a de-

fined amount of time, with generally no

long-term impact. That is, upon removal

of the impetus for the multi-discipli-

narity, the participants return to their dis-

ciplines. Interdisciplinarity, however, is

the convergence of multiple disciplines

that results in longer term effects. That is,

each participating discipline is richer for

the experience and gains in some tangible

manner. In this instance, there are

marked effects on the participating disci-

plines. Transdisciplinary is a melded dis-

cipline; the participating disciplines con-

tribute to the creation of a new,

standalone discipline.

Considerations in Purposefully

Building Interdisciplinarity

The needs of an interdisciplinary

center that is not located in a college or
department are unique. Points to con-

sider include the physical and budgetary

location, the budget and deliverables, the

academic review process in place, the

staffing necessary from the unit or from

the university, the focus on student par-

ticipation (as students are centric to the

university mission), and the realities of

faculty involvement. A center generally

spans university units and provides a col-

laboratory and infrastructure for team-

based work. The ideal center relies on a

core of permanent research faculty, ra-

ther than building on the talents of ten-

ured or tenure track faculty, who gener-

ally have multiple responsibilities be-

yond the bounds of the center. Research

center faculty are 100% dedicated to research,
yet they can connect with tenure/tenure-

track faculty who are dedicated to teach-
ing, research, service. Research faculty

provide an environment which is indus-

try friendly – particularly with respect to
goals, deliverables, and metrics - they

also provide a student friendly environ-

ment – i.e. training of students in a real

world, collaborative environment.

There are several classic structural

problems, specific to centers. First, simple

use of the term interdisciplinary does not

guarantee interdisciplinarity. Seeding

money for cross-disciplinary interactions

in the foreground does not ensure inter-

disciplinarity in the long-term; typically,
once the money disappears so do the par-

ticipants. Often, research groups are not

cohesive and do not tackle well-defined

problems. Research administrators often

define a list of people and disciplines,

with little regard to the research problem

or to the potential for integration of these

individual efforts. The accounting for in-
direct returns, proposals submitted, etc.
cannot stimulate competition with de-

partments or the center will not survive.

Often there is lack of administrative sup-

port units such as human resources or

sponsored programs. There is a myth of

self-sufficiency; nationally, very few in-

stitutes or centers realize complete self-
sufficiency. This is typically due to an un-

realistic view of return on investment and

lack of a business plan. Often the center

lacks a unified and unifying problem def-

initions and project directions.

The center is, in effect, a flexible
clearinghouse. The institute or center

must be independent from but comple-

mentary to departments and should

serve as a hiring draw for departments

(due to the ready-made collaborators and

infrastructure). A permanent director is

responsible for marketing and direction.
Longer-term stability is provided by the appointment of permanent research faculty members as the core. In contrast, tenured and tenure-track faculty are involved as dictated by the scientific needs of projects and investigator availability. It has been shown that a flexible and dynamic participation model of this type provides benefits. According to Rhoten, “Researchers who felt free to enter and exit collaborative relationships reported more progress with their interdisciplinary projects and greater satisfaction in their professional lives overall”.

**Budget and Deliverables**

Many centers and institutes are developed on the enthusiasm of the technical experts and without in-depth attention to the financials. Hence, a business plan must be developed with contributions from finance and technical personnel. A focused mission statement should provide the “filter” for investment in future projects. A realistic return on investment should be identified, along with a self-sufficiency plan and related metrics. Annual and multi-year reviews should be defined, along with assessment plans and goal setting exercises. The unit will need mavens, connectors, and salespersons (M. Gladwell, 2000). That is, needed are individuals with great expertise in the discipline but high critical thinking skills, individuals with ability to connect, and individuals with ability to communicate the value of the center. Generally center connectors include industry and education liaisons, while mavens include human resources and sponsored programs personnel. Highly functional centers incorporate research personnel with respect to technical diversity.

**Rewards System Overhaul**

There are several important reward concerns. In particular, effort toward and participation in a center must be recognized by tenure/promotion committees. Rewards are based on output; common output includes congressional testimonies, public policy initiatives, popular media, or product development. Center research tends to lend to multiple author publications, which incorporate different perspectives from different disciplines. Letters of support from collaborators, defining the critical role of a center researcher, can be vital to the tenure and promotion process.

**Center Impact**

Center education and training impact may be monitored by a count of new “languages”, number of disciplines, performance in courses and retention, as well as student participation in research programs. Research metrics may be monitored by a count of publications, presentations, and intellectual property development. The metrics should be meaningful – for example, the number of disclosures filed may suggest positive impact; however, licensing is probably a more meaningful measure of translation and impact. It may be possible to identify short-term, high return intellectual property opportunities to support the broader center mission.

Thus, the described interdisciplinary center model is industry friendly, major government initiative friendly, and student friendly. Center research faculty complement departmental unit foci and provide stability. When based on existing collaboratives a center provides a rich training environment. Most importantly,
the center provides a microenvironment where the disciplines gain independently and collectively.

References:
Facilitating Interdisciplinary Research, National Academies, National Academies Press, 2014