INTERDISCIPLINARY EDUCATION AND RESEARCH AT THE UNVIERSITY OF ALASKA FAIRBANKS: PROSPECTS AND CHALLENGES

Report of the Faculty Senate Task Force on Interdisciplinary Studies

November 17, 2013

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EXECUTIVE SUMMARY

Interdisciplinary research and education are increasingly important in meeting contemporary challenges of society, offering opportunities for new discoveries, forms of dialogue, and problem solving. In response to the need for greater interdisciplinary activities, universities around the world are mobilizing resources and initiating bold institutional change to create and grow new innovative programs that transcend and integrate across conventional disciplinary boundaries. These research and education programs, however, often confront considerable challenges in their establishment and development. At the University of Alaska Fairbanks interdisciplinary efforts and initiatives have a long history, but for the most part they have received limited institutional support at best, and have emerged synergistically through self-organized faculty and student initiatives. Our task force was directed by the UAF Faculty Senate to explore the issue of how to advance interdisciplinary research and education at UAF, and to identify barriers that impede their development. Barriers were identified at three levels and include, but are not necessarily limited to:

Institutional & Administrative Level

- Limited institutional frameworks that support interdisciplinary research and education;
- "Bean Counting" allocation of resources and "credits;"

- Students who have co-advisors or committee members from different units that are only counted for "primary" unit. Co-advising students that are housed in different units, or for serving on INDS committees are discouraged by some department heads or deans, ostensibly because of workload issues as defined by the Union and the statewide administration;
- Space (offices, labs) is allocated primarily to faculty / staff who are clearly situated within one disciplinary unit rather than for faculty who work in interdisciplinary teams and/or thematically clustered groups;
- Academic units "fighting" over revenue distribution based on student tuition because of an archaic statewide accounting system;
- Units "fighting" over overhead revenue from externally funded grants generated by faculty with joint appointments. Overhead typically goes to the one unit through which proposal is submitted, and to the unit within which the PI is situated, or within which the PI tenure line is positioned;
- Deans / directors giving more recognition to faculty engaged in disciplinary research rather than to those who work on interdisciplinary problems, and/or who teach interdisciplinary courses, whether graduate or undergraduate.
- Graduate and undergraduate programs jointly introduced by more than one unit can only count for one unit.

Faculty Level

- Disincentives, and in some cases even penalties for faculty engaging in interdisciplinary scholarship, especially when facing tenure and promotion, and when evaluated primarily by "rank and file" disciplinarians;
- Evaluation of files for promotion, tenure, annual reports, etc., from faculty with joined-appointments may be biased if some activities of faculty do not directly benefit the unit of the dean/director evaluating files. Other contributing units may not have an equal say in evaluating files. The current system is flawed, is not on par with other universities who are working at the cutting edge of interdisciplinary research, and works at cross -purposes with the increased capacity of UAF to offer a genuine, strongly institutionalized interdisciplinary education.
- Cross-listed classes count for the departments of students registered for class, irrespective of which department the instructor belongs. This is a disincentive for teaching cross-listed classes.

Student Level

- Limited funding support for graduate students pursuing Interdisciplinary (INDS) degrees;
- A requirement that expects INDS degree applicants to have fully formed research proposals before being accepted into the program;

- The privileging of disciplinary students over INDS graduate students by some deans, directors, departments and department heads when competing for departmental funding support (e.g., TAs, travel grants, scholarships) from "home" departments, even though INDS students are counted by the unit in the current merit funding system.
- Interdisciplinary feeling "lost" because they do not belong to a certain peer group.
- The hesitation of students to apply for INDS programs, due to lack of knowledge and requirement to prepare an acceptable Graduate Study Plan, to assemble a functional committee, and to write a research proposal as part of application, and prior to acceptance or rejection. Interdisciplinary research and education is iterative, emergent, and the present system discourages rather than encourages the cross pollination of experience, ideas and communication across disciplines and programs.

UAF has several active and growing interdisciplinary research and education programs. Other universities provide several models for fostering interdisciplinary scholarship. How then should UAF advance such programs? Based on the task force's findings, we provide the following recommendations for strengthening interdisciplinary research and education at UAF:

- The administration should actively contribute to the growth and development of interdisciplinary research and education by formally encouraging such activities, shaping the "culture" of UAF to reward such efforts, and creating a functional institutional framework for interdisciplinarity within UAF, and at the statewide administrative levels.
- Promote "cluster hires" and shared faculty workloads, with this model working to organize faculty from multiple disciplines around critical problem areas of societal relevance, problems coupled with educational and research areas that are recognized and rewarded by external funding agencies. The "cluster hire" model is working well at many other universities, and in fact, is becoming the paradigm of choice at many.
- The Tenure and Promotion process and protocol needs to be revisited, reconsidered, and probably reconfigured to support and encourage interdisciplinary activities.
- Tenure and review committees for joint appointments should include faculty members from both appointment areas (not just the academic home), in order to appropriately evaluate the faculty member's interdisciplinary academic performance.
- Acceptance criteria for the INDS graduate programs should consider postponing the full thesis proposal until after the student has formulated his or her research ideas.
- We recommend that a "Faculty of INDS Graduate Studies" be established, so participating faculty receive greater recognition on workloads and in promotion and review processes, so that faculty can work more effectively in

interdisciplinary teams to secure peer-reviewed external funding, to develop and promote interdisciplinary curriculum development, and to increase student enrollment and retention at both the undergraduate and graduate levels.

