

## Appendix III: Questions for CALS Departments

**Department Name: Agricultural & Applied Economics**

**Submitted by: Ian Coxhead, Chair**

*1. What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when complimenting your department?*

Historically we have been strong in all of our major fields: (i) Economics of Agriculture, (ii) Natural Resource and Environmental Economics, (iii) Development Economics, (iv) Community Economics. We have been, and remain, national research leaders among our peer departments in the latter three areas. In Agricultural Economics we have always been known for individual “stars” with national prominence. We also historically have been known as the home of the journal *Land Economics* and AAE faculty currently serve as editors for two other top journals in the field.

*2. How does your department “fit” within CALS shared missions of teaching, research, or outreach? Which if any academic units within CALS does your department align with?*

AAE plays a key role in providing input on applied economic issues to all of the departments within CALS as well as across campus (e.g., Nelson, Engineering, Global Health Institute, Wisconsin Energy Institute). We have strong appeal as collaborators on research because of our department’s applied mandate. Our core economic methods have broad applicability to analysis and policy across disciplines and our faculty and student research areas intersect with those of other CALS departments in agriculture, environment, resource use, international development, rural communities and more.

We do not have a single academic unit within CALS or the university with which we “best” align. Rather than a departmental alignment with one or two departments each of our sub-fields has alignments: Economics of Agriculture with the production agriculture departments (Agronomy, Horticulture, Dairy Science); Natural Resource & Environmental Economics with Forest & Wildlife Ecology, Nelson Institute, Limnology, WID and Wisconsin Energy Institute; Economic Development with Nelson, Area Studies Programs, LaFollette School, Political Science, Economics, Sociology, Geography, and Wisconsin Energy Institute; Community Development with Community & Environmental Sociology as well as the Extension campus.

*3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?*

- a) The economic viability of farming in the US. Economics is at the core of almost all of the production agriculture issues for US farming going forward.
- b) Valuing and protecting the environment at local as well as global scales.

- c) Using and understanding “Big Data”. Economics has a lot to add to the study of big data in identifying both behavioral factors and understanding causality within big data applications. Also, while current big data applications in agriculture have focused on yield increases (e.g., Climate Corp), what will benefit our growers most will be profitability increases, which requires the economic toolkit.
- d) The roles of international trade and immigration in the economy.
- e) Feeding a growing planet.

4. *What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department? For example, “numbers of graduate students are underrepresented because many get degrees from unit X.”*

- a) We teach a lot of courses for non-majors, so the number of majors understates our engagement with undergraduate students. A big part of this engagement comes through two undergraduate certificates that we offer (in agribusiness management and in development economics). These certificates are very popular but require resources to promote and administer. The only way in which they are recognized in current metrics is through CFI.
- b) Grants in our field are not accurate measures of faculty productivity. We do not maintain physical infrastructure like labs or experimental plots, and therefore we also employ very few post-docs, technical or scientific staff. Faculty can be productive with very little grant money and very often, grants serve primarily to support graduate students.
- d) In the social sciences, researchers typically publish many fewer papers (of greater length and complexity) than their peers in the natural sciences. Paper count-based measures of academic productivity, unless adjusted for different disciplinary cultures, work against us.
- c) We show poorly on some campus measures of diversity in our student population, despite a high level of diversity among our students. That is because those measures typically exclude non-US citizens. For example, our graduate student population is about 50% students from other (mainly developing) countries, but this contributes nothing toward measures of diversity keyed to racial and ethnic features of the US population.

5. *Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?*

- a) Generally for our department, we think it is organized about optimally. We do not see obvious departments for us to combine with, where there would be added synergies to our research or teaching mission or where there would be significant (or any) administrative cost savings achieved. We have very strong synergies across fields within the department, strong research synergies with other college and campus units, and a strong and vibrant connection to several CALS departments through participation by their

undergraduate students in our program— either as double majors or (increasingly) as participants in our two undergraduate certificate programs.

b) Failure examples: Combining departments: Many universities we know have combined their Agricultural Economics with Rural Sociology departments. We do not know of any examples where this has worked. In every case except one (Penn State) it has led to the end of Rural Sociology while not actually creating a stronger Ag Econ unit. Recently, Clemson combined Ag Econ, Ag Engineering and one other department. This has been viewed in the Ag Econ world as a dissolution of the Ag Econ department rather than as a strengthening of it. UC Riverside provides an example of an Ag Econ department that was dissolved and the faculty sent to disparate units around the college and the campus. Many of those faculty ended up leaving the university, and those that have remained have seen major negative effects on their careers.

## **CALS Organizational Redesign Committee**

### **Questions for CALS Departments**

**Department Name: Biological Systems Engineering**

**Submitted by: Douglas J. Reinemann**

1. What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?
  - a. Forage harvesting and dairy feed processing
  - b. Biofuels: biomass pretreatment
  - c. Dairy production systems Engineering
  - d. Soil conservation and water quality engineering
2. How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?
  - a. High degree of congruence with all three parts of CALS mission, in all priority theme areas.
  - b. Food Science (Joint support of food engineering option)
  - c. Dairy Science (every faculty member contributes to dairy production systems in some way)
  - d. Soil Science (Natural resource and environmental engineering group is closely aligned and highly collaborative)
3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?
  - a. Sustainable food production systems: Food, Energy, Water nexus
  - b. Equipment and analytics to turn large, real-time data streams into management and control strategies
  - c. Food safety and quality: sensors and systems for tractability and quality control of food products.
  - d. Environmental quality management for more production intensive agro-ecosystems, especially at the urban/ag interface
  - e. Controlled climate and urban agriculture.
4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department? For example, "Numbers of graduate students are underrepresented because many get degrees from unit X."
  - a. We have a number of affiliated faculty at the forefront of multidisciplinary activities and advising graduate students in:

AgroEcology, Nelson Institute for Environmental Studies, Dairy Science, Food Science, College of Engineering

5. Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?
  - a. Maintain undergraduate degree programs (and alumni identity) with a more flexible administrative structure with fewer administrative units organized around research themes/groups.
  - b. Establish mechanism for faculty to periodically (5 year cycle, corresponding with tenure, promotion and post tenure review) adjust affiliation with administrative units and commit to supporting undergraduate instruction degree programs

## CALS Organizational Redesign Committee

Department Name: Soil Science

Submitted by: Alfred Hartemink (in consultation with soil science faculty)

### 1. What are the top 3-5 historical and present strengths of your department?

#### Historical strengths

- First soil science department in the world
- Best soil science department in the world
- 3 faculty Members of the National Academy
- Realizing the importance of environmental science in the 1960s
- Providing leadership and service to CALS

#### Present strengths

- Most courses at full capacity
- Highly relevant research for Wisconsin, US and globally
- Flourishing Environmental Science Major, 135 students
- 39 graduate students
- Innovative and forward looking
- Excellent Extension programs
- Cooperative nature, service to CALS
- \$10.6 million in grants and contracts
- No. 1 in funding of soil and crop departments in the US (Academic analytics)
- \$6.6 million in endowments,
- \$122,000 in donations in 2016
- Able to live with aging lab and class room space
- Active faculty, good departmental climate, loyal faculty
- Realizing that there is potential for growth and enhanced impact

### What do peers from other institutions or industries say when they are complimenting your department?

Between 1906 and 2016, the Department has graduated 2380 students (1303 BS, 583 MS and 494 PhD degrees). There are few agricultural, natural resource or earth science departments in the US that have no direct connection to one of our graduates, or that employs one or more of them. We have a strong historical base. We have been reduced in the past 10 years, but vigorously maintain our programs whereas at other universities soil science departments have been merged, relabeled, or simply dissolved.

People are impressed that we are a department dedicated to soils in the broadest sense, and for our newer faculty that has been a major reason to come here. If you are a soil scientist and looking for a faculty position, UW Madison is a prestigious place to be – a comment that many of us have heard. The other comment that people make is that they like the innovative work that is conducted at our department.

## 2. How does your department "fit" within CALS shared missions of teaching, research, or outreach?

Our work broadly addresses science and outreach central to healthy environments and sustainable agriculture in Wisconsin, the US and worldwide.

