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Working Paper

Examining Interdisciplinary Sustainability Institutes at Major Research Universities: Innovations in Cross-Campus and Cross-Disciplinary Models.

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Examining Interdisciplinary Sustainability Institutes at Major Research Universities:

Innovations in Cross-Campus and Cross-Disciplinary Models.

A research study conducted by the University of Michigan
with financial support from the Cynthia and George Mitchell Foundation

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April 2017

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Foreword

George P. Mitchell, founder of the Cynthia and George Mitchell Foundation, recognized early in life that educating young people to think critically about complex problems was the key to forging a sustainable path for the environment and society. He watched as the international sustainability movement gained momentum, and often described the principles of sustainability as the critical threads that could, and must, unite the different disciplines – from the social sciences to architecture and city planning to environmental studies. "You have to get the young people energized," George Mitchell said. "If you could get 100,000 young people really working hard, you could change the thinking of this country."

The sustainability science approach to solving complex environmental and social problems aims to bring together scholarship and practice, global and local perspectives, and disciplines across natural and social sciences. The approach is neither pure science nor applied science. Instead, scientific disciplines are tools for problem solving, with the scientific approach defined by the problems being addressed rather than the particular discipline employed. George Mitchell realized that it was necessary to infuse the flavor of sustainability science into as many disciplines as possible at the university level in order to prepare our future leaders for the changing world ahead.

This report from the University of Michigan, as commissioned by the University of Texas at Austin and funded by the Cynthia and George Mitchell Foundation, takes an in-depth look at 18 universities with various models of sustainability institutes. These institutes are charged with no easy task, breaking down the long-cemented disciplinary and financial silos that hinder progress of sustainability education. While many universities across the United States have recognized the importance of this effort, this study is the first attempt to analyze the distinctive characteristics, activities, challenges, and opportunities of this certain type of sustainability institute. With our eyes toward the future, the Cynthia and George Mitchell Foundation hopes that this report will help support the efforts of the universities included in this report, as well as many others, to break down the barriers within higher education in a thoughtful, sustainability-focused way, as George Mitchell intended.

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The Cynthia and George Mitchell Foundation
Austin, Texas

Acknowledgements

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Executive Summary

This is a study of the distinctive characteristics, activities, challenges and opportunities of a specific type of sustainability institute, one that spans the many disciplines of the University and, to do so, reports to upper administration (Provost or Vice President.) Among research universities within the Association of American Universities (AAU), 19 are identified and 18 agreed to participate in this study. Directors were sent a 71-question survey in January 2017 that covered issues of Governance, Research, Education, Engagement, Campus Operations and Best Practices.

Ten respondents indicated that their institute reports to the Provost's office and seven report to the Vice President (or Vice Chancellor) of Research. Faculty Director compensation varies from low (0-30% Full Time Equivalent), to medium (50-70% FTE) to high range (100% FTE). Typical performance metrics cover fourteen categories, with research performance, students impacted, grants received, publications created and revenues generated leading the list. Staffing of these institutes ranges from 1 to 60 personnel, with an average of 22. Faculty affiliates range from 22 to 492 total faculty (average of 146) and a range of relationships including core (100% appointment), joint (≤50% appointment), participating (0% appointment) faculty and lecturers. The majority of those engaged are participating faculty with no formal appointment (average 131 or 82% of faculty). Reported institute annual expenditures range from $350,000 to $25 million, with an average of $7 million. Thirteen institutes report an internal advisory board and twelve institutes have an external advisory board. Seven institutes have no separate research centers under their direction, ranging from 1 to 8.

Columbia's Earth Institute is an outlier on this dimensions with 25 research centers (as well as 199 employees and a $135 million dollars in annual expenditures), suggesting an alternative organizational model than the rest of the sample.

Respondents report that, on average, 48% of their research is conducted in collaboration with external stakeholders, and that they maintain a balanced mix of basic and applied research (an average of 44% and a median of 50% of basic research). Half the institutes offer no degrees, certificates or minors to their students. Of the other half, two offer certificates only, one offers a degree only (bachelors), three offer certificates and degrees (bachelors, masters and doctoral), two offer certificates and a minor, and one supports a minor only. Twelve institutes report that they pursue projects with campus facilities and operations, using the university campus as a learning laboratory, assisting campus facilities staff to implement broader climate action plans, and advancing the efficiency, effectiveness and cost of campus operations. Far more detail on these and other related data are included within this report, with respondents noting that all universities are not the same and any attempt to create a cross-campus sustainability institute should be contingent upon the "unique circumstances, strengths and resources of the existing Institute and its organizational context within the university."

Despite this variation, five broad themes emerged. First, these types of institutes can be provocative as some perceive them to be competing for resources, most notably money and students. Second, the way to overcome such tensions is complement and not "compete with academic departments" by adopting a service mindset. Third, a key success factor is broad participation, engagement and relationship building across a wide array of stakeholders in the university. Fourth, be sure to communicate the value proposition you provide to the University and your constituencies widely and often. Fifth, but certainly

not the least important success factor, "be configured to earn your way" by securing steady, reliable, diverse and long term funding.

While the institutes in this study are focused on sustainability, the information and lessons presented could be applicable to any topical institute which seeks to link the multiple disciplines of a university campus into a common endeavor. Thus, the new organizational model these institutes represent offer broader value to fostering a "one university" culture which breaks down siloes among schools and encourages multi-disciplinary research in the service of society. This report is intended as an aid to these institutes to help them understand their shared role in achieving this important goal of making the sum of the diverse activities of the university greater than the individual parts. Fostering greater interconnections among the many disciplines in a university is necessary for both addressing the major issues of our day, and reinvigorating the vitality of the university research enterprise.

Main Report

1. Introduction

The significant sustainability issues of our day present some of the greatest challenges for the next generation. Indeed, the world that young people will inherit and live in will be far different than the one we live in today. Ecosystem changes – resulting from climate change, water scarcity, ocean acidification, ecosystem destruction, nitrogen and phosphorous pollution and more (all part of what is called the "Anthropocene"[1]) – coupled with social changes – in the form of income inequality, human rights abuses, and environmental injustice – require new ways of conceptualizing and organizing academic research, teaching, and engagement. The traditional domain for many universities to address sustainability lies within schools of the environment which were formed in the early 1900s to focus on issues such as forestry, fisheries, and resource management. But today, this structure may be insufficient to the challenge at hand. Instead, sustainability education and research, especially in research-intensive universities, is finding a welcome home across the campus, in schools of business, architecture, public policy, public health, engineering, law, and many more. This reality creates new challenges for internal coordination and focus, as well as for building external partnerships, fund raising, and engagement.