Ultimately, achieving the growth and development of interdisciplinary research and education at UAF will require one or more new administrative structures that promote "cluster hires" and shared faculty workloads, organizes faculty from multiple disciplines around critical problem areas of societal relevance that are recognized and rewarded by external funding agencies.

INTRODUCTION AND BACKGROUND

The Task Force on Interdisciplinary Studies at the University of Alaska Fairbanks convened in February, 2013 at the request of Faculty Senate President, Jennifer Reynolds, and President-Elect, David Valentine. The committee was tasked with identifying existing problems, barriers, and constraints in the way that interdisciplinary studies at the University of Alaska Fairbanks (UAF) are organized and implemented. Using key findings from this report, the faculty senate is to target new ways of fostering cross campus faculty collaboration and finding more effective ways to create an institutional environment and "culture" that will help rather than hinder the progress of interdisciplinary research and education. This report is a compilation of several weeks of reflection and discussion by committee members. While the report does not necessarily reflect consensus of the committee, it does reflect the opinion of active committee members.

Definitions are an important starting point since there is considerable ambiguity by what is meant by the term interdisciplinary. Following from the 2004 National Academy of Sciences Task force on the subject, we define interdisciplinary as *"a mode of research [or learning] undertaken by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice."* Terms such as "transdisciplinary", "multi-disciplinary", and "pan-disciplinary" are often used in similar ways. The nuanced differences in these definitions will not be addressed here, and the application of interdisciplinary efforts depends on orientation of researchers or learner, context, problem, and institution.

Based on the directive received from the faculty senate, our committee worked from the belief that UAF should embrace and encourage interdisciplinary education and research. Our task was therefore to identify institutional conditions that would hinder and/or foster an environment in which there would be greater a cross-pollination through the interaction of faculties, units, and programs, engaging in thematically related problem areas that makes strategic and effective use of multiple and functionally integrated analytical tools, methods and techniques.

The pursuit of interdisciplinary research and education has the potential to contribute to society in critically important ways by generating new discoveries, creating important dialogue and knowledge transfer, and by providing insights into contemporary societal challenges. The significance of interdisciplinary research and education is situated in the axiom that complex problems require complex solutions and systems level thinking, and that the problems and solutions of societal relevance can no longer be solved by any specific discipline that operates in isolation. It should be noted that the goal of advancing interdisciplinary activities at UAF is NOT a plea to ignore the power of individual disciplines to positively contribute to such problems. Indeed, the contributions of

disciplinary science and education are critical as they often serve as the basic foundations for interdisciplinary endeavors. The effort here is simply to meet a real and growing need at the university, state, and societal levels.

Today's need for interdisciplinary research and education at UAF is the result of several conditions. These include:

- A new internal administrative awareness at the University of Alaska about the importance of interdisciplinary scholarship;
- New federal and state funding initiatives that require interdisciplinary approaches to research;
- Governmental and industry needs for creative and innovative thinkers who can span disciplinary perspectives to provide robust solutions to real-world problems;
- A rapidly growing student interest, even student demand, for interdisciplinary undergraduate and graduate education and research programs;
- An emerging national mandate for interdisciplinary research and education.

The demand for interdisciplinarity is clearly reflected today in the growing number of well-funded and subscribed interdisciplinary graduate programs across the globe, with many new, innovative and creative interdisciplinary initiatives in place or being developed. While at face value the demand for a new interdisciplinary framework at UAF reflects grassroots interest among faculty and students, the need is, in part, driven from a broader scale.

As evidenced from the findings of this committee, the University of Alaska Fairbanks is moving slowly but positively toward improved ways of structuring interdisciplinary education and research. In spite of this progress, there are still too many barriers and constraints for a functionally integrated framework to emerge, a framework that will reward rather than implicitly if not explicitly penalize students, faculty, and administrators for engagement in interdisciplinary activities.

In the sections below, we report on how interdisciplinary research and education at UAF have evolved both "piece-meal" and organically, and provide examples of how other universities are reorganizing around interdisciplinary themes. These descriptions help us identify barriers to the advancement of interdisciplinary research and education at UAF and lead to recommendations for the future development of interdisciplinary scholarship at UAF.