### Teaching

Instruction in soil science is essential for a wide range of undergraduate and graduate students in environmental science, agriculture and natural resource management. We are home to the following instructional programs:

- BSc degree, Soil Science

- BSc degree, Environmental Science

- MSc, PhD degree, Soil Science

- Contributor: Farm and Industry Short Course

- Agroecology MSc, Nelson Institute degrees, Ecotoxicology program

As professionals these students will engage in numerous issues including the immediate challenge for Wisconsin's dairy farms of managing manure in an efficient and environmentally sound manner, to research seeking to understand the controls of important greenhouse gases or the fate of nanoparticles and prions. Our instructional program includes fundamentals of soil science, plant nutrient management for production and environmental quality, the soil dynamics of nutrients and environmental contaminants, soil resource mapping, soil and water conservation, and soil biology and microbial ecology. Soil science education contributes in many and diverse ways to the search for sustainability. Within each CALS priority theme of the strategic plan, soil science makes a contribution. Our graduated students swiftly obtain employment (mostly in the private sector).

### Extension

Our activities include field research and extension training on soil management and required levels of soil fertility, and the roles of cover crops, chemical fertilizers and livestock manure. The recommendations (published as UWEX Bulletin A2809) have the force of law for most Wisconsin farmers, necessitating constant revisiting as practices and yield potentials change. We host scientists and computer programmers (SnapPlus) who develop software for farmers, consultants, and government agency staff to plan nutrient and soil conservation management strategies, and to select times for land application of livestock manures that minimize chances of environmental damage. Our department runs the largest Extension conference in the mid-West, the Wisconsin Agribusiness Classic, with an attendance of over 1600. Our faculty advises the Discovery Farms program and NPM. We are also the home to the SFAL laboratory that provide chemical analyses of soil, plant, and manure for farmers and researchers.

### Research

The department has an extensive research portfolio and currently manages over \$10 million in grants. The work of our faculty and staff in soil management is central to maintaining environmental agricultural services and preserving soil and water quality across the state. This includes the development of novel soil management strategies, as well as fundamental research on the underlying biochemical and physical processes. A Research focuses on climate change adaptation, nutrient recovery, cover crop use and soil health.

In recent years attention has turned to prions, pharmaceuticals, health aids and cosmetics, and nanoparticles, all of which may be present in the soil through spread biosolids from waste waters. Our faculty members address these challenges with their expertise in microbial physiology, anatomy, and genetics, the roles of soil mineral surfaces in immobilization of risks,

and prion and nanoparticle behavior in soil. Detoxifying soils and aquifers contaminated by industrial chemical accidents and mismanagement has long been a priority in our department. Our faculty members are important contributors to a wide range of supra-departmental programs, including the Agricultural Research Stations. Significant linkages and leadership also includes: Molecular and Environmental Toxicology Center (Medical School), Environmental Chemistry and Technology (College of Engineering), The Center for Sustainable Nanotechnology, Nelson Institute for Environmental Studies (Campus), USDA Dairy Forage Research Center, and the Wisconsin State Laboratory of Hygiene.

**Which, if any, other academic units within CALS does your department align with?**

Bacteriology, Community and Environmental Sociology, Agronomy, Forest & Wildlife Ecology, Horticulture, BSE, Urban and Regional Planning

- 3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?**

Soil science is critical to 5 of the 17 goals of the UN Sustainable Development Goals, including: zero hunger, good health and well-being, clean water and sanitation, climate action, and life on land. In different wording, soil science is critical to the global environmental challenges that include food security, climate change, maintaining biodiversity, securing water quality and quantity, and bio-energy production. These challenges are valid at every scale level whether that is a potato farm in Adams county, a school garden in Milwaukee, or the entire US. We shall continue to work on bridging results and findings across scales by applying regional solutions to global problems and *vice versa*.

On a more detailed level, high impact issues include healthy soils in urban food systems, characterization and mapping of soils and landscape processes, management of plant nutrients in relation to crop growth and eutrophication of surface waters and contamination of groundwaters, and environmental fate and transport of emerging biotic and abiotic risks.

The most important problem remains the maintenance and understanding of the soil resource in providing a wide range of ecosystem services, under a burgeoning human population and an increasing demand on the land.

- 4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department? For example, "Numbers of graduate students are underrepresented because many get degrees from unit X."**

The number of undergraduate majors in soil science is low but the number in the Environmental Science Major is 135. That number is not always reflected in CALS metrics. For the rest, we sense the current metrics are adequate.

Our CFI will make a major jump in 2017, we have increased our course offerings and teach a few new courses. As mentioned, we have 39 graduate students, but half of them are in other programs, yet the grants are administered through our department.

Looking at the Academic Analytics data and comparing our department to 33 other departments in the US, we are doing very well on grants and papers, but less so in collecting awards. The department as a whole has an *h*-index of 50 (Web of Science). That is a high index and could be used as an indicator of scientific impact to compare departments in CALS.



**5. Given existing resources, in your opinion, what is the ideal organization of the college?**

- Leave faculty in their departmental (= scientific disciplinary) home but make them members of centres (clusters) that correspond to the priority themes of the strategic plan.
- Create administrative hubs which means centralizing some services, but keep the faculty in their centre of expertise
- Around majors (currently 24, should be reduced to 10 – each with 2 or 3 specialisations). There is no reason why this cannot be done soon.

**Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?**

Three people have responded to this:

1. Successes included a foreword looking disciplinary visions and the implementation of bold and novel ideas. Successes also included retirements of a generation that scientifically had little to contribute. Failures included a strict top-down, metric driven and robotic approach in restructuring causing a loss of community feeling and demotivation. Restructuring departments without restructuring the administration is half the job. In the end, restructuring has to enhance scientific excellence and productivity in teaching and outreach. That should be kept in mind.

2. My perspective after Cornell's restructuring - 5 plant-related departments were merged together into a school, maintaining their integrity as "units". I don't think this really helped reduce administrative costs. It added an additional layer of bureaucracy. In addition, I think it was a negative for the crop and soil science department - merged into a fundamentally plant-focused school makes it very unlikely that future hires will be soils focused to the degree that is necessary to provide a strong soils education.

After postdocing at Berkeley, I also have some perspectives on their ESPM (Environmental Science, Policy, and Management) department. This department was created by merging several different departments, including Soils. The department as it functions now seems much too big to me. I experienced extremely little sense of intra-departmental community - faculty didn't attend seminars because the topics were too broad to be relevant to them, people didn't spend time together as a department, departmental events were proportionally poorly-attended. I was actually pretty disappointed at the lack of community I found there, and found instead community just at the level of my own lab group. I was looking forward to meeting professors I knew were in the department, but I never saw them at a single departmental event. I think this is an example of a department that was too big, and too diverse. If people don't have enough in common, community will be lost. Similarly, I would emphasize the importance of sharing physical space in maintaining a cohesive academic community.

3. At UC Davis the new department of plant sciences required a new building so different groups were housed together, that was part of the success. The other part was strong and visionary leadership.

## **CALS Organizational Redesign Committee**

### **Questions for CALS Departments**

Purpose: The following questions were created by the CALS Organizational Redesign Committee to get a better understanding of departments -- their pasts, presents and futures. We will review departmental-level data held by the University administrative structures, plus each department's documents from 2012-13 Strategic Planning process. But we felt that we need a deeper perspective and a longer view. So, the committee crafted 5 questions that we think will give us the insights we seek. Please reach out to a Redesign Committee member if you have questions about what we are asking.

Instructions: Please give concise answers to these questions, providing the insights sought within two single-spaced pages. It is perfectly fine to submit a document with bullet points and short to-the-point sentences.

Please send your answers to the following questions to Kara Luedtke ([kara.luedtke@wisc.edu](mailto:kara.luedtke@wisc.edu)) by March 10.

**Department Name:**

**Submitted by:** William Tracy

1. What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?
  - a. **Plant breeding and plant genetics**
  - b. **Crop management research and extension**
  - c. **Agroecology and climate**
  - d. **Crop molecular biology and biochemistry**
2. How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?

**Please see Agronomy Response to Chairs Strategic Planning Worksheet**

- **In terms of research Agronomy is most closely aligned with Dairy Science and Soil Science.**
- **In teaching at the graduate level Agronomy has strong relationship with PBPG, Agroecology.**
- **In Extension, Agronomy makes major contributions to a number of the program areas, especially in crop production and management.**

3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?

**Please see response 1.b. on the Agronomy CALS 125<sup>th</sup> Anniversary Survey Response document.**

4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department? For example, “Numbers of graduate students are underrepresented because many get degrees from unit X.”