In response, universities are experimenting with new types of organizational centers and institutes which are intended to make the sum of the diverse activities greater than the individual parts. This report is an examination of this new form of cross-disciplinary sustainability institute, one that spans the traditional disciplines of the university, seeking to harnesses the power of their communities to address the grand challenges of sustainability. While the institutes in this study are focused on sustainability, the information and lessons presented could be applicable to any topical institute which seeks to link the multiple disciplines of a university campus into a common endeavor. Therefore, we hope to provide an aid to universities seeking to understand how best to structure themselves to provide coordinated, multi-disciplinary solutions for the great challenges we face as a society and a world, and to help the institutes themselves to work more effectively and efficiently. The issues that this report examines include:

- **Governance.** How do institutes manage reporting, organizational design, finance and mission? To whom does the institute Director report directly? What is the administrative FTE allocated for the institute Director? What type of advisory boards do institutes use? What are the metrics of success? How large a staff do institutes employ, and what are their roles? Do institutes employ their own development staff? How many faculty are engaged with each institute, and what disciplines do they represent? What is expected of faculty? How do institutes coordinate activities across diverse faculty communities? How large are total annual expenditures, and to what activities are they directed? What are the sources of annual revenue and how are they managed? What is included in an institute mission and vision statement? How do they define "sustainability"?

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[1] Crutzen, P. (2002). "Geology of mankind," *Nature*, 415: 23; Crutzen, P. and E. Stoermer (2000). "The 'Anthropocene'". *Global Change Newsletter*, 41: 17–18; Zalasiewicz, J., M. Williams, W. Steffen and P. Crutzen. (2010). "The new world of the Anthropocene," *Environment Science & Technology*, 44(7): 2228–2231.

- **Research.** What is the balance of applied and basic research? What is the balance of disciplinary, interdisciplinary or transdisciplinary, research? How do institutes decide which projects to pursue? What types of services are offered to support faculty in securing and administering research grants? What themes of research projects do institutes pursue? At what geographic scale do they focus?

- **Education.** What level of student is offered educational content? What degrees are offered (if any)? What kinds of resources are provided for students? Do institutes create and offer their own portfolio of course offerings, or do they facilitate course development in other academic units? How are faculty rewarded for teaching course content? How are faculty compensation and tuition revenue handled?

- **Engagement.** Who are the relevant internal stakeholders? Who are the relevant external stakeholders? What kind of activities are employed to engage stakeholders? What tools are used to disseminate information to stakeholders?

- **Campus Operations.** Do institutes pursue projects with campus facilities and operations? How do they engage, and on what topics? What are areas of synergy and tension between institutes and campus operations?

- **Best Practices.** What advice would an institute Director provide regarding the formation of a new institute? What advice would they provide for improving an existing institute? What are the key elements of structure and model that aid in producing widespread benefits within and beyond the university? What are the key challenges associated with this structure and model? What are the sources of opposition or tension that exist with other parts of the University? What are some examples of successes; of failures? What special skills or attributes are critically important for a successful Director of an institute? What is one key element (i.e. structural, programmatic, etc.) that differentiates one institute from another?

> **PARTICIPATING INSTITUTES**
> - Boston University, Institute for Sustainable Energy
> - Brown University, Environmental Change Initiative
> - Columbia University, The Earth Institute
> - Cornell University, David R. Atkinson Center for a Sustainable Future
> - Duke University, Nicholas Institute
> - Johns Hopkins University, Environment, Energy, Sustainability and Health Institute
> - Northwestern University, Institute for Sustainability and Energy
> - Pennsylvania State University, Penn State Institutes of Energy and the Environment
> - Princeton University, Princeton Environmental Institute
> - Stanford University, Woods Institute for the Environment
> - Texas A&M University, Energy Institute
> - University of Arizona, Institute of the Environment
> - University of California-Los Angeles, Institute on the Environment and Sustainability
> - University of Illinois at Urbana-Champaign, Institute for Sustainability, Energy, and Environment
> - University of Michigan-Ann Arbor, Graham Sustainability Institute
> - University of Minnesota-Twin Cities, Institute on the Environment
> - University of Wisconsin-Madison, Nelson Institute for Environmental Studies
> - Vanderbilt University, Vanderbilt Institute for Energy and Environment

In the end, the type of organizational innovation that this report examines represents new territory for many, if not most, universities. While some may prefer to maintain a single intellectual home in which a specific domain of research, teaching, and engagement is conducted, others are developing central organizing hubs to connect the network of such homes, aspiring to create the connective tissue that

helps each home unit to do its work better and have greater impact for solving the great sustainability challenges of our day. While each university has been innovating largely on its own, they each have garnered experiential knowledge from which others can learn. The time is right for compiling this information to help diffuse the best practices learned by these organizations, and to help other universities adopt similar initiatives to alter the academic landscape across the country in order to push toward transforming the university in greater service to society.

Methodology. This study focuses on sustainability institutes that report to a university administrator in central administration (above the level of a school or college dean) at research universities within the Association of American Universities (AAU). Nineteen were identified; 18 agreed to participate in this study, 1 did not reply to our invitation. Each Director was emailed a 71-question survey in January 2017 (through Survey Monkey). Questions required both qualitative and quantitative answers and covered seven domains: (1) Introductory Information - 5 questions; (2) Governance (including (a) Reporting, (b) Organization, (c) Finances and (d) Mission/Vision) - 29 questions; (3) Research - 8 questions; (4) Education - 6 questions; (5) Engagement - 5 questions; (6) Campus Operations - between 1 and 5 questions, and; (7) Best Practices - 13 questions. Answers were received and clarified by late March 2017 and data was analyzed (using Excel and Qualtrics). We followed up with in-depth discussions with some institute Directors to gain more clarity. One institute – The Earth Institute at Columbia University - was treated separately because their data and characteristics were distinctly different from the rest of the sample. It not only represented the largest institute in terms of funding and personnel, but its governance model also differed from the remaining 17 institutes.