INTERDISCIPLINARY DEGREE PROGRAMS AT UAF

History of Interdisciplinary Programs at UAF

Interdisciplinary studies at UAF are not a recent phenomenon. For example the research of Professor Lawrence Irving (biologist and founder of the Institute of Arctic Biology) regularly explored human dimensions of the natural world, such as his 1958 paper "Naming Birds as Part

of the Intellectual Culture of Indians at Old Crow, Yukon Territory." Anthropologists at UAF also have a long history of addressing problems through an interdisciplinary lens, such as examining human-environment interactions through the subfield of cultural ecology and archeology. Other fields, such as engineering and the study of Alaska's energy needs, also have included interdisciplinary elements. Funding for several interdisciplinary research projects have been granted to UAF through the decades, and since in the early 1990's, requirements for interdisciplinary approaches have been made explicit by several key funding agencies. For example the National Science Foundation's first effort to consider the human dimensions of arctic climate change was through a large grant funded to UAF and UAA as co-leads of the project, "The Sustainability of Arctic Communities." The North by 2020 initiative as part of IPY represents a more recent effort to promote interdisciplinary research at UAF. Courses have also long spanned the disciplinary boundaries, but have often been offered as special topics courses rather than as part of a formal, required curriculum. These creative activities have taken place more as novelties on the margin of mainstream university research and education, than they have as mainstream initiatives.

The Interdisciplinary Degree Program (INDS) was formally initiated in the 1960's with Board of Regents approval for the University of Alaska Fairbanks to award graduate degrees through a formally institutionalized venue; the first officially recognized PhD at UAF was with a degree awarded in Geophysics. Records show that the first undergraduate INDS degree was awarded in 1975, and since that year, 249 undergraduate students have received degrees in topics ranging from Cross-Cultural Media Studies, Exercise Science, to Peace Arts. Since 1981, about 331 graduate INDS degrees have been awarded, in a similar broad set of subject areas. In other cases, interdisciplinary research has been successfully undertaken as part of disciplinary degree programs.

With the passage of time, thematically, but informally organized clusters of interdisciplinary studies emerged in the geophysical, marine and biological sciences. As the university grew over subsequent decades, these informal clusters evolved into more broadly defined PhD programs, but these programs lacked then, as they lack now, a reliable funding stream and consequently have come and gone, operating as they have been forced to largely outside the rewards and incentives of the statewide accounting system. The current INDS degree program is administratively situated in the Graduate School. Several degree granting units that have a topic focused orientation, such as Northern Studies, Rural Development and Alaska Natives, and Natural Resource Management, can also be considered interdisciplinary. Hybrid programs (interdisciplinary but not degree granting) have also been created, such as the Resilience and Adaptation Program. Student enrollment in such programs is growing.

Most recently, interdisciplinary research has emerged as central activities in several research units, such as the Center for Alaska Native Health Research, the Scenarios for Alaska Planning, EPSCoR 3, and the Bonanza Creek LTER. These research and education programs, although limited in number, have served many faculty and students well, and their activities support the general mission of the university by facilitating scholarship, supporting young-to-senior scholars conducting research that is broadly scoped across cross disciplinary boundaries. Today several UAF faculty members are

internationally recognized for their efforts in the area of interdisciplinary research. However, the number of faculty with skills for designing and leading interdisciplinary research is limited. Moreover, these achievements have occurred because of efforts that are mostly self-organized by faculty working with no formal, well institutionalized framework that provides incentives and rewards for such work.

Based on the findings of this task force, we believe that the UAF administration could contribute tremendously to the growth and development of interdisciplinary research and education by actively and formally encouraging such activities by students and faculty, and by creating a functional institutional framework within UAF and at the statewide administrative level. Given national and international interests in interdisciplinary research and education, failure to move forward in this area may be reflected in lower enrollments, the loss of valuable faculty members and qualified students who choose more creative and forward looking educational institutions, and potentially in the loss of funding streams through externally funded grants (e.g., NSF, NOAA, USDA, etc.) that now require interdisciplinary elements. Continued failure to move forward, to move out of a mid 20th century academic model, may also have an impact on high quality faculty retention as well.

In the sections below we describe several interdisciplinary research and education programs at UAF and other institutions, which support the identification of barriers and the recommendations listed at the beginning of this report.