**Ten to twenty percent of the graduate students we advise are in the agronomy Ph.D. and M.S. degree programs.**

**Over the last ten years many of our faculty have done much of their work through GLBRC. None of this effort shows up in grants or IDC. While GLBRC has benefited our programs greatly, given the effort expended on behalf of GLBRC there have been significant lost opportunities for proposals and grants that would have shown up on our books.**

5. Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?
  - a. The college needs to protect and enhance its basic science strengths.
  - b. The college needs to decide what mission oriented activities it needs to maintain. These then need to be invested in.
  - c. Faculty and staff in those areas the college will no longer invest in need to be provided with options that will allow them to make meaningful contributions for the remainder of their career.
  - d. I have observed that forcing departmental mergers or forcing faculty to join other units has not worked well.

## **CALS Organizational Redesign Committee**

### **Questions for CALS Departments**

Purpose: The following questions were created by the CALS Organizational Redesign Committee to get a better understanding of departments -- their pasts, presents and futures. We will review departmental-level data held by the University administrative structures, plus each department's documents from 2012-13 Strategic Planning process. But we felt that we need a deeper perspective and a longer view. So, the committee crafted 5 questions that we think will give us the insights we seek. Please reach out to a Redesign Committee member if you have questions about what we are asking.

Instructions: Please give concise answers to these questions, providing the insights sought within two single-spaced pages. It is perfectly fine to submit a document with bullet points and short to-the-point sentences.

Please send your answers to the following questions to Kara Luedtke ([kara.luedtke@wisc.edu](mailto:kara.luedtke@wisc.edu)) by March 10.

**Department Name: Biochemistry**

**Submitted by: Brian Fox**

**1. What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?**

- a. Establishment of WARF and research contributions described in many patents – through the annual WARF gift, this contribution allows campus to pursue new avenues of research, provide funding for our world-class faculty, and invest in the next generation of faculty, scientists, and trainees.
- b. Research
  - Historic
    - Discovery and elucidation of the importance of vitamin D
    - 10 past and current members of the National Academy of Sciences
    - Establishment and staffing of the Institute for Enzyme Research in collaboration with the Graduate School
    - Establishment and staffing of the Institute for Molecular Virology, now ongoing within the Office of the Vice Chancellor for Research and Graduate Education
    - NIH-funded Protein Structure Initiative, ~\$70M in campus research over 14 years.
  - Present
    - Campus leadership role in the now advancing cryo-electron microscopy initiative, which will bring new research investments and faculty hiring in CALS, SMPH, COE and the Morgridge Institute
    - Emergence of chemical biology as an internationally recognized discipline

- Research in molecular mechanisms of diabetes, bone formation, virus structure and function, membrane biochemistry, protein engineering, microbiome, bioenergy, RNA biochemistry, cellular differentiation and development, and technology development
- Campus leadership in establishing and maintaining protein X-ray crystallography expertise at UW-Madison, including beamline access at Argonne National Laboratory, ~100 researchers campus-wide are participants
- Establishment and continued operations for 30 years of the National Magnetic Resonance Facility at Madison (NMRFAM, Markley, Butcher, Henzler-Wildman), >\$50M funding brought to campus, numerous new careers started, ~1000 research publications created
- Leadership in cluster hires in the areas of structural biology, vitamin D research, chemical biology, genomics, and biocatalysis and biodesign
- Remote site for the World-Wide Protein DataBank, an international repository of structural biology data
- Continued, active intellectual property engagement with WARF
- Prominence in the national discussion of how to “rescue biomedical research” – Faculty initiatives and national involvement have brought wide recognition to Madison in this discussion (Kimble, Hoskins).

c. Education

- Doubled enrollment in undergraduate courses in ~10 years
- Providing domestic and international research opportunities for undergraduates promoted by faculty mentorship and donor support (Biochemistry Scholars Program, Cox)
- Formed the Integrated Program in Biochemistry (IPiB) graduate program to allow joint recruiting and development of a core curriculum with the Department of Biomolecular Chemistry (SMPH)
- Administrative home for the NIGMS-funded T32 Biotechnology Training Grant, which supports 20 predoctoral trainees from CALS, L&S, COE and SMPH

**2. How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?**

The UW-Madison Department of Biochemistry contributes to research, education, service, and economic innovation that benefits the university, state, nation, and the world.

Our major undergraduate courses are highly desired by undergraduates that aspire to more advanced training in graduate, medical, veterinary, and law schools.

Knowledge of biochemistry provides the foundation for discovery across the life sciences. The interests of our faculty, and their diverse teaching and research contributions, span agriculture, human health, energy sciences, nutrition, biological engineering, and many other disciplines. These broad thematic areas in research, teaching, and service align quite well with CALS priorities.

Faculty in our department have research and teaching interests that align with those of many others in CALS, COE, L&S and COE. This is represented in shared students, grants, and publications.

Biochemistry is closely aligned with Genetics and Bacteriology. Our three departments provide a basic research focus to the CALS mission. This could form a discrete nucleus that emphasizes basic research in molecular mechanisms.

Biochemistry has developed specific educational programs:

- Development of teaching approaches in the HHMI (Amasino);
- Involvement with the Native American community (POSOH, Amasino);
- Khorana, Uganda, SCORE/SUPERG international programs (Ansari, Ntambi, Wickens)
- Involvement in high school student programs and apprenticeships (Fox, Weibel)
- NSF CRYSTAL program (Holden)

**3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?**

The department conducted a strategic planning session in January 2016 that addressed this question, among others. A summary of the priority issues identified and strategies for pursuing these areas is attached.

**4. What do the standard UW and CALS metrics available on departments, such as CFI (Credits Follow Instructor), CFP (Credits Follow Program), grants, IDC (Indirect Costs), not adequately or accurately capture about your department? For example, "Numbers of graduate students are underrepresented because many get degrees from unit X."**

25-30% of our ~600 undergraduate majors in Biochemistry per year are from the College of Letters & Sciences. These are not included in the documentation provided to the Restructuring Committee.

The department has faculty members that participate in the GLBRC, which is administered through the College of Engineering, so it is unclear whether the department or College receives credit for this research effort in campus accounting schemes.

The department contributes to the graduate training mission for the Biophysics Doctoral Training Program, the Graduate Program in Cell and Molecular Biology, and a few other graduate degree programs administered outside of the department.

**5. Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?**

CALS should consider models for faculty hiring and other resource allocations that correspond to where undergraduate and graduate students are seeking training, and to where funding sponsors (federal and non-federal) are providing continuing levels of support. Support from CALS should emphasize external funding and students (both undergrad and grad) and post-docs trained.

CALS could consider creating a division of Molecular and Genetic Sciences that contains Biochemistry, Genetics and Bacteriology. This would be along the lines of the Hearn committee's recommendation of creating a separate College of the Biological Sciences.

A minimum size is required for an academic unit to function efficiently. Creation of strategic alliances and long-term strategies for staffing should be encouraged to achieve a critical mass in disciplines.

Collective sacrifice should not be used to maintain departments where there are inadequate student to faculty ratios or where extramural research funding is not sufficient to sustain independent efforts.

CALS needs to develop a mechanism for longer-term predictability in hiring in the departments that do the largest share of teaching and acquisition of funds; restructure the way we allocate positions to allow new initiatives. Departments that contribute heavily to teaching and also maintain vigorous externally funded research programs should be assured of being able to hire annually to maintain their size and strength.

Support new initiatives in both undergraduate and graduate training. Prof. Kimble's involvement in several national forums has given the university recognition in these areas, and CALS should build on that. We need to encourage and support new initiatives in the way we educate the next generation of scientists and provide new career pathways.

Support joint departmental initiatives in common areas of interest, while bearing in mind the extent of teaching contributions and external support those individual departments provide. Allow simultaneous hires in related areas across multiple departments – for example, an intracollege cluster hiring plan in biochemical genomics and quantitative biology to simulate growth in new research areas.

## **CALS Organizational Redesign Committee Questions for CALS Departments**

Purpose: The following questions were created by the CALS Organizational Redesign Committee to get a better understanding of departments -- their pasts, presents and futures. We will review departmental-level data held by the University administrative structures, plus each department's documents from 2012-13 Strategic Planning process. But we felt that we need a deeper perspective and a longer view. So, the committee crafted 5 questions that we think will give us the insights we seek. Please reach out to a Redesign Committee member if you have questions about what we are asking.

Instructions: Please give concise answers to these questions, providing the insights sought within two single-spaced pages. It is perfectly fine to submit a document with bullet points and short to-the-point sentences.

Please send your answers to the following questions to Kara Luedtke ([kara.luedtke@wisc.edu](mailto:kara.luedtke@wisc.edu)) by March 10.