Overall, the institutes in this sample differ from those in previous studies of sustainability (or environmental) institutes on college campuses, as surveyed by groups such as the National Council for Science and the Environment (NCSE)[2] or the Association for the Advancement of Sustainability in Higher Education (AASHE)[3]. First, this is a much more focused sample. Though 11 schools in this report are members of the NCSE[4], NCSE studies cover a much broader demographic. For example, the 2012 NCSE census covered 1,151 academic units/programs offering 1,859 IES baccalaureate and graduate degrees located at 838 colleges and universities. This study covers 18 very specialized units. The vast majority (82%) of the institutes in the NCSE study reported to a dean, or department chair.[5] None of the

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[2] Vincent, S., K. Dutton, R. Santos and L. Sloane (2015) *Interdisciplinary Environmental and Sustainability Education and Research: Leadership and Administrative Structures*, Washington DC: National Council for Science and the Environment; Vincent, S., S. Bunn and S. Stevens (2012) *Sustainability Education: Results from the 2012 Census of U.S. Four Year Colleges and Universities*, Washington DC: National Council for Science and the Environment; Vincent, S., S. Bunn and S. Stevens (2012) *Interdisciplinary Environmental and Sustainability Education: Results from the 2012 Census of U.S. Four Year Colleges and Universities*, Washington DC: National Council for Science and the Environment.

[3] Urbanski, M. (2014) *2014 Higher Education Sustainability Review*, Denver, CO: Association for the Advancement of Sustainability in Higher Education; Urbanski, M. (2015) *Salaries & Status of Sustainability Staff in Higher Education*, Denver, CO: Association for the Advancement of Sustainability in Higher Education;

[4] Boston University, Columbia University, Cornell University, Johns Hopkins University, Pennsylvania State University, Texas A&M University, University of Arizona, University of Illinois at Urbana-Champaign, University of Michigan, University of Minnesota, University of Wisconsin.

[5] Vincent, S., K. Dutton, R. Santos and L. Sloane (2015) *Interdisciplinary Environmental and Sustainability Education and Research: Leadership and Administrative Structures*, Washington DC: National Council for Science and the Environment.

institutes in this study report to that level, instead reporting to the Provost or Vice President's office. Both the NCSE and AASHE studies focus heavily on education whereas this study focuses more broadly on all activities of a sustainability institute. Finally, institutes in this study are generally newer, with an average year of formation of 2002 (see Figure 1), compared to an average year of formation of 2000 in one NCSE study (see Figure 2). Despite these differences, this study offers a complement to the existing literature on sustainability teaching, research and education on college campuses, whose "analysis, synthesis and sharing of experiences is vital for informing the design and implementation of future initiatives."[6] While centers for sustainability are experiencing rapid growth overall - from 13 programs in 2008 to 141 in 2012[7] - this report offers a glimpse into a specific new form of innovative unit to achieve similar ends.

<center>-- INSERT FIGURES 1 and 2 ABOUT HERE –</center>

Broad Themes. Several common themes emerge in the analysis that follows. Institute respondents repeatedly point out that **all universities are not the same** and "adopting another university's model might not work at your university." Any attempt to create a cross-campus sustainability institute should be contingent upon the "unique circumstances, strengths and resources of the existing Institute and its organizational context within the university." It should reflect "your institution's culture," "the intellectual capital and interests of the University faculty" and "the external challenges requiring input." For example, one respondent points out that external "cuts in state funding have reduced funding for cross-campus efforts." Others point to internal challenges such as "traditional university protocols and structures," "finance, reporting and course administration models," a lack of "strong development support," rigidly siloed cultures with "an institutional bias against innovation and risk-taking," and "differing budget models for different schools." All of these issues point to a recognition that different models emerge out of different contexts. But, there are commonalities that were found across institutes that are worth noting.

First, **these types of institutes can be provocative**. While some respondents report that there are no or low tensions with other units on campus, others highlighted that there are many, both perceived and real, and that Directors must actively attend to them. The most common tension is a sense that these institutes are competing for resources, most notably money and students from the traditional centers of teaching and research; the individual schools and departments. Respondents warn of "territorialism and adherence to long-held precedents of interactivity," "concerns from other units that faculty grants are 'lost' to interdisciplinary centers, along with indirect cost recovery," "the perception that funds provided to the Institute would be better invested in the academic units," or that they are "stealing students from other units, or stealing teaching credit." Summing up, one respondent warns that you should "make sure you understand who is

> *"concerns from other units that faculty grants are 'lost' to interdisciplinary centers."*

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[6] Hart, D. et al. (2016) "Mobilizing the power of higher education to tackle the grand challenge of sustainability: Lessons from novel initiatives," *Elementa: The Science of the Anthropocene*, 4: 1-5; O'Bryne, D., W. Dripps and K. Nicholas (2015) "Teaching and learning sustainability: An assessment of the curriculum content and structure of sustainability degree programs in higher education," *Sustainability Science*, 10: 43-59; Lang, D. et al. (2012) "Transdisciplinary research in sustainability science: Practice, principles, and challenges," *Sustainability Science*, 7 (Supplement 1): 25-43;

[7] Vincent, S., S. Bunn and S. Stevens (2013) *Interdisciplinary Environmental and Sustainability Education on the Nation's Campuses 2012: Curriculum Design*, Washington DC: National Council for Science and the Environment.

threatened by the formation of your institute, and be proactive about engaging them and addressing their concerns."

Second, the way to address such concerns is repeated often; be complementary and not "competitive with academic departments" by **adopting a service mindset**. For example, your "structure and goals must complement, not compete, with existing organizations on campus" where you "become a resource" and "provide services and opportunities to the academic units that they cannot provide for themselves." One respondent warns against being territorial, pointing out that "we consider ourselves to be the mother ship rather than the umbrella. So, there are pockets of institute relevant research all over the university, and we don't feel the need to claim them in any way." Another states the same service goal in a different way, "we operate a little like an internal foundation providing resources, organization and visibility."