Existing Interdisciplinary Research and Education at UAF

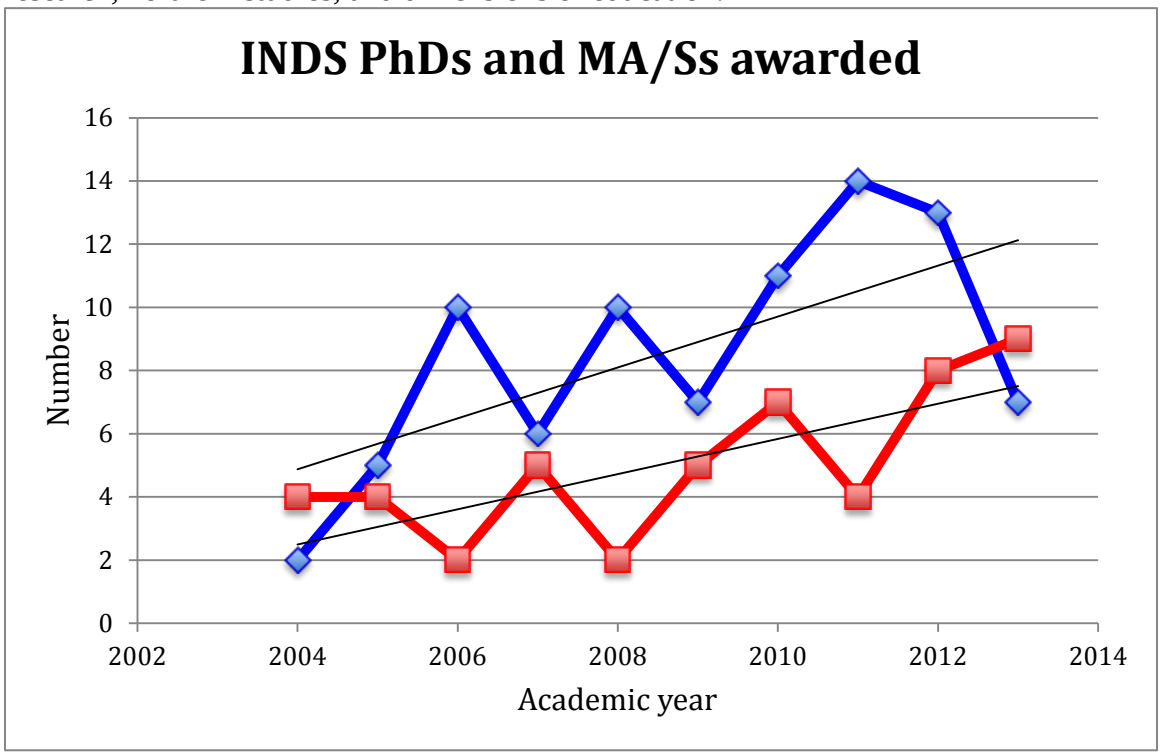
Undergraduate Studies

The conventional wisdom of an undergraduate liberal arts education is that students should develop skill and depth of knowledge in specific areas. At UAF several important programs have successfully departed from this paradigm by developing degree programs focused on problem or topic areas. These include: Northern Studies; Rural Development; Alaska Native Studies; Natural Resource Management; Women's & Gender Studies; Global Studies, and General Science (offered through the undergrad INDS program). Other programs, such as the UAF Honors Program, have focused on interdisciplinary themes (i.e., sustainability) as a complement to students' regular degree programs. Many special topics courses have been offered as well, such as "Land and Environment' which was team taught over four years between Political Science, Biochemistry and Marine Sciences. Some of these courses have also been stacked with undergraduate and graduate students, well subscribed, and drawn many non-enrollees as observers (e.g., Biology's "Climate Change Seminar"). Most recently, UARCTIC courses have been created that span disciplines to address specific problem areas related to the North. The demand for interdisciplinary degree programs is increasing, as is evidenced in the number of students graduating with the INDS Undergraduate degree.

Interdisciplinary Graduate Program Mission and Practices at UAF

UAF currently offers interdisciplinary (INDS) graduate programs at the MS and PhD levels, programs that are intended for students whose research does not specifically fit graduate programs offered by specific disciplines. The primary mission of the Interdisciplinary Master's and PhD programs is (1) to provide opportunities for quality graduate education through student and faculty collaboration in research, educational and scholarly activities; (2) to create opportunities for students and faculty to work conceptually and pragmatically across disciplines; and (3) more realistically, the existing INDS program works well for disciplines that do not have a formal graduate program, but that clearly do have interest in and access to the necessary interdisciplinary expertise for successful completion of an INDS graduate degree, with this coupled with a strong student interest in interdisciplinary research and education.

Overall INDS graduate enrollment increased from 53 students in fall, 2004, to 108 in spring 2010, with a PhD/MS student ratio of approx. 3.5:1. Records show that the increase in INDS graduate students is greater than the overall increase in total number of graduate students at UAF. Thesis projects often fall within clusters of topic areas, such as social-ecological systems research, northern studies, and dimensions of education.



Blue = PhD; red = MA/S (source: 2013 Graduate School Draft Report)

Recent program reviews show that over half of the UAF faculty members are now or have in the past successfully comprised INDS graduate committees, and that program quality is equal to or in some cases greater than what is expected of disciplinary PhD degrees. These committee members are either UAF faculty and/or scholars from other

institutions who are widely recognized for their expertise. Committee chairs, however, must be tenured or tenure-track faculty at the UAF. An INDS student has a formal "home department," in the academic unit within which the faculty advisor, the committee chair, is situated. Students are counted in the committee chair's unit for evaluation of program productivity, but are not formally counted by "Statewide" in the Interdisciplinary Program.

It is noteworthy that while a single unit receives "credit" for serving as the home of the INDS student, in some cases these students are considered a lower priority for TA funding through their home department (e.g., Biology Department). We therefore recommend that the second-class standing of students seeking funding from their home departments be modified so that they compete with other students of that department on the basis of merit and not by virtue of their disciplinary allegiance. This recommendation follows from the belief that that if a department is to receive student "credit" it should provide those students with equal opportunities and support.

The current INDS paradigm for graduate studies at UAF is based on student-driven initiatives, with the major advisor and faculty who have the appropriate expertise in a proposed research project forming the student's committee, regardless of departmental or college affiliation. In practice the INDS graduate degree requires greater engagement and collaboration among faculty committee members, which differs from conventional models of one student working closely with one advisor throughout the PhD research experience. Established standards in the Graduate School help students prepare an application and Graduate Study Plan, one that is reviewed and accepted or rejected by an Interdisciplinary Review Committee that is comprised of faculty from multiple disciplines prior to matriculation and acceptance. All applications and proposed study plans are reviewed by the Graduate Student Admission Committee, with a recommendation to accept or reject forwarded for final approval to the Dean of the Graduate School. Students must have institutionally recognized Masters degrees from this or another university to be accepted into the INDS PhD program at UAF.

Our review suggests that while the INDS Masters program is underdeveloped, it has considerable potential for growth and development. Finally, we recommend that the idea of creating a "Faculty of INDS Graduate Studies" be considered, so participating faculty receive greater recognition on workloads and in promotion and review processes.

Admission to INDS graduate studies requires a well-defined research prospectus and a graduate study plan approved by the proposed committee, the larger INDS committee, and the Dean of the Graduate School. These requirements go beyond what is typically required for admission to discipline-specific graduate programs. On the one hand, this places a burden on applicants, especially if they are from out of state and have difficulty identifying suitable committee members. On the other hand, this means that INDS graduate students are typically better prepared when they enter their programs. New approaches that allow students to enter and then "find their feet" may expand students enrollment numbers and allow students the flexibility to experiment, create, and innovate.

While intended for truly interdisciplinary projects, the INDS PhD program also serves as a placeholder for disciplines where there are no specific graduate programs available (e.g., Education). In several cases, the INDS program has served as an "incubator" for emerging degree programs, while specific graduate programs are being established (which can take years) such as the PhD in Indigenous Studies or the PhD in Engineering. This means that not all INDS graduate students necessarily pursue truly interdisciplinary research; some projects are interdisciplinary in name only, simply because no alternative program exists. During 2004-2010, the largest number of INDS PhD students was associated with CLA, followed by CNSM, SNRAS and the SoE (there is a Synthesis Report available for review in the Graduate School).

In some cases, students who have applied to the INDS program would fit well enough within a specific existing PhD program, raising the question as to whether or not applicants have sought to avoid the restrictive standards imposed by existing programs; in some cases prospective students who apply to the INDS Program may actually have been denied acceptance by discipline-specific admissions committees. A mechanism could easily be put into place to avoid a problem of the perceived and/or real "double-standard," but it is important to note that there are also more students who apply to the INDS Program with legitimate interdisciplinary interests than there are students who are applicant "refugees" from existing departments and programs, and this is becoming increasingly the case as the educational and research landscape is changing nationally and internationally.

The current INDS program provides for much flexibility due to its broad scope. For example, there is no minimum number of required courses, there is no specified time period required for degree completion beyond that required by the Graduate School and the university, nor, while technically required, is there an enforced residency requirement at UAF, with the latter considered a problem by the INDS Faculty Senate Committee. In a number of instances, PhD level graduate study plans with less than 3 years overall duration have been approved, sometimes even for candidates that worked full time elsewhere while pursuing their PhD, and this raises questions for some faculty about academic standards and quality of the educational experience and product. The existing INDS model further creates the danger that the program could be abused since it leaves virtually all programmatic academic and research decisions up to the students committee. To avoid this, it is advisable to introduce standards based on an average of other disciplines, rather than the lowest common denominator. Examples of such additional requirements could be provided, although we suggest flexibility and a critical review of requirements by both the Faculty Senate and the Graduate School.

Examples of Interdisciplinary Collaborations at UAF

Several interdisciplinary research programs at UAF have been or are now proving to be highly successful, and in combination, provide helpful insights into ways to move forward with interdisciplinary research and education. These are described below. We could, but do not specifically describe the Bonanza Creek Long-Term Ecological Research program (BNZ-LTER), the Center for Alaska Native Health Research

(CANHR), and the Northern Studies Masters Program as additional excellent examples that cross-cut disciplinary boundaries, each with a different set of objectives, mission and mandates. With the hope that UA administrators will find creative ways to move interdisciplinary research and education forward, the following serve as good models to review.

Water and Environmental Research Center (WERC)

The Water and Environmental Research Center (WERC) is a UAF research institute with faculty members from a broad range of disciplines (Anthropology, Biology, Civil Engineering, Ecology, Environmental Engineering, Environmental Studies, Hydrology), with some holding joint appointments with other entities such Alaska Center for Climate Assessment and Policy, Civil and Environmental Engineering, Cross Cultural Studies, Fisheries and Oceanic Sciences and IARC.

The primary mission of the Water and Environmental Research Center is to perform basic and applied research related to water and environmental resources, to train graduate students at master's and PhD levels in this field, and to disseminate pertinent research information to the public. While arguably best known for field-research on Alaskan hydrology and climate change, WERC research spans a broad range of topics including fish habitats, permafrost, contaminated soil remediation, watershed modeling, glaciology, subsurface contaminant transport, methane emissions, sediment transport, food security and water/wastewater treatment. Weekly seminars, with presentations by graduate students who are enrolled in different programs (MS Civil Engineering, MS Environmental Engineering, MS Environmental Quality Science, MS INDS, PhD Engineering, PhD INDS) foster community and cohort spirit and collaboration. The Water and Environmental Research is interdisciplinary by definition and practice, while the various affiliated engineering programs largely remain tied to their current disciplinary vision, for good reasons in some cases as their first obligation is to serve the educational and certification needs of engineering students.

Indigenous Studies Model for Shared Faculty Workloads

Prior to 2009, the only option for pursuing a PhD in most academic areas related to the study of Indigenous Knowledge Systems at UAF was the Interdisciplinary Studies PhD, though few Alaska Natives were choosing to pursue this option. Most of the departments related and relevant to this topic area did not and still do not have the capacity to offer a departmentally based “stand alone” doctoral program.

Following from a survey that identified over 100 Alaska Natives who had completed a Masters degree program and had expressed interest in pursuing a PhD with an Indigenous Studies emphasis, faculty members from several departments/colleges/schools began to form an informal alliance around academic subjects related to Indigenous Knowledge Systems. Over a period of two years, faculty members from CRCD/RD, SOE, CLA and RAP/NRM assembled to form an interdisciplinary PhD program that cut across academic units and provided a set of core courses with an Indigenous Knowledge focus, along with

six specialty emphasis areas focusing on Indigenous Knowledge Systems, Indigenous Language, Indigenous Research and Native Ways of Knowing, Indigenous Leadership, Indigenous Education, and Indigenous Sustainability.

The Indigenous Studies PhD program was approved by the Faculty Senate and the Board of Regents in 2009, is now administered through the Center for Cross-Cultural and Indigenous Studies and the Graduate School, and has associated faculty with interest in one or another of the above emphases contributing workload time and expertise drawn from all the participating academic units. Currently there are 34 PhD and 20 masters students enrolled in the program cutting across all six emphasis areas. In 2012 additional funds were obtained through a legislative appropriation to establish four additional faculty and staff positions in support of the program through the Center for Cross-Cultural and Indigenous Studies; this legislative appropriation and mandate must be recognized and honored by the new Dean of the College of Liberal Arts, by the Provost and other administrators in order to fulfill the obligations of the appropriation, and, more importantly to ensure a full complement of faculty in the program and to foster program quality. This model for cross-disciplinary programs provides a flexible means to offer academic options across units that share common interests but otherwise are likely to have insufficient students, faculty and resources to offer a program on their own, and is a model that could easily be adopted across campus to facilitate interdisciplinary research and education.

The Resilience and Adaptation Program (RAP)

RAP provides another good model for interdisciplinary graduate studies in Sustainability Science. Since its establishment in 2002, the Resilience and Adaptation Program has proven to be a highly innovative effort of UAF to foster cross-campus collaboration in interdisciplinary graduate studies. The program was funded initially through two "soft money" five-year NSF IGERT (Integrated Graduate Education Research Traineeship) grants, the first funded for $2.8 million and the second for $3.2 million.

The RAP curriculum provides training at the Masters and PhD levels in integrating social and natural science around the concepts of resilience, vulnerability, adaptation, and transformation at the community, regional and statewide levels. A systems approach to problem definition, analysis, and solutions is a central tenant of the curriculum. Students of RAP take their graduate degrees in existing programs of UAF and come together as a cohort for a common set of four core courses (8 credit hours total). Students also participate in internships that broaden disciplinary and interdisciplinary perspectives, and are co-located in offices in order to keep them together as a group for cross-disciplinary cohort learning.

Over eighty RAP students have participated in the program, and more than forty have graduated and successfully moved into university, academic research institutions, non-profit and state and federal agency organizations. Over 40 UAF faculty members from CLA, CNSM, SFOS, SNRAS, SOM, SNRAS, SoE, with at least 9 home departments have been involved, and have served as major advisors. In addition to graduating students,

the program has served to stimulate many new interdisciplinary research collaborations among UAF faculty, contributing to the establishment of the Scenarios for Alaska Network Planning (SNAP) and the Alaska Center for Alaska Center for Climate Center Assessment and Policy (ACCAP). The program also resulted in a graduate-level textbook that has been used both in the first-year core class and by faculty at other institutions.

In 2012, RAP received continuing base funding of $300,000 per year through an AK State Legislature appropriation. The success of RAP can be attributed to several design features:

- Participating departments had a sense of ownership of the program
- Department's students were funded by the program,
- RAP courses were cross-listed by all participating departments,
- No effort was made to create an entity that competed with schools/colleges and institutes.
- Most core courses were co-instructed with a social and natural scientist,
- All student committees had at least one natural and one social scientist,
- The program was co-directed by a natural and social scientist with experience in interdisciplinary inquiry,
- Student research was typically policy-relevant, addressing issues critical to Alaska's future,
- The program achieved international recognition through numerous student and faculty publications and the projects of students,
- The program's high level of fellowship support ($30,000/year) helped to attract high-quality student applications and achieve scholarly achievement.

Marine Ecosystem Sustainability in the Arctic and Subarctic (MESAS)

The UAF MESAS program was created to educate future leaders in ecosystem-based management and sustainable use of living marine resources and is currently funding PhD students through a grant from the NSF (IGERT) and MS students through the NSF Science Masters Program.

This interdisciplinary graduate program provides broad training that crosses the disciplines of Anthropology, Ecology, Economics, Fisheries Science, Management, Marine Policy and Oceanography. MESAS acknowledges that traditional graduate education is not broad enough for an ecosystem-based approach, and that, in particular, training that crosses the large divide between natural and social sciences is needed. UAF Faculty from the School of Fisheries and Ocean Sciences, the College of Liberal Arts, the Geophysical Institute, the School of Natural Resources and Agricultural Sciences, and the School of Management participate in the program. The program involves 30 graduate students working towards degrees in Fisheries, Marine Biology, Oceanography, Indigenous Studies, and Natural Resources and Sustainability. Graduate students engage

in coursework, internships and thesis research that transcend disciplinary boundaries in new and innovative ways.

PhD Degree in Sustainability and Natural Resources through SNRAS and SOM

The NRS PhD program is a joint effort of the SNRAS and SOM, established in 2009. The program was created with the intent of leveraging the existing resources, without additional budgetary requirements. This leveraging includes a pool of participating faculty with expertise in the social and natural sciences, and in public policy development. It is distinguished from other UAF programs through the emphasis on research and education of natural resource issues specific to Alaska. The program is organized thematically and in an interdisciplinary ways, with emphasis on: (1) resource economics; (2) resource policy and sustainability science; and (3) forest and agricultural sciences. A limiting factor, however, is a consistent funding stream to support graduate student education, and to enhance program development.

Students are encouraged to cross the thematic areas, and/or to select courses in related disciplines. The multi- and interdisciplinary focus of the program allows for students to have a broad base of academic experience and expertise from which to draw. Student interest has been strong from the inception of the program. With the exception of economics, there is no Fund 1 money for research assistantships or program development dedicated to this program. Despite the funding limitations, student numbers have consistently ranged from 12 to 15 over the last three years.

OTHER UNIVERSITIES, OTHER MODELS

Universities across the country are in various stages of creating new and innovative interdisciplinary programs for both research and undergraduates' and graduates' education. Given the purpose of our report, these examples provide insights into others' experience and thus provide a road map for linking interdisciplinary ambitions to action. As demonstrated from these examples universities that have successfully transitioned to strong interdisciplinary efforts have attracted a greater number of externally funded research grants and contracts, as well as a greater number of high quality graduate students who apply and actually matriculate.

<u>Interdisciplinary Cluster Hires Model at the University of Hawai`i Manoa</u>

The University of Hawai`i Manoa introduced a cluster hire initiative as a new and innovative way to grow and nurture interdisciplinary relationships across the colleges and schools engaged with Native Hawaiian programs and services at UHM. Every new faculty appointment becomes part of an ohana (family) and contributes to growing the expertise and skill base of the Hawai'inuiākea School of Hawaiian Knowledge, and contributes to the growth and embedding of Hawaiian knowledge throughout the UHM system. This initiative has the potential for Native Hawaiian and non-Hawaiian scholars

with a Hawaiian orientation to positively contribute to the expansion of new knowledge at UHM.

The Chancellor's Office at the University of Hawaii Manoa initiated the "Cluster Hire Innovative Program" that has now added ten new Native Hawaiian hires, and one First Nations faculty member from Canada, faculty in much needed and specifically targeted areas across the campus. This innovative program has filled many of the gaps in schools and colleges across campus that will greatly benefit from the presence of Native Hawaiian faculty. Faculty are appointed to a cluster hire position on a 25% or 75% assignment in a participating college or school, with 75% workload appointments determining the primary home department of the faculty member. A 25% workload assignment in a department establishes the faculty member with an affiliate appointment in the cluster.

The Interdisciplinary Cluster Hire Model has been adopted and is being implemented at other universities across the U.S. and Canada, although with varying themes and place-based iterations. The model is portable, transferable, can be organized and implemented in different ways and through different academic contexts, and is thus relevant to the University of Alaska Fairbanks as we work towards new ways of institutionalizing interdisciplinary research and education.

Academy for Advanced Interdisciplinary Studies, Peking University

At Peking University, interdisciplinary studies are organized under a single "academy" or institute, established in 2006. Its mission is to 1) promote interdisciplinary communication among faculty from different departments or colleges; 2) provide a support infrastructure that will facilitate collaboration on interdisciplinary research projects; and 3) train graduate students with interdisciplinary knowledge. Under its umbrella eight, cross-cutting thematic centers are located, including

- Center for BioMed-X Research,
- Center for Theoretical Biology,
- Center for Functional Imaging,
- Center for Nanoscale Science and Technology,
- Center for Environment and Health
- Center for History and Philosophy of Science
- Center for Ocean Science
- Center for Environment and Health

The advantage of this model is in its ability to adapt with the emergence of new themes and problem areas and, more importantly, promoting the interdisciplinary studies with organizations of joint appointment of faculty from various backgrounds and the exploring of resources from the different laboratories and institutes in the university. In these ways the Academy provides faculty and students space for intellectual engagement in cross-cutting problem areas and a means for receiving formal recognition for their efforts.

University of California Davis Interdisciplinary Graduate Studies Program

The University of California at Davis (UCD) institutionalized interdisciplinary Graduate Groups to provide graduate students with the intellectual freedom to transcend disciplines, and this framework has been in place for over 40 years. Today the majority of UCD graduate programs, 47 out of 87, are organized in this fashion. This university structure retains a standard college and departmental organization, through which undergraduate programs are administered, faculty are hired and classes offered, but this allows for graduate education to go beyond these boundaries. Graduate Groups bring together faculty from departments across campus around a common theme. For example, the Graduate Group in Ecology has 200 students and 126 faculty members from 32 different departments/units on campus. Faculty from different departments can apply for a three-year appointment to the Graduate Group, which requires teaching and serving on graduate and other administrative committees of the Group.

Only faculty in the Graduate Group (note that the departmental restriction in place at UAF is not pertinent to the UC Davis program) may serve as major professor for graduate students in that program. Faculty can belong to more than one Graduate Group, and many do. The Graduate Group has an administrative home that is based in the department of the Chair of the Group, with staff responsible for administering the graduate programs within this Group. Students in a Graduate Group earn their degree from the Group. For example, students in the Ecology Graduate Group earn a PhD or MS in Ecology, with a specified Area of Emphasis, that ranges from biological orientation, e.g. Physiological Ecology, to a more social orientation, e.g. Environmental Policy and Human Ecology. There are a variety of Graduate Groups within traditional disciplines; for example, the College of Biological Sciences includes 8 Graduate Groups and 5 academic departments. This model allows for great flexibility for graduate education, and although not explicitly stated, likely synergizes research across disciplines as well.

<u>"The New American University": Research University as Knowledge Enterprise at Arizona State University</u>

Under the leadership of its President, Dr. Michael Crow, Arizona State University embarked on a comprehensive reorganization (2002-2012) of its academic departments to emphasize an orientation towards problem solving around themes, rather than a traditional model of discipline-specific departments. President Crow, an expert in knowledge-based organizational innovation, led the reorganization to re-imagine ASU as "…an egalitarian institution committed to academic excellence, inclusiveness for a broad demographic, and maximum societal impact" (Crow 2010: 3). Drivers of institutional change included the growth of the university (approaching 70,000 students), the changing market and global reach of major research universities (e.g., American universities moving into foreign markets, Chinese investment in education at home), and rapidly changing demographics in Arizona that required a new approach to maintain access and affordability of higher education. Crow argued that the desire of many research universities to emulate Ivy League or other elite institutions works against a vision of shared societal prosperity, socio-economic mobility and a more educated American population.

To meet these challenges, ASU established a reorganizational design team of administrators and faculty members and others that reviewed its academic operations and organization and recommended that the University re-envision itself as a federation of research and teaching colleges, schools, interdisciplinary research centers and departments. As ASU has four campuses (main and satellite), each campus has its own distinctive and complementary set of programs.

In order to shape this new research and learning environment, departments were merged where their research and teaching interests intersected. Many of the new schools retain a significant fraction of a past department, but with more diverse faculty represented now. For instance, the School of Human Evolution and Social Change is predominantly comprised of anthropologists from the old anthropology program, but it now also includes faculty with more interdisciplinary interests (such as computational social science), including shared faculty lines.

The reorganization has resulted in more than 20 new interdisciplinary schools, including the School of Human Evolution and Social Change, the School of Earth and Space Exploration, the School of Sustainability, the New College of Interdisciplinary Arts and Sciences, and the College of Nursing and Health Innovation.

New research institutes include the Global Institute of Sustainability (GLOS) and the Biodesign Institute focused on, "…biomedicine & health outcomes, sustainability and security" (http://www.biodesign.asu.edu/about). In the reorganization process, ASU eliminated a number of stand-alone academic departments including biology, sociology, anthropology, and geology.

References Cited:
Crow, Michael M. 2010. Toward Institutional Innovation in America's Colleges and Universities. Trusteeship May/June: 2-5.
Suggested reading: http://newamericanuniversity.asu.edu

CLOSING THOUGHTS

Unless the need for institutional change is recognized and action taken, the University of Alaska Fairbanks may fall behind other universities that are moving forward in new and creative ways to promote rather than detract from interdisciplinary research and education. The UAF model of self-organized faculty and student interdisciplinary efforts continues to have a place, but the institutional framework must be changed so as to provide the venue and the incentive for faculty to effectively move interdisciplinary studies forward. The statewide accounting system for credit hour counts and funding allocation needs to be reconsidered, and a new system put in place, one that, again, promotes interdisciplinary research and moves UAF into the 21st century. The Tenure and Promotion process needs to be re-evaluated, and reconstituted in such a way that interdisciplinary researchers are rewarded rather than penalized.

None of our suggestions for change makes the existing administrative structure for disciplinary education obsolete, and this is important to acknowledge. Our thought is that a complementary organizational framework should be institutionalized, one that promotes the cluster hires and a new faculty workload model for interdisciplinary research and education for UAF, with Arizona State University and the Peking University models being just two good examples. This university cannot achieve its potential in the interdisciplinary research and education as long as the university administration is mired in a 'business as usual" model.

It may be useful if Faculty Senate members and/or our current university administrators would visit ASU or any of the other universities mentioned above that promote interdisciplinary education, talk to administrators at these institutions, learn how the programs work, and begin to think creatively about change here at the University of Alaska Fairbanks.