**Department Name: Community and Environmental Sociology**

**Submitted by:**

1. What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?
  - a. Probably the number one strength of C&E Sociology is the joint graduate program with Sociology. For several decades, the graduate program has been ranked as number 1 or 2 in the country. This is our primary competitive advantage compared to other similar departments that do not offer the breadth or depth of our graduate program. Most of our undergraduate courses also are crosslisted with Sociology, which contributes to the high demand for our courses.
  - b. C&E Sociology is widely known for research and training in Environmental Sociology. Several of the leading figures in this field, such as Fred Buttel and Tom Heberlein, were trained and taught in this Department. We have had several large training grants (NSF funded) over the years to support this program.
  - c. Our Department was one of the first programs to develop an emphasis on Agrifood Systems. Over the past 30 years, the work of scholars, such as Jack Kloppenburg, has attracted the top students interested in this topic.
  - d. Beginning in 1911, Charles Galpin established a field of community sociology that has continued through several generations (e.g., John Kolb, Gene Summers) of scholars at UW-Madison. Much of this work has been applied to communities throughout the state.



2. How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?

C&E Sociology faculty regularly contribute to the teaching and research mission in CALS through involvement in several programs, such as the Agroecology Program (several graduate students are advised by faculty) and the Center for Integrated Agricultural Systems (the past two directors have been C&E Sociology faculty). Our Department carries a large responsibility for Extension activities in community development. We have three tenured faculty devoted to this program area. In addition, the Applied Population Laboratory has seven academic staff and several studies who work across the state on demographic issues.

3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?

a. Implications of economic inequality and demographic changes for Wisconsin rural communities, especially for health care, education, and the workforce.

b. Local food systems and sustainability—understanding how to improve the economic, social, and environmental viability of local food systems.

c. Environmental health—improved understanding of how different populations are influenced by environmental degradation and change.

4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department? For example, "Numbers of graduate students are underrepresented because many get degrees from unit X."

Like many other units, our faculty participate in a variety of interdisciplinary centers and institutes across campus. Many faculty grants are administered through these units and we do not get credit for the research expenditures. We have several faculty who have joint appointments with other units. Although the credits follow the instructor, these credits are shared with these other units which does not adequately measure the impact of their teaching for CALS. Finally, we currently advise approximately 50 students—half in Sociology and the rest in Environmental Studies, Agroecology, and Development Studies. These contributions never are documented in campus or CALS data.

5. Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?

CALS could benefit by concentrating administrative resources into four or five hubs. This would achieve greater efficiency and more opportunities for advancement among staff. It also might be possible to reduce the number of undergraduate majors and create some majors that cross department boundaries. Finally, some of the most successful efforts at restructuring have established “divisions” that combine several departments. These divisions reduce the number of administrators while enabling department to keep some relative autonomy. A divisional structure may allow specialized graduate programs to continue while providing opportunities for broader undergraduate programs.

## **CALS Organizational Redesign Committee Questions for CALS Departments**

**Department Name: Food Science**

**Submitted by: Scott A. Rankin**

1. What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?
  - Authors/lead editors of the quintessential Food Science text book, *Fennema's Food Chemistry*.
  - Rigorous science-based undergraduate Food Science pedagogy.
  - Leading Food Science undergraduate accomplishments.
  - Impactful, revenue-generating professional outreach programs.
2. How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?

The Food Science department is highly productive and integrative in each of these areas – teaching, research and outreach. We have native alignments with numerous departments/faculty across teaching, research and outreach programs, including Animal Sciences, Bacteriology, Biochemistry, Biological Systems Engineering, Dairy Science, and Nutritional Sciences, to name a few as well as with the Food Systems component of the CALS Strategic plan.

3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?
  - The development of Food Scientists as leaders, capable of advancing science-based decisions for and perspectives of societal food issues.
  - Research, education and outreach programs focused on the provision of a safe, wholesome, sustainable, and affordable food supply.
4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department? For example, "Numbers of graduate students are underrepresented because many get degrees from unit X."

We feel that available metrics or rankings, although not entirely accurate depictions of productivity for reasons common to this approach of assigning value, do not position our department any more or less valuable, than most other departments. There are a few items of significance to Food Science that are not manifest on these measures of scholarly impact. Food Science faculty direct numerous outreach

programs that attract hundreds of attendees from an international pool of clients on such subjects and dairy manufacturing, fermentation, confections, and food preservation. The Food Science department also manages a high-visibility, high-maintenance operation – Babcock Dairy plant and store that will undergo a substantial remodeling within the next few years and is considered by the chancellor's office as a having high revenue-generating capacity. Furthermore, Food Science maintains one faculty member, John Lucey, as the director of the Wisconsin Center for Dairy Research (~40 people and numerous, high impact programs).

5. Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?

Although there may be some exceptions, I find that most departments are like ours – challenged to maintain basic functionality/infrastructure yet seeking a means to design a hopeful future. Although I am open to hearing of novel designs that somehow overcome these current challenges, I have yet to encounter a design that did not have at its core the approach of strategically divesting resources from some programs while reinvesting those resources into programs of higher productivity or potential impact.

The commonly voiced proposition of “departmental mergers” does not seem to have a convincing economic or operational value. While some efficiencies and savings may be identified through mergers and the creation of larger departments and administrative hubs, such actions are not capable of bearing the weight of reestablishing budgetary strength lost in the past sufficient to enable a high capacity future. Furthermore, such mergers run the risk of creating programs of reduced organizational function caused by diverse collection of faculty unable to determine a unifying strategic design. Such a divided organization would most likely struggle to design and advance an impactful vision, including outcomes relative to the “entrepreneurial strategies” called for by the Chancellor's office, compared to other departmental structures created with robust strategies to increase their established disciplinary strengths and foster financial capacity.

In short, I suggest that the “ideal organization” for CALS is to restructure around strategic themes of high productivity and impact, including revenue-generating capacity; part of that restructuring process involves shifting resources from areas that have less growth capacity or sustainable scientific relevance.

**Department Name:** Plant Pathology

**Submitted by:** Patty McManus, Chair

1. *What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?*

**Historical:** 1) Graduate program consistently recognized among top 3 nationally. 2) Faculty are leaders nationally and internationally in scientific societies. 3) Innovative teaching is recognized nationally and internationally. 4) Since the mid 1980s, within CALS and nationally, we have stood out for faculty gender balance; many of our faculty have been/are leaders in diversity and equity initiatives. 5) Phytobacteriology.

**Current:** 1) See #1-5 above; our historical strengths remain strengths. 2) Broad coverage and excellence of extension and outreach programs, that are led not just by faculty and staff but by graduate students as well. 3) Potato research and outreach, including the internationally respected Wisconsin Seed Potato Certification Program.

2. *How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?*

Our faculty collaborate, have recently collaborated, or are planning to collaborate on research, teaching, or extension with faculty in almost every CALS department plus many outside CALS. In particular, faculty working in extension, statistical consulting, or sustainable agriculture collaborate broadly not only with biologists but also social scientists.

3. *What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?*

- **New diseases** constantly are being discovered, and formerly insignificant **diseases are emerging** as pathogens evolve (e.g., gain virulence factors or become resistant to pesticides), move across and among continents, expand their range due to **climate change**, or as changing agricultural practices create conditions favorable for disease. From its inception as an academic discipline in the early 1900s, plant pathology has been interdisciplinary. We have the capacity to build the interdisciplinary teams needed to handle new and emerging problems and **ensure food security**.
- **Harnessing knowledge of microbiomes** associated with both hosts and pathogens to better understand disease biology and to develop novel approaches for disease management.
- **Apply modern big-data/high-density genotyping** approaches to plant genetic improvement via traditional genetic methods, especially to improve plant stress tolerance (e.g. disease resistance traits, drought tolerance, salt tolerance). Transformational change is needed to break the current yield plateau in many crops and to feed a growing population given a finite amount of suitable land.
- If we assume that social acceptance of genetically modified crop plants is on the horizon, including **CRISPR/Cas9 gene-edited crops, or crops genetically improved by not-yet-invented methods**, there are numerous genes and ideas ready to be tested (and many more to be discovered) to create plants with greater disease resistance.

- We need to better **communicate the importance and impact** of our work. This is not unique to plant pathology but to the sciences in general.