> *"structure and goals must complement, not compete, with existing organizations on campus."*

Third, **a key success factor is broad participation, engagement and relationship building** across a wide array of stakeholders in the university. "Engagement, engagement, engagement" is the advice from one respondent, while another points out that "our work seeks to make the whole greater than the sum of the parts by catalyzing new efforts, while providing integration and support services to those already in existence." The most important constituency is a fully engaged faculty. As one respondent makes clear "listen to your faculty. You live and die on their success, not yours." To that end, many recommend an investment of time and effort in "faculty quality" by developing "strong support among a core group of tenured faculty" to "cement a sense of ownership in the institute." With that core in place, "cultivate relations with new faculty who have interests complementary to the aims of your institute," "be inclusive" and continually "seek to unite new partners and areas - the greatest opportunities for transformation often occur along the seams." At the same time, develop "genuine partnership with deans and unit heads." As one respondent notes, "We have strong relationships with the deans whose colleges are responsible for more than 80% of external grants." Finally, it is critical to "find and cultivate multiple strong champions in the upper administration" and "report to a high level in the university," preferably the Provost or Vice President "to ensure that the enterprise is cross-campus. Otherwise, it will be an uphill effort." With these relationships in place, "make sure you agree on goals and metrics" and "deliver (and document) value in ways that the administration understands and appreciates." Some respondents report that there is strength in numbers in their efforts and have "built informal and formal collaborative networks with other topic relevant Institutes and Centers" in order to " 'brand' our institutes to maximize our contribution to campus and more effectively aid development efforts."

> *"Listen to your faculty. You live and die on their success, not yours."*

Fourth, **be sure to communicate** the value proposition of your institute to the University and your constituencies. To the point, "you can't communicate too widely or too much." In particular, "top level communication" is critical. But consistent with the service mindset, "put more effort into communicating on behalf of your unit, partners, faculty and staff." As one respondent explains, "we document how the faculty we co-fund are a disproportionate part of each dean's success, and how the large interdisciplinary awards that we focus on bring institutional recognition and reward." The benefits emerge when "the deans of the colleges recognize us for science leadership. Because our co-funded faculty are embedded in colleges and our

> *"you can't communicate too widely or too much."*

> *"[Our unit] is heavily research-oriented, but is not exclusively research oriented. Thus, being under a Vice President of Research has limitations."*

support structures (seed grants, shared instrumentation, etc.) are available to the entire research community, there is strong support for us from the colleges and deans." Communications should not be focused only internally. "Continue to publicize the special expertise of your institute both on and off campus, and develop regular summaries of ongoing faculty research for news and communication."

This leads to the fifth, but certainly not the least important, success factor; "be configured to earn your way" by securing **steady, reliable, diverse and long term funding**. Diversity of funding sources is repeated often. You "need to have multiple funding sources if you want to be able to grow and have serious impact," particularly "some combination of indirect flows, tuition recovery, professional tuition returns, and philanthropy will be essential" within "the first few years." Funding that goes beyond research is also seen as vital. "If all the resources are related to research, then the institute will not really serve across campus that well." Echoing the service model, "be sure the funding model, return on grants, and credit for teaching does not compete with but benefits the academic units." "Try to get off being funded by overhead return. Not just that it is uncertain, but it sets up a competition with departments that is unhealthy." In the end, "a strong link with the development office makes a big difference, as does a generous advisory board."

> *"have multiple funding sources if you want to be able to grow and have serious impact."*

These common themes emerge repeatedly and in multiple forms throughout this report. But there are differences in approach as well. All are explored in the detailed survey analysis in the remainder of this report, which is divided into 9 sections: Reporting, Organization, Finance, Mission and Vision, Research, Education, External Engagement, Campus Facilities and Operations and Conclusions (including attributes that are required for a successful Director).

2. Reporting.

Reporting relationships for the institutes in this study sample are split: Ten report to the Provost's office and 7 report to the Vice President of Research (in one case, Vice Chancellor of Research). Notably, 5 that reported to the Provost's office had a dual reporting relationship: 2 reported to the Provost and Dean, 2 reported to the Provost and Vice President of Research and 1 reported to the Provost and Vice Provost. This is a governance issue that is viewed as critical for freedom of movement around the campus. As one respondent explains, "reporting to the Provost, and having stature equivalent to deans is an effective way to ensure that the enterprise is cross-campus, assuming the other deans are supportive of the enterprise."

But that level must match the objectives of the institute. As one respondent notes: "[our unit] is heavily research-oriented, but is not exclusively research oriented. Thus, being under a Vice President of Research has limitations." Another respondent concurs that "being under a Vice President of Research limits the scope and effectiveness of an environmental enterprise because the enterprise needs to be broader than research." Reflecting that sentiment and as shown in Table 1, institutes that report to the Provost rather than the Vice President of Research were:

- more likely to have activities related to education such as awarding tenure, hiring lecturers, and developing their own course offerings,

- more likely to draw revenue from institutional appropriations, expendable gifts, endowment income and unrestricted funds,
- less likely to draw revenue from government and other grants,
- more likely to be older.

-- INSERT TABLE 1 ABOUT HERE --

But even if the Director reports to a high-level administrator, they must be prepared for shifting priorities and emphases. "When a school's leadership changes, priorities usually shift as well." To be prepared, one respondent notes that one should "get everything in writing! Provosts and Presidents change more often than faculty do. It doesn't always work, but it can help." This applies to the Director as well, adds one respondent, "have a transition plan in place for possible future leadership changes - whether within the institute or at the university-that could affect priorities and resources available to the institute."

Compensation for the faculty Director varies within our sample, with clusters at the low (0-30% Full Time Equivalent), medium (50-70% FTE) and high range (100% FTE) (see Figure 3). Two institutes operate with a co-Director model, but the majority have a single faculty Director. As shown in Table 2, institutes in the high compensation range (100% FTE) tend to:

- have larger annual expenditures than those in the low range, but fewer than those in the medium range,
- be older than the medium and low range,
- have larger staffs than the medium and low range,
- be more likely to draw on (government and other) grants and restricted sources. Of note, the middle compensation range draws more from institutional appropriations and tuition and fees than both the high and low ranges.

-- INSERT FIGURE 3 and TABLE 2 ABOUT HERE –

Twelve institutes occupy **physical space** in a university owned building that is shared with other units, 2 occupy a sole use university owned building, 2 occupy multiple university owned buildings and 1 has no dedicated space. Among those with dedicated space, overall square footage ranges from 0 to 31,000 with an average 11,000 and a median of 10,000 square feet.

Thirteen institutes have an **internal advisory board** and 12 institutes have an **external advisory board**. Only two of these internal advisory boards have decision making authority, the rest are advisory. Internal advisory boards range in size from 5 to 50 with an average of 18 members from disciplines that span the university (some include Deans, staff, Provost and Vice Presidents). Some institutes have sub-committees for more focused work on governance and education.   External advisory boards range in size from 6 to 21 with an average of 13, and are comprised of representatives from business, non-profits, government, academics, entrepreneurs, private investment firms, private research centers, foundation leaders, alumni, major donors, and students. Two institutes without external advisory boards reported that they were in the process of forming one. One institute operates with no internal or external boards at all. But most respondents agree that "having strong advisory councils (i.e., deans, faculty, external) are critical structural elements."

Seven institutes have no **separate research centers** under their direction. Eight have between 1 and 5 research centers and 2 institutes have 8. The Earth Institute at Columbia University is an extreme outlier in this area with 25 such units. For that reason (and several others), it is covered separately (see Inset).

-- INSERT EARTH INSTITUTE INSET ABOUT HERE --

Institutes report **performance metrics** across 14 different categories (see Figure 4). The top tier include 4 highly cited metrics with *Research Performance* leading the list; fifteen institutes use this as a metric. As one respondent states, their institute is "mostly focused on research achievement." Research performance metrics include research programs started, student/faculty/staff involvement, and media responses to research. The second most cited metric is the measure of *Students Impacted* (post docs, graduate students and undergraduates), including the number of enrolled students, majors, minors, and graduates, as well as alumni placement, student credit hours generated and student ratings. Closely related are metrics are in the category of *course development* (number six on the list) and include such items as the number and type of courses, course and certificate enrollments and trends, continuing education, and technical training courses.

Grants are next on the list, with metrics on the number and size of externally secured government grants, sponsored research funding from corporate research partnerships and foundation funded projects. Some institutes are evaluated on the number of proposals submitted as well as the return on investment for grant development. Closely related metrics include revenue in support of the institute mission, which includes funds raised through philanthropy (individual, corporate and foundation), donor development, and the development of a resilient portfolio of benefactors. Some institutes track non-pooled tuition funds raised through professional programming as well as revenues from commercial activities.

Publications are the fourth most highly cited metric with measures for the number, quality and citations for publications (both peer reviewed and non-peer reviewed). Some institutes measure the number of collaborative publications they helped to develop. Related are measures of faculty impact, including H-factors, cross-disciplinary collaboration, number of faculty as principal investigators, conference participation, research group membership, and the number of academic departments engaged.

Moving to the second tier of metrics, *General Revenue* is the fifth most important metric and covers funding achievement, including research specific funding, gifts, and other forms of revenue generation including funding obtained for projects for institute staff and tuition revenue. *Media attention* is number seven on the list as institutes track earned media through external press and social media, as well as planned media penetration through the development of original content, social media utilization and analytics, and website traffic and response to research publications.

Engagement with faculty, students, staff, government, non-profit organizations, and industry is the eighth most common performance category, with metrics tracking the number and type of constituents engaged, corporate engagement, and unsolicited requests for assistance from various decision makers. Related measures include impacts on public knowledge, government policy, and corporate management. Some institutes focus on more narrow constituencies (i.e. native nations), several note that qualitative metrics are valued and some measure specific forms of engagement, including symposia and colloquia, plenary and keynote lectures, invited lectures and seminars, workshops, and the number of events with interdisciplinary audiences and community members. Lastly, some institutes measure

campus level engagement through criteria such as reduction of campus carbon emissions, influence on the organization and norms of the university or the inclusion of institute staff and ideas in university-wide policy and program development.

Rounding out the end of the list are metrics used by fewer than one-third of the institutes. These include *Awards and Honors*, and the development of *Intellectual Property*, patents (both applications and awarded), licensing agreements, start-ups, technology commercialization, and business development activities.

-- INSERT FIGURE 4 ABOUT HERE --

Where these performance measures represent criteria that institutes report to upper administration, respondents were also asked how they measure their **institute successes** and the accomplishments for which they were most proud. These two list have similarities but these accomplishments appear to have more of a service orientation, with specific constituencies served as more pronounced. Just as with performance metrics, *Research Initiatives* lead the list, with respondents identifying the new programs and initiatives that were started but notably, these are generally mentioned in conjunction with the number of *Faculty Engaged* (number 9 on the metrics list). One respondent reports "400+ faculty engaged in sustainability research" while another notes that "an integrated research and teaching program that has involved a large cross-section of the University community (in excess of 500 faculty and students) in environmental research." Another calls out, "our 62 co-funded faculty are PIs or co-PIs on about $100M of external funding annually, greatly exceeding the average research expenditures of typical faculty in their disciplines." One respondent highlights the purchase of $7 million of instrumentation to support energy and environmental research and the hiring of the associated technical support staff that "is widely used by researchers across the university, who are charged operational and administrative costs a cost-recovery basis." Finally, one respondent sees its growth of faculty affiliates from 70 to 240 in the last two years as a key success.

Right behind service to faculty is *Service to Students*, with one respondent reporting that the institute engaged "over 400 students during the 2016-2017 academic year," with others highlighting the "development of rigorous new curricula in environmental studies and environmental sciences," "a growing and popular curriculum portfolio, which we are developing into a formal Minor program," "new interdisciplinary graduate programs," a new "fellows program for top environmental graduate students across campus," and the honor of having "the most popular undergraduate certificate program" or over "300 sustainability-related courses and 48 student sustainability organizations."

> *"ours is a 'think and do' tank that seeks to engage in projects where the results can reduce or avoid emissions in real world scenarios."*

Many of these initiatives had real world impact in conjunction with external partners, so *External Engagement* is mentioned third most often as an institute accomplishment (number 8 on the metrics list). One respondent notes that "ours is a 'think and do' tank that seeks to engage in projects where the results can reduce or avoid emissions in real world scenarios." Others identify their "emphasis on outcomes-oriented fundamental research" and a tendency "to focus on our impacts outside the academy, given our mission" while another highlights "engaging nearly 400 external partners across academia, government, corporate and NGOs." Some of the accomplishments were extremely specific and outward facing with tribal leadership, regional manufacturing centers, experiment stations, municipal

government, as well as outcomes that led to legislative proposals, corporate management changes, or climate adaptation models.

Grants and *Revenue Generation* emerged fourth on the accomplishment list (number 3 and 5 on the metrics list). Many respondents list success examples such as "$3 million from a private donor to fund our flagship project," "attracting $95 million to support sustainability-related work," "five-year, $3.7 million grant from the National Science Foundation," "two endowed professorships and one fully endowed chair in the last three years," "a recent $1 million grant dedicated to diversity in STEM education," "over $1.5 million generated from sale of campus certified carbon credits in 2014 and 2016," And "the University's first Master Research Agreement with an energy provider."

Related to revenue generation, *Expenditures* of institute funding is fifth on the list, with accomplishments like "providing funding support to more than 1100 students and 200 faculty," "a 40% increase in academic programming expenditures," "better than $3-to-$1 return on internally-invested faculty seed funding, as measured by follow-on sponsored research," and "149 seed grant proposals resulted in 38 seed grant awards (25% success) totaling $809,000; these 38 awards supported 71 graduate and undergraduate students, generated 49 publications and 45 presentations, and resulted in 53 external proposals."

Service to other units rank sixth with activities such as co-funding faculty hires in departments and colleges through salary support or start-up packages or the creation of "a strong intellectual community of faculty across natural and social sciences" as well as the sponsorship of specific events, like conferences, workshops, lectures and community events. Some respondents note successes in *Alumni* who "have achieved leadership roles in their professional careers" and others mention *Awards* from groups like the Association of the Advancement of Sustainability in Higher Education (AASHE) STARS Gold Rating. One respondent notes successes in *Earned Media*, with "over 700 stories in external media" and a final respondent notes simply the accomplishment of survival, with the legacy of a "20-year history."

But in the end, the pursuit of better and more accurate performance metrics remains a critical concern. One respondent wonders if the institutes in this report are really being innovative if the focus of performance metrics remains fixed on standard measures like money and faculty degrees. To answer this question requires a more focused inquiry into how are we judging impact and the adoption of a spirit of innovation for transformational change. "Do we really know if we have a value add, even if just anecdotal?"

3. Organization.

Staffing of these institutes ranges from 1 to 60 personnel (average of 22), with a mix of fulltime (from 1 to 45) and part-time (from 1 to 26) staff (see Figure 5). Five institutes are staffed entirely by full time staff, and on average institutes employed 78% full time staff (the median was 85%). Shown in Table 3, those institutes in the upper half of staff size typically have:

- higher levels of Director compensation,
- occupy larger office space,
- more budget for instructional services,
- more capacity in functions for development, information technology, traditional media and education and outreach (see Figure 6).

-- INSERT TABLE 3 ABOUT HERE --

Of the 18 institutes in this study, 3 faculty directors are female (17%) and of the 11 institutes with a managing director, 7 are female (64%). While twelve institutes report that they have dedicated development staff, six report that this is a shared resource with central administration, central development and/or with other institutes on campus.

> *"a dedicated staff can drive rapid progress and can take time to communicate results outside of academic publications, project reports."*

Many respondents note the importance of a strong staff to the success of the institute. While faculty are also acknowledged as critical, one respondent notes that "relying heavily on faculty who have many other responsibilities limits the rate of work. Therefore, we are growing our team of dedicated staff." Another adds that "a dedicated staff can drive rapid progress and can take time to communicate results outside of academic publications, project reports." One respondent defines their institute's key distinctive element as a "structural reliance on senior professional staff to maintain mission of sustained external engagement." Often, these staff can be directed to have impact in ways that tenure track rewards and incentives for faculty do not consider; such as the administrative tasks of forming collaborative teams for cross-disciplinary research on issues of a more applied nature (i.e. not necessarily publishable in an academic journal) or translating that work for constituencies of practice beyond the academy. One respondent points out that attracting and retaining uniquely qualified staff requires a focus on wider range of skills and background than may be typical, including a focus on staff that are "translational PhD-level scientists."

But this focus on staff development comes with a caution from one respondent; "Because we have our own professional staff in visible roles, we sometimes find that the faculty believe the Institute is more interested in drawing attention to our own staff than faculty colleagues. I think investment in collaboration and planning projects together has lessened this latter concern." This issue returns attention to the service mindset. Respondents report that they strive to "provide services that are not generally available to the academic units." One adds that "our work in fostering interdisciplinary collaborations and addressing areas that would otherwise not be supported has led to new university-led initiatives that have benefited the entire community." Another notes that "our staff and faculty develop relationships with external stakeholders that others can leverage. This is helpful with companies as well as state and federal agencies."

-- INSERT FIGURE 5 and 6 ABOUT HERE --

All institutes include **faculty engagement** in their work, with the scale ranging from 22 to 492 total faculty and an average of 146 (see Figure 7). While there are a range of relationships including core (100% appointment), joint (≤50% appointment), participating (0% appointment) faculty and lecturers, the majority of those engaged are participating faculty with no formal appointment (average 131 or 82% of faculty). There are 3 outliers: one institute draws 60% of its faculty engagement from joint appointments, and two institutes draw 51% and 26% of their faculty engagement from core faculty.

One respondent notes that it is wise to "have some dedicated lines, but many shared appointments" to build collaborative partnerships across campus. Another warns that "our biggest challenge is appropriate appointments for talented, accomplished individuals without traditional academic CVs." Another reports that "it can be difficult to get jointly appointed faculty to teach for the environmental program (their loyalty tends to be first and foremost to their disciplinary home)."

Among these faculty, institutes strive for **multi-disciplinary engagement**. The disciplines that are most engaged are the physical sciences, engineering, environmental science, social science and professional schools, while journalism, education, medical science and veterinary science are least engaged (see Figure 8). This ranking closely mirrors the level of importance that respondents place on each discipline (see Figure 9) with one notable observation; respondents would like to see more engagement from all disciplines, as represented by the ratio of importance to engagement which is above 1.0 for all disciplines (as shown in Figure 10), with an elevated desire to see more engagement from education, veterinary science, medical science and journalism. One respondent reports that their faculty affiliates hail from nine colleges and schools, more than 20 University departments, two branch campuses, and two University System member institutions. Another respondent notes a strong desire to be as inclusive as possible by stating that "all disciplines, education levels, and ideas are welcome at the table of our vision."

The ability to bring together multiple disciplines is seen as a defining element of several institutes. One respondent notes their institute's "commitment to the whole scholarly community of campus, including not only physical, biological and social sciences, but also including serious commitment of programming and scholarly integration of the environmental humanities (history, ethics, literature, religion, art)." Another notes their Laboratory of Environmental Narratives and their "embrace of humanities - film, theatre, design, and literature - more than any other environmental institute." A third notes that its "multidisciplinary approach is relatively unique, insofar as it pushes the cohesive integration of technical, financial/economic, and policy/law for its areas of research and expertise. It does not seek to establish a Center for Energy Policy, but rather integrate that policy framework into each of its research centers." And a fourth notes "the structure and vision to cross departmental and college boundaries to address all facets of the energy landscape that naturally connect engineering, sciences, technologies, economics, law, and policy decisions."

But such integration is not easy for at least two reasons. The first is to "recognize that each discipline has its own language and incentive structures." One respondent notes that "fostering truly interdisciplinary work that spans the natural and social sciences is far from easy…we have found that it is critical to have collaborators become aware of differences in epistemological assumptions, methodological orientations, and professional norms across disciplines. These differences can compromise projects before they are even off the ground." The second challenge is to recognize that there are limits to an institute's ability to reach out to all departments and constituents. One respondent notes that "our university is highly decentralized with each school/college having a great deal of autonomy. A challenge for an institute like ours is managing all of those relationships effectively, knowing that each has very different dynamics. Some schools/colleges are behemoths where sustainability is an important but small focus area, while others schools are quite small and have sustainability as a significant (if not central) theme. Still others lie somewhere in between. Therefore, it is important to forge strong, productive, and positive relationships with each unit, where expectations and roles are clearly defined and understood." Indeed, another respondent notes that "it takes quite a lot of effort to manage so many bi-lateral relationships with deans and colleges. Often, institute directors are not included in dean gatherings where greater efficiencies could be had."

> *"recognize that each discipline has its own language and incentive structures."*

All institutes report that they have certain **expectations and responsibilities** of engaged faculty. In all cases, faculty are expected to perform research and most expect external engagement, participation in meetings and committees and teaching (see Figure 11). Most respondents encourage that faculty be put to work once they are engaged. As one states, "engage your faculty in strategic planning through an open and transparent process, then be sure to report back to them on implementation and assessment to show that you are following through on their great ideas. We also involve a broad group of respected faculty in ongoing implementation, not just asking advice but in many cases putting them in decision making roles (such as seed grant selection or prioritizing new shared instrumentation)." Many respondents note that an engaged faculty builds support and commitment to the institute, and creates value in other ways. One notes that "Faculty with deep expertise are an interesting and useful resource for external partners."

> "an engaged and energetic faculty is the difference between success and failure."

That said, two respondents report that they are not very demanding and that faculty can engage as they wish. This mirrors two realities that many institute Directors admit. The first is that "an engaged and energetic faculty is the difference between success and failure," and the second is that "the primary tool for a Director is persuasion – there is little power and few sanctions available if one is running the show transparently." One Director reports that "engagement and relationship management is the most critical skill" for an institute Director, another notes that "the Director spends a good deal of time interacting with faculty across campus."

With limited power to sanction, the key tools that Directors use to **attract faculty** relate to research, communications and grant preparation support. These support functions align well with pre-existing faculty objectives and can help the institute perform its role which, as one respondent describes, "we see ourselves as supporting the faculty and departments to do their best work." This fits with the tools that institutes use to keep faculty involved and coordinate activities across the portfolio of engaged

> "we see ourselves as supporting the faculty and departments to do their best work"

faculty. Grants administration is mentioned often as a service they provide. One respondent notes that "we have an effective grant-writing team that can help faculty pull together large, multi-investigator grants." One goes so far as to state that their grant support is "better than offered in departments." Another adds an important caveat to their grant support, "the value of research grants administered in our center are credited to the faculty's home department in addition to the center. This eliminates competition for grant administration." Additional tools for attracting faculty include project administration and coordination for inter-disciplinary research projects, seed funding, education support, communications and events. In communications, institutes report the use of newsletters, annual reports, quarterly reports, list serves, and university wide branding. In terms of events, they report the organization of Friday seminars (with wine and food), faculty research meetings, award programs, formal engagement with advisory boards and deans, lecture series, roundtable discussions, networking events to help faculty find collaborators, student events, and use of institute space for meetings and engagement.

4. Finance.

Institute **annual expenditures** range in size from $350,000 to $25 million, with an average of $7 million (see Figure 12, one institute did not provide its budget figures), though some institutes note that this reported figure does not include sponsored research expenditures, faculty salaries, endowed chairs and the Director's compensation (which in this case, comes from the Provost's office).   Institutes with expenditures less than $1 million focused primarily on research and do not provide much support for teaching and education. Institutes with larger expenditures tend to have more expectations for teaching and course development and offer more financial support in these areas. They also tend to have more staff and more engaged faculty (which includes more core and joint faculty), are more likely to offer tenure to faculty, and offer degrees or certificates.

-- INSERT FIGURE 12 ABOUT HERE --

There are five primary **sources of revenue** reported (shown in Figure 13) with all institutes drawing some portion of their funding from institutional appropriations. As a percentage of revenues, institutes draw on average 37% of revenues from this source and 24% from government grants, followed by expendable gifts (13%), endowment income (11%) and other grants (11%). Looking beyond averages, there is a wide range of proportional funding models. One institute draws the entirety of its revenue from institutional appropriations and two more draw the majority of their funding from institutional appropriations (89% and 66%); four institutes draw the majority of their funding from government grants (80%, 70%, 55% and 50%); one institute draws its majority from endowment income and another from expendable gifts (each 60%). One outlier draws 30% of its revenue from tuition and fees (on average, this makes up just 2% of all institute funding) and another outlier draws 30% of its budget from corporate support for research projects. Overall, three institutes rely primarily on one source for more than 70% of their budget, eleven institutes rely on two sources, and three institutes rely on three sources.

Respondents note several fine-grained elements of successful revenue generation. One notes that their success lies in "a funding model built primarily on return on IDC (indirect costs) or individual school contributions." Another respondent notes "small amounts of discretionary funding" are critical to success and a third concurs that "strong discretionary money that is ongoing allows us to add value to colleges." One respondent counsels that securing external funding is valuable because "it gains university respect."

-- INSERT FIGURE 13 ABOUT HERE --

While every institute draws at least some of its budget from institutional appropriations - ranging from 6% to 100% with an average of 37% - six institutes **negotiate their appropriation** annually (for an average of $780,000 per institute this year) and seven institutes receive a fixed amount of annual funding (for an average of $1.7 million per institute). Of the remaining institutes, two are guaranteed fixed appropriations for the first five years, and two have a mix of fixed and negotiated appropriations, one noting that "between 25-50% of institutional appropriations 'float' on changes in enrollments in courses taught by our core (paid) faculty, proportionate to the percentage of their lines paid from the Institute's budget).

There is a distribution among institutes on the percentage of **restricted versus unrestricted revenue** sources but there is a weighting towards restricted funding. Among all institutes, the average level of restricted funding is 56% (the median is 70%). While two institutes have none of their funds restricted and one has 2% restricted, the rest range from 10% to 60% restricted.

Ten institutes report that they do not have an **innovative funding model** to increase revenues. Instead, they turn to more common funding mechanisms such as: "a preference for expendable gifts over endowment (given low yields)"; "long term partnerships with external collaborators, such as corporations, government, NGOs and foundations"; and "direct funding from the state legislature." Of the remaining seven institutes, innovative models include: "a professional program that allows a 90% recovery of tuition from accelerated and non-traditional models (in particular, summer enrollments, a hybrid masters, and online courses);" "the development of an external board that is made up of philanthropic organizations;" "selling campus reductions in carbon emissions to the private sector;" "a negotiated agreement that the institute receives a budget increase for every grant over $1 million;" and one institute is considering "a partnership with an impact investment fund."

The dominant use for **expenditures** is research and general administration, which every institute supports (see Figure 14). As a percentage of total uses, research support averages 59% and general administration averages 18% of total expenditures. Of the remaining items, eleven institutes support instructional and educational services, averaging 17% of their expenditures and nine institutes support operations and maintenance, averaging 19% of their expenditures. Seven institutes listed an "other" category, averaging 19% of their expenditures and include items like campus sustainability, internal and external engagement, communications and development.

-- INSERT FIGURE 14 ABOUT HERE --

Exclusive of administrative expenses (which range from 7% to 49% and average 18% of institute budgets), **annual expenses** break down into 6 categories. Research program support averages 41% of reported institute expenditures (after subtracting administrative expenses), twelve institutes fund direct student support for an average of 14% of their expenditures, eleven institutes fund direct faculty support for an average of 17% of their expenditures. Between six and eleven institutes support academic program support, co-curricular educational support, and campus sustainability support with between 4% and 7% of their expenditures. Other expenditures include engagement, marketing and communication expenditures, and development.

5. Mission and Vision.

When establishing a new unit, one respondent warns that it is important to create a clear identity. "The primary challenge, which can result from a sometimes-ad hoc accretion of units and responsibilities over time, can be a lack of coherent and unifying identity. This is felt both externally, where the mission and responsibilities are poorly understood by those in government, civil society, and across campus, as well as internally, where the overall goals are obscure even to longstanding staff and faculty." Another adds that "an expansive scope can encourage too many initiatives that may become disparate." To counter this tendency, an institute should "ensure that you formulate clear goals, strategies, and tactics" and "when you are engaging externally, ensure you have thought through

> *"determine what you are NOT in the business of doing. Most mature interdisciplinary units suffer from 'drift' and being spread too far."*

what you are offering that is distinctive and valuable." Put another way, one respondents suggests that you "determine what you are NOT in the business of doing. Most mature interdisciplinary units suffer from 'drift' and being spread too far. Periodic strategic planning is recommended." Respondents note that a strong identity is defined by an institute's ability to carefully and effectively align its multiple facets, including "research, education, and campus sustainability missions: Closing the circle." One respondent warns that this is critical; "a research-only focus will alienate many on campus and off, which can make some funding models (i.e., all from a VPR) less than ideal."

With these general assessments noted, the **mission statements** of institutes in this study range in size from 13 to 140 words, with an average of 50 and a median of 35 words. Figure 15 is a word cloud of commonly used terms. Overall, six common themes emerged. First, most mission statements are specific about the *topics of focus*, with environment, energy, and sustainability topping the list. Some institutes combine multiple topics while two institutes did not mention a topic at all (though institutes use these words in their titles: 12 use environment, 7 use energy, and 6 use sustainability or sustainable. Others topics include society, policy and health. The second most common theme is a statement about the institute's *central activities* which covered four dominant areas: research (referred to as "translational science," "interdisciplinary research" "advancing understanding," "interdisciplinary scholarship," "advancing knowledge," or "transformational research"), followed by education (using terms like "transformative learning," or "interdisciplinary education"), and engagement (such as "campus leadership," or "operations"). One mission statement mentions policy development as a central activity while another mentioned "storytelling."

A third common feature in ten mission statements is a focus on *practical solutions* with words like "real-world problems," "actionable," "timely, effective and economically practical solutions," "real world problem solving," "move science to action," "real-world decisions," or just a general focus on "solutions." A fourth feature is a focus "interdisciplinary" to describe their *approach to research*, using related words such as "collaborative," "multi-disciplinary," "cross-departmental," "integrative," or an "interactive community of scholars." Five mission statements focus on *who they are trying to reach* with their work, some through a direct reference to "engagement" or "external partnerships." including individuals, corporations, foundations, government agencies, their university, the public, the research community, decision-makers, local or regional communities, the ecosystem, the world or the planet. Finally, four institutes have an *aspirational focus* on addressing the needs of "the future" or "generations to come" while others focused on training "future sustainability leaders" or the "next generation of leaders" Conversely, one institute stresses a focus on making a "difference today, not tomorrow."

-- INSERT FIGURE 15 ABOUT HERE --

Though three institutes do not have **vision statements** (one respondent notes it is embedded within their mission statement), the remaining fourteen institutes have vision statements that range in size from 14 to 627 words, with an average of 106 and a median of 36 words (in other words, most vision statements are short and to the point).Within them are three dominant themes: a strong problem statement, an aspirational vision and actionable or measureable outcome variables for clarifying success (see Figure 16). Some vision statements are pragmatic and short: "to create a strong multi-disciplinary undergraduate and graduate research and education program, which will evolve into a center of national and international leadership in this field;" "to embed sustainability as a fundamental value at the University through the development of sustainability literacy, solutions, and leadership;" or to be "internationally recognized" for "research, education, and external partnerships."

Others are longer, beginning with a statement that human populations are rising in their influence on the Earth systems and that, looking forward, this influence will grow as population grows. This leads to statements about the challenges ahead. While "our advances brought food, water, medicine and