4. *What do the standard metrics not adequately or capture about your department?*

- CFI captures quantity but does not reflect the high *quality* of our teaching and advising:
  - The great majority of our teaching is by faculty. This was deemed important as recently as a decade ago when UW-Madison was criticized for lack of faculty in the classroom.
  - Lab and field based courses are “high-touch” and high-impact, which is not captured in CFI.
  - Extension and outreach teaching performed regularly by about half our faculty amounts to 1,000s of “CFI” annually that are not counted.
  - High-quality research experiences for undergraduates, not all of which are for credit.
- Positive workplace climate created by faculty, staff, and students who value diversity and inclusiveness; our leadership and impact in this area is not quantified by current metrics.
- At any time we have 6-10 graduate students from other programs doing thesis research in the labs of PP faculty; conversely, there are at any time 4-6 PP affiliate faculty in other departments who advise PP grad students on thesis research in their labs. In other words, students and faculty from outside Plant Pathology want to be affiliated with our programs.
- Loyal and rewarding base of “friends” proven by our UW Foundation endowments.
- Many grants that support our crop-oriented work do not come with large IDCs but serve diverse agricultural sectors that are economically and politically relevant.

5. *Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?*

- Administrative hubbing is an outstanding model for land grant universities and should be implemented more broadly in CALS. The cost savings is real, essentially eliminating any added cost of “small” (15-20 faculty) departments, and the university gains by sustaining highly visible departments with national and international academic impact. Where Plant Pathology departments have been merged or disbanded (e.g., Univ. Illinois, UC-Berkeley, Univ. Missouri), there has been a loss not only of disciplinary identity but also of impact of faculty and success of graduate programs. Free-standing Departments of Plant Pathology have thrived and remain influential and very attractive to candidate faculty, students, and employers.
- Departments are the governance units defined by FPP. Certain functions of the faculty, including tenure, become unwieldy and/or politicized in larger units.
- At other universities, department workplace climate has often suffered following realignments. A department’s success in diversity and inclusion is diluted instantly when merged with a less diverse department, and can take many years, even decades, to rebuild.
- If we are struggling to identify a model better than ours, then perhaps it doesn’t exist. Resources can be allocated “to make the most of the financial, human, and time resources

we have” (stated purpose of the CALS Organizational Redesign) without disrupting well-functioning academic units.

**CALS Organizational Redesign Committee**  
**Questions for CALS Departments**

**Department Name:** **Genetics**

**Submitted by:** **John Doebley**

1. What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?

Historical strengths: population genetics, epigenetics, medical genetics, cancer genetics, developmental genetics, neurogenetics, genomics

Current strengths: evolutionary, population, gene editing, genomics

UW Genetics is regarded as producing high-quality trainees for both industry and academia, and producing excellent science in a collaborative environment

2. How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?

Teaching: Genetics provides key courses for Genetics majors, other majors and non-science majors in CALS and across campus.

Research: Genetics knowledge permeates all aspects of CALS, from basic science to practical applications to social studies.

Outreach: Understanding genetics principles is essential for society at large for decisions ranging from individual health to food sources and technologies, to the environment and policy-making in these areas.

Alignment: Genetics aligns best with that of other basic science departments (Biochemistry, Bacteriology) but reaches beyond to applied science departments, for example Agronomy, Horticulture, Animal science, FWE, Entomology. Genetics has strong connections with many departments in SMPH and L&S including Botany, Zoology, Statistics, BMC, CRB, Neurology, Oncology, Pediatrics, Anesthesiology, Med Micro, Biostatistics, Population Health, Ophthalmology, the Cancer Center, LCMB, Genome Center, the Eye Center, Waisman Center, WID.

Improved methods of gene editing will increase all these connections, and in particular there will be tremendous potential for new synergism with applied science.



3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?

Analysis of large data sets for gene identification, quantitative gene network modeling for trait prediction, methods for precise gene editing (germ line and soma), methods for regenerative medicine, health in an aging population, epigenetic gene regulation, personalized medicine, cancer genomics

4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department? For example, "Numbers of graduate students are underrepresented because many get degrees from unit X."

These metrics are important but as Mark Twain said: "There are lies, damn lies and statistics." Faculty FTE numbers for genetics in the databases can be wrong and out of date. Does Sean Carroll who lives in Washington and is paid by HHMI count as an FTE? How are faculty with split appointments counted? How are faculty with administrative appointments counted? There are 11.46 CALS Genetics faculty FTEs today, 10.46 on 7/1/2017.

Counting federal grants dollars is difficult. Faculty funded via subcontracts may not appear in the database, grants of faculty in Centers are not on the CALS books, etc.

CFI data can also be skewed because of the rules on how credit flows from central campus to departments.

5. Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?

Any organization should help maintain strength of high-functioning departments (e.g. in terms of producers of research funds) to that they can continue to be so. Structures that take away from high-producing departments to help low-producing departments are not competitive or sustainable.

A possible scenario for reorganization would be, first, strategic fusions of small departments with others with aligned interests to produce a smaller set of stronger departmental units. This smaller set of departments could be further organized into larger divisional units with shared administration and potential for interaction and collaborative work.

Basic Sciences and their undergraduate students could be better served in CALS. Short term, Basic Sciences should have representation in CALS leadership; long term, cross-college restructuring of biology and the basic sciences would benefit UW.

**Department Name: Dairy Science**

**Submitted by: Kent Weigel**

1. What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?
  - Dairy Science is widely recognized as the top program in the world, as regards dairy herd management and dairy cow biology, due to our sharp focus on dairy, talented faculty, broad portfolio of dairy-related courses, and location in America's Dairyland.
  - In the six years that Academic Analytics has been available, we have ranked 1<sup>st</sup> four times, 2<sup>nd</sup>, and 4<sup>th</sup> in faculty productivity (grants, publications, citations, and awards) among 60+ dairy science and animal sciences programs nationally – after a particularly productive month a couple years ago, the Editor of the Journal of Dairy Science jokingly suggested that maybe we should start our own journal.
  - Virtually every important product, tool, or protocol used on modern dairy farms is somehow linked to a UW-Madison professor, graduate student, or alumnus. Our graduates serve key technical, sales, and communications roles and heavily populate the management teams and boards of most important dairy-related companies
  - We are praised for our emphasis and impressive record of coupling groundbreaking discoveries with translational applications to solve practical problems. For example: elucidating the details of ovarian physiology to create timed artificial insemination programs that save Wisconsin dairy farmers \$58 million per year, or adapting genotype imputation algorithms to enable the development low-density DNA microarrays that are now used to test > 40,000 dairy calves per month on U.S. farms.
2. How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?
  - Dairy Science places strong emphasis on all three CALS missions. All twelve of our faculty have research appointments, while six have classroom instructional roles and the other six have off-campus educational roles as integrated extension specialists.
  - We are closely aligned with Animal Sciences for undergraduate instruction, and courses such as Introduction to Animal Agriculture, Animal and Veterinary Genetics, Comparative Animal Nutrition, Animal Physiology, and Reproductive Physiology are cross-listed with shared (or offsetting) teaching responsibilities.
  - Our research and graduate training collaborations vary widely by PI, because we are an interdisciplinary department. Closest relationships are with the following: USDA-ARS Dairy Forage Research Center, School of Veterinary Medicine, Bacteriology, Nutritional Sciences, Computer Science, Animal Sciences, Food Science, Biological Systems Engineering, and Agricultural & Applied Economics.
  - Our undergraduate students often double-major in Life Sciences Communication or Agricultural & Applied Economics, and upon graduation the students in our program: attend graduate or professional school (30%), own or manage a dairy farm (20%), or work in a dairy-related agribusiness (50%).

3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?
  - The overarching challenge for our faculty is to help the dairy industry achieve an optimal balance of economic, environmental, and social sustainability.
  - Increasing the efficiency of food production while mitigating its impact on air, soil, and water is one key challenge – more milk from less land and fewer inputs.
  - Improving production efficiency while simultaneously improving animal health and welfare and ensuring food safety is the other key challenge – consumers demand safe and nutritious dairy products from healthy and well-treated farm animals.
4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department? For example, “Numbers of graduate students are underrepresented because many get degrees from X.”
  - Right now our 11 faculty (the 12<sup>th</sup> doesn’t start until July 15) have \$8.35 million in active grants. When this figure is divided by their average duration it comes out to \$3.3 million per year, or \$300,500 in external grants per faculty member per year.
  - The previous figures, as well as any CALS or campus metrics, don’t include a significant number of gifts to UW Foundation for specific faculty or programs, nor do they consider the in-kind value of employer-funded graduate students.
  - Of the 39 graduate students in our program, 9 are employer-funded; this number is increasing. Companies like Vita-Plus, Purina, Standard Nutrition, Rock River Labs, Landmark Coop, and Alta Genetics hire new employees and enroll them in our MS and PhD programs, with thesis research focusing on topics of mutual interest.
  - A significant number of PhD students trained by Dairy Science faculty (e.g., Wiltbank, Hernandez, White) receive their degrees in the Endocrinology and Reproductive Physiology Program or Interdepartmental Graduate Program in Nutritional Sciences.
5. Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about restructuring?
  - Dairy Science must emerge from the CALS restructuring with its brand intact. We are known worldwide as the epicenter of innovation and leadership in dairy cow biology and dairy farm management, and we cannot destroy this key advantage.
  - Focus and strategic allocation of resources should be the committee’s only priority. The biggest fear of our faculty is that a forced merger will disrupt our focus and dilute our resources –without courageous leadership, our time may be diverted from high-impact contributions for Wisconsin’s \$43 billion dairy industry to low-impact coverage of teaching and extension gaps caused by lack of focus in Animal Sciences.
  - I do not presume to know the answer, but when we are at a point where we are taking money from our graduate students (i.e., Hatch assistantships) and assistant professors are forced to spend their startup money on lab repairs, nothing should be off the table. We must stop doing something, even if that means closing half of the experiment stations, terminating some majors and sending the students to other UW System campuses, or eliminating an entire layer (college or departments) from a hierarchical administrative structure that was built in the horse and buggy era.

## Department of Horticulture

### **1. *Top 3-5 historical and present strengths***

Perhaps the greatest strength of the department, as measured over many decades, is a tradition of high impact scientific output and the extension of this output to practitioners and stakeholders. In recent years, faculty, staff, and students in our department were responsible for developing several new molecular genetic techniques that are widely used in the genetics communities throughout the world and in projects such as the International Rice Genome Sequencing project. Major genes of horticultural importance have been cloned and characterized in the department, leading to patents and high impact publications in the world's top journals. Research projects have led to technological improvements for crop production from the fields of Wisconsin to the terraces of the Peruvian Highlands. New germplasm of snap bean, cucumber, carrot, table beet, onion, tomato, pepper, squash, cranberry, and potato has been developed, released, and incorporated into cultivars that are grown by farmers worldwide. Numerous horticultural crop plant genomes have been sequenced and characterized in the department including onion, cucumber, carrot, and potato. Faculty have led germplasm collection expeditions around the world for potato, carrot, garlic, and other crops. Faculty and their students have also solved complex problems for Wisconsin farmers and implemented solutions that are benefitting Wisconsin farmers.

The department has one of its greatest strengths in its connectivity with the producer communities of Wisconsin. For example, cranberry and potato growers, processors, and retailers are heavily involved in the research and outreach work of our faculty, staff, and students. We provide some of the key science that is a part of their value chain.

Horticulture is home to a suite of inter-organizational programs that continue to expand and provide impacts for the college, campus, and state. The impressive collection of activities encompass the Nutrient and Pest Management Program, the Integrated Pest and Crop Management Program, The Wisconsin Institute for Sustainable Agriculture, the Allen Centennial Garden, the IR-4 Program, the Crop Diagnostics Training Program, and the Master Gardener Program.

We have a long-standing effort to promote international experiences in horticulture for undergraduate students through our course in Tropical Horticulture and a unique partnership with the Department of Latin American, Caribbean, and Iberian Studies (LACIS). The Tropical Horticulture course includes a semester's activities on campus followed by a two-week trip to Costa Rica and Nicaragua during Winter Break.

### **2. *Fit within CALS shared mission***

We have always felt a strong degree of fit with the CALS missions of teaching, research, and outreach. We are one of the four original departments in the college and have always felt that our expertise is part of the core expertise of the college. Horticultural crops continue to be very important to Wisconsin agriculture and Wisconsin citizens, and knowledge of

horticultural biology is an important niche for our continued understanding of plants. We align well with many of the plant and soils based production agriculture departments in CALS as well as departments such as Food Science, Nutritional Science, Community and Environmental Sociology, and Genetics.

### **3. *Most important problems and issues***

Our understanding of horticultural traits has grown tremendously in recent decades and we are now poised to use this information for the improvement of horticultural crops. The next 10-25 years will see an explosion in translating the knowledge of these traits into practical outcomes. In addition, horticultural production systems must become more sustainable and one of the key frontiers for cropping will be gains in the sustainable use of water, nutrients, and soil. A third frontier is the necessity of sustainable landscapes for the built environment. As our country and the world continue to urbanize, there will be an increased demand for sustainable landscapes, and horticultural science will play a key role in these developments.

### **4. *What do the metrics miss about our department?***

Our metrics are fairly strong when compared to our peers nationally. Academic Analytics, for example, shows us to be as strong as any horticulture department in the country. However our local metrics (CFIs, for example) are relatively low in the college. This may reflect the fact that horticulture departments nationally are experiencing significant enrollment declines. Many departments have merged with other plant science units and eliminated their majors. Our department, like the few remaining stand-alone horticulture departments in the country, still possesses an extremely strong portfolio of research and extension expertise that is of value to the state and the country, but is not reflected in local metrics that are based primarily on student numbers. In addition, the great majority of graduate students mentored by our faculty train in programs other than the horticulture graduate program. The metrics reflect a tiny graduate program despite the fact that we have more graduate students than undergraduates in our majors.

### **5. *Ideal organization of the college***

We recognize that collaboration across departmental boundaries will be critical to our future success. To that end, we see joint majors- that focus on key themes- at the undergraduate and graduate level as being a necessity. For the plant sciences, we can imagine giving up our majors and joining a new interdisciplinary major in the plant sciences / food systems area, and in fact those conversations are already underway. We can also imagine joining forces with other plant science / food system departments, perhaps in an integrated institute or department, to bring together our strengths. Perhaps more importantly, we can imagine letting go of our traditional full-service departmental ambitions and focusing instead on strengths in basic and applied science. These models- interdisciplinary majors and fused departments towards shared goals, might be a reasonable approach for certain sectors of the college.

**CALS Organizational Redesign Committee Questions for Departments**  
**Department Name: Entomology**                      **Submitted by: Susan Paskewitz, chair**

1. **What are the top 3-5 historical and present strengths of your department? What do peers from say when they are complimenting your department?**

Basic and applied research, graduate and undergraduate instruction and outreach/extension on arthropods affecting human health, food systems, and ecosystem stability. Strengths in:

- Biology of arthropod vectors of plant and animal disease
- Pollinator behavior, conservation and health
- Response to environmental threats: climate change, invasive species, habitat alteration, biodiversity loss, toxicological inputs, transgene escape
- Integrated Pest Management and Plant Protection Sciences
- Disciplinary strength in Chemical Ecology, Symbioses, Landscape Ecology, Taxonomy

We are complimented for strength in joining research and teaching, for strong relations with our stakeholder community, for being “ahead of the curve” and for integrating basic to applied research in invertebrate biology to address pressing problems.

2. **How does your department "fit" within CALS shared missions of teaching, research, or outreach? Which other academic units within CALS does your department align with?**

- **Entomology is unusual** among departments in that our faculty are strong participants in **almost all of the CALS strategic priorities, including Food Systems, Health and Wellness, Changing Climate, Healthy Ecosystems, and Bioenergy.** Faculty are adept at integrating across these themes wherever arthropods play critical roles.
- Entomology has a balanced structure with Research:Instruction:Extension FTEs of 10.1: 2.1: 1.8; this includes 2 USDA scientists.
- Team teaching with Nutritional Sciences (Global Health, Paskewitz), School of Veterinary Medicine (OneHealth, Paskewitz), Agronomy (Agroecology, Gratton), Environmental Toxicology (Lindroth, Groves), Forest and Wildlife Ecology (Raffa, Gratton) and Zoology (Gratton).
- Hubbed with F&WE, Plant Pathology
- Members of cross-college Extension teams (vegetable, field crops, grains, fruit, turf)
- Funded research with CALS Genetics, Agronomy, Horticulture, Plant Pathology, F&WE, Biometry. We also align and interact frequently with Botany, Zoology, School of Medicine and Public Health (especially Population Health and Molecular & Environmental Toxicology), School of Veterinary Medicine, Nelson Institute, Global Health Institute, Great Lakes Bioenergy Consortium, Molecular and Environmental Toxicology

3. **What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?**

Insects are the only group of invertebrates that consistently and universally cause problems for humanity. They are tiny, able to disperse over long distances, short-generational, and, because they are ectotherms, respond to changes in temperature very rapidly. They are also the primary group of animals to engage in ecosystem services including nutrient recycling, biological control,

and pollination services. Over the next 10-25 years, our unique expertise will be needed for research to address issues including:

- How climate change affects pest populations, impacts, distributions, and disease dynamics
- New ecological and genetic strategies for managing invasive species (e.g. emerald ash borer, soybean aphid) and emerging infectious disease (Wisconsin is a hotspot for emerging tick-borne disease)
- Developing and testing models of how land-use changes affect key ecosystem services including pollination and natural enemies that suppress pest populations
- Improvements to pest management strategies that conserve environmental quality and the availability of clean water resources by reducing pesticide inputs (including genetic solutions, plant germplasm development)
- Pollinator conservation, plant protection, bioenergy, evolution of resistance, transgene escape and natural resource conservation

**4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department**

- The major is characterized by high-impact practices: all undergraduates do research projects with faculty, the capstone is a multi-week field experience, most classes involve laboratories, many Hildale and Holstrom awards have been received. **The number of majors is small now, but could grow based on peers.**
- We have a strong program of 30+ graduate students. Not captured is the fact that an additional 8-10 students at any one time are trained by Entomology faculty, but receive degrees from other units. These include Master's of Public Health, Agroecology, Forest and Wildlife Ecology, Comparative Biomedical Sciences, Zoology, Molecular and Environmental Toxicology, and Plant Pathology. Graduate education requires smaller classes and these should have a multiplier in the CFI calculations.
- Extension deliverables and associated impact are not effectively captured, nor are relationships with the public (PJ Liesch) and stakeholders significant for the College
- **Entomology has a broader portfolio of funding support** than most CALS Departments, including current or past support from USDA, HFSP, NSF, NIH, CDC, DOE, DOD, WHO as well as many commodity groups. Peer departments generate \$8-11 million in extramural support each year. Current metrics for our department are a reflection of a lack of (recent) re-investment as well as demographics and USDA appointments.

**5. Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?**

- Stand-alone departments should remain where the evidence of success at comparable institutions supports this structure. Entomology, highly defined yet exceedingly broad, would be impossible to house as one unit with any other department.
- Restructuring should focus on departments where there is complementarity of interests.
- Colleagues at peer institutions noted that organizing around themes didn't affect interactions, so no synergy was gained. Whatever structure is produced, metrics must determine whether improvements to research funding, high impact science, and student training result.

# **CALS Organizational Redesign Committee**

## **Questions for CALS Departments**

**Department Name: Nutritional Sciences**

**Submitted by: David Eide, Chair**

### ***1. What are the top 3-5 historical and present strengths of your department?***

The Department of Nutritional Sciences is consistently ranked in the top 5 Nutritional Sciences programs in the US. This high ranking is due to many factors.

- Faculty in Nutritional Sciences perform cutting-edge research to improve the health of the US and global population. Our strength in research is evident in our high level of federal (primarily NIH) and nonfederal grant funding; the research funding of the average faculty member in Nutritional Sciences is ~\$350,000 per year (4<sup>th</sup> highest in CALS). Additional evidence is our longstanding (24 years) NIH T32 training grant.
- Our strength is also evident in our undergraduate teaching. Our department offers two undergraduate degree programs, Dietetics and Nutritional Sciences. There are ~180 students in the accredited Dietetics track and ~100 students in the Nutritional Sciences track. We are nationally recognized for the quality of our undergraduates. For example, placement of Dietetics students into RD internships is 88% (national average 50%).
- The Nutritional Sciences graduate program is also consistently ranked in the top 5 nationally. This program is interdepartmental with about 50 faculty trainers from 19 different departments across the UW-Madison campus. We currently have 29 PhD students and 1 MS student in the program. Also, our new online MS program in Clinical Nutrition will meet the needs of nutrition professionals nationwide.
- Finally, our extension faculty and staff work directly with citizens of Wisconsin to improve their nutrition and health through USDA programs like SNAP-Ed and EFNEP.

### ***2. How does your department "fit" within CALS shared missions of teaching, research, or outreach? With which academic units within CALS does your department align?***

The activities of Nutritional Sciences fit very well with the CALS missions of research, teaching, and outreach. Because Nutritional Sciences is a very interdisciplinary field, we align in research interests with several other departments including Biochemistry, Genetics, Bacteriology, Animal Science, and Dairy Science, as well as departments outside of CALS such as Public Health Sciences, Endocrinology, Medicine, Surgery, and others. In instruction, our Dietetics students take 3 Food Science courses (7 credits total). Nutritional Sciences students may take 1 Food Science course as an elective.

### ***3. What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?***

Key issues for research in nutritional sciences in the near future include the following:

- *Personalized Nutrition*: Understanding variability in individual responses to diets and foods. Important factors include genetics, epigenetics, and microbiome effects.



- *Pediatric Nutrition*: Enhancing the impact of nutrition on healthy growth and development.
- *Nutrition and Aging*: Increasing our understanding of nutrition in adult and geriatric health maintenance.
- *Nutrition and Disease*: Providing mechanistic insights into the initiation, progression, and treatment of acute and chronic diseases with nutrient-related pathologies.
- *Clinical Nutrition*: Improving the impact of nutrition in disease treatment.
- *Nutrition Education*: Understanding and improving nutrition-related behaviors.

Advances in these areas will require traditional tools of research combined with more recent developments in “omics” approaches (e.g. genomics, transcriptomics, proteomics, metabolomics), microbiome analysis, bioinformatics, biostatistics, systems biology, improved biomarkers of status and health, and clinical studies.

**4. What do the standard UW and CALS metrics available on departments, such as CFI, FP, grants, IDC, not adequately or accurately capture about your department?**

We believe that the standard metrics accurately reflect the success of our department. Our most recent 2-year average CFI is the highest in the college. Even if our popular service course, NS 132, is removed from that calculation, we still rank 4<sup>th</sup>. Our faculty also mentor graduate students from other programs including CMB, Genetics, and Microbiology.

**5. Given existing resources, in your opinion, what is the ideal organization of the college?**

Nutritional Sciences agrees with the goal of reorganizing the college into fewer, stronger departments each with a critical mass of 15-20 faculty. With our current 12.5 faculty FTE (which includes the completion of our ongoing faculty hiring process and the addition this summer of Dr. Jing Fan, a Morgridge-supported new faculty member), we hope to strengthen Nutritional Sciences in this reorganization process. Because of the interdisciplinary nature of nutrition research, no single department within CALS would be a logical partner for fusion with Nutritional Sciences. While we and Food Science bear a superficial appearance of connection, this is not actually the case. Food Science deals primarily with food production, chemistry, and preparation issues while Nutritional Sciences addresses nutrient metabolism in the body and the effects of dietary constituents on health and disease. Moreover, instructional overlap between our two departments, while important, is not very extensive. Therefore, we have little research and instructional connection with Food Science and see minimal benefit to fusing our units. Both Food Science and Nutritional Science are successful units with high student numbers and strong research in their respective areas and we do not encourage disrupting that success.

**As an alternative strategy**, there are many faculty in other departments in CALS who are doing excellent nutrition-related work and these individuals could be invited to move their appointments to Nutritional Sciences. Examples include Laura Hernandez, Sebastian Arriola Apelo, and Heather White (Dairy Science), Tom Crenshaw, Mark Cook, and Dhanu Shanmuganayagam (Animal Science), Alan Attie, Wes Pike, and Margaret Clagett-Dame (Biochemistry), Federico Rey (Bacteriology) and JP van Pijkeren (Food Science). Adding as few as 2 or 3 of these excellent nutrition-oriented faculty to Nutritional Sciences would quite easily raise us to the critical mass that is the goal of this reorganization process.

1) *What are the top 3-5 historical and present strengths of your department? What do peers from other institutions or industries say when they are complimenting your department?*

- Strong to exceptional research capacity and extramural support in interdisciplinary, applied ecology and spatial analysis of ecological systems that emphasizes foundational knowledge and management implications with a secondary strength in social sciences
- Demonstrated commitment to and impact on how species and ecosystem are managed in Wisconsin and beyond; Extends beyond extension faculty to nearly everyone; Strong connections with state and federal management agencies, and conservation organizations
- Exceptional students at both the undergraduate and graduate level; Strong commitment from students to shape their educational experiences and achieve professional success; BS graduates are seen as strong, adaptable, science-based natural resource professionals
- Historically, F&W Ecology has strong, multiple relationships with the WI Department of Natural Resources. The agency was a strong and consistent funder of applied research and contributed to portions of two faculty lines. Applied research and faculty support continues, but at a lesser level and with greater uncertainty over the last four years.

2) *How does your department “fit” within CALS shared missions of teaching, research, or outreach? Which, if any, other academic units within CALS does your department align with?*

- Ecology doesn’t have a department “home” on campus, but F&W Ecology has one of the highest concentrations of faculty, staff, students, and trainees working in this domain. Our faculty are relatively young suggesting continued strengths for the years ahead.
- We most closely align with the “healthy ecosystems” and “changing climate” CALS priority themes, but also connect to “bioenergy and bioenergy” and “economic and community development.” We have a keen interest in college and campus initiatives surrounding ecoinformatics and the microbiome.
- Our faculty are highly collaborative internally and with colleagues in CALS and across campus. In general, any unit with ecologists are likely to have current or past collaborations with our faculty. Our closest CALS connections are with colleagues in Agronomy and Entomology, as well as collaborations with AAE faculty. We also have substantive ties to AOS, Botany, Geography, Zoology, and the Nelson Institute.

3) *What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?*

- Direct, indirect, and compounding effect of climate change on ecological systems and the need for management approaches to address those effects
- Continued human and societal impact and encroachment on ecological systems amid increasing demands for services that sustain human life and well-being
- Emergence of novel ecosystems that require new management paradigms and approaches to ensure the sustainable provisioning of ecosystem services
- Potential for genomics and new sensors to transform conservation and management of natural ecosystems related to endangered and invasive species, climate change, etc.

- Changing societal expectation about forests and wildlife from traditional management foci (e.g., fiber and hunting) toward provisioning a broad suite of ecosystem services

4) *What do the standard UW and CALS metrics available on departments not adequately or accurately capture about your department? For example, “Numbers of graduate students are underrepresented because many get degrees from unit X.”*

- Departmental teaching (i.e., F&W Ecol listed) includes a roughly equal proportion of field and lab courses to lecture courses by credits offered; field and lab courses are required to adequately train our undergraduate students for professional opportunities (e.g., accreditation).
- Graduate students funded through the Department may be in programs outside the department, including Nelson’s Environment & Resources and Agroecology.
- Administrative support services are external to the department and managed in partnership with the Entomology and Plant Pathology; Russell Labs Administrative Support Center (‘the hub’) has been mostly positive, but the potential for additional efficiencies is limited.
- F&W Ecology resulted from the merger of Forest Ecology & Management, and Wildlife Ecology in 2007. At merger there were 28 faculty, while today there are 19 with one offer extended. Greatest loss of capacity has been in forestry and the social sciences.
- Three divisions are present in the department: biological, physical, and social sciences.

5) *Given existing resources, in your opinion, what is the ideal organization of the college? Would you like to share any lessons learned from peer institutions about successes or failures in restructuring?*

- Any new structure must serve the future needs of our students, advance science, and result in functional units. However, any new structure will necessarily be a compromise between the present and the future.
- ‘Hubbing’ may seem attractive, but it focuses on administrative efficiencies, not the vibrancy of intellectual communities, and thus, doesn’t address the underlying challenge facing the college.
- For whatever new programs emerge, some degree of self-determination with respect to faculty lines is essential. I envision larger units with sufficient budgets to largely manage their own risk (25-35 professors). The social sciences are most at risk under this approach, but they are essential to our ability to meet current and future grand challenges.
- At peer agricultural colleges (e.g., MSU, UMN), forestry and wildlife are in separate departments. Other peer institutions might have stand-alone colleges of natural resources that house both programs (also as separate departments), along with other programs (e.g., recreation, wood materials, environmental science). Penn State, when it consolidated its College of Agricultural Sciences, combined its School of Forest Resources (forestry and wildlife & fisheries programs) with the soils faculty from its Department of Crop & Soil Sciences to create the Department of Ecosystem Science & Management. Alternatively, Iowa State consolidates support services and hired a single Department Head to oversee the Departments of Entomology and Natural Resource Ecology & Management.

DRAFT (pending department review)

**Department Name: Life Sciences Communication (LSC)**  
**Submitted by: Dominique Brossard, Professor and Chair**

1. *What are the top 3-5 historical and present strengths of your department?*

*Research:* LSC is one of the top programs in science communication globally, competing directly with private schools, such as MIT, Stanford and University of Pennsylvania. Based on Academic Analytics data, LSC faculty are ranked #1 (ahead of MIT and any other communication program in the nation) in publications per faculty, and #4 in citations. The latest NRC doctoral program rankings include UW-Madison, Penn, and Stanford as the only three programs with a #1 ranking. Finally, a forthcoming report from a project on science communication funded by the European Community lists science communication at UW-Madison as the global leader in research productivity in this area.

*Policy and industry footprint:* Our faculty are centrally involved in working with policy makers, corporate stakeholders and the National Academies of Sciences (NASEM) toward using empirical science communication research for closing science-public divides on issues, such as GMOs, gene editing, environmental issues and risk communication. This past year alone, LSC faculty served on four different NASEM committees.

*CALS-relevant interdisciplinarity:* LSC has a long history of collaborating with physical and biological scientists in CALS and beyond. This has included DOE-funded research with nuclear physics, NSF-funded work with engineering, and USDA-funded work on food and meat. In other words, our faculty are deeply integrated into all areas of science within the university and CALS. Communication-related competencies are relevant for all CALS students and for the college overall across all focal areas the college identified in its strategic planning document.

*Undergraduate instruction:* LSC has a long history of bringing a special blend of real-world applications to theory-based instruction, and for preparing well students for job opportunities across industries. We have therefore gained a reputation among industry executives and recruiters as the go-to department for excellent employees. Our graduates, who have often double majored in a life sciences discipline and LSC, have the core communication competencies CALS board of visitors and alumni routinely highlight as essential in today's marketplace.

2. *How does your department "fit" within CALS shared missions?*

LSC "aligns" with or provides work that is relevant to all departments in CALS. Effective science communication cuts across every academic department in CALS. Our research is particularly relevant in today's climate, where CALS scientists need to effectively with the public.

3. *What do you see as the most important problems or high-impact issues that scientists and experts in the fields within your department will need to work on for the next 10-25 years?*

3/10/17

Effective communication about complex and often controversial scientific and agricultural issues is more than ever necessary and science communication research will have to continue to provide theoretical and applied answers to difficult societal questions. LSC faculty have written about this extensively. In fact, one of our faculty members just vice-chaired a NASEM report that outlined a research agenda for the field of science communication:

<https://www.nap.edu/catalog/23674/communicating-science-effectively-a-research-agenda>

4. *What do the standard UW and CALS metrics available on departments not adequately or accurately capture about your department?*

- LSC is #1 in peer-reviewed publications, a measure that accurately capture our research excellence.
- LSC number of graduate students has decreased but this does not reflect the quality of our program nor the demand for our degrees. The decrease is due to two reasons:
  - o We have switched to a model in which we fund all our students. Historically, this has not been the case for the field of communication, but we find that we cannot compete with private schools in recruitment unless we fund students.
  - o Faculty FTEs do directly impact advising capacity at the graduate level. Lecturers cannot advise Ph.D. students and – in most cases – M.S. students. As a result, our number of graduate students reflects the realities of CALS not replacing departures and retirements.
- The grant infrastructure for communication is very different than other CALS departments, and the available funding pool is much smaller.
  - o NSF doesn't have a communication specific program, even within SBE. This is different for other social science units in CALS (e.g., Sociology has an NSF program).
  - o This makes LSC's ability to attract extramural funds even more impressive, even though it may not be reflected in the data provided by central campus. Academic Analytics shows us in the top 20% of communication departments nationally in terms of extramural funding, despite our very small faculty. We have tapped funding sources in other NSF directorates, and most of our funding has not come from specific social scientific funding. We have leveraged our interdisciplinary collaborations within CALS to attract funding from bench and life science directorates within NSF and other agencies.
- Some of our lecture courses, which provide competencies relevant to all CALS majors, can enroll a large number of students. However, some of our class sizes need to be smaller than many CALS lecture classes because the instructors need to spend great amounts of time correcting and helping improve students' science communication work.

5. *Would you like to share any lessons learned from peer institutions?*

Our closest competitor is Cornell—both at the departmental and the college level. CALS at Cornell has moved ahead of UW-Madison CALS in recent years with little indication that we will catch up any time soon. One of the key areas of investment at Cornell has been science communication. CALS at Cornell has recognized that competencies in communicating complex science and technology to consumers, citizens, and policy makers is increasingly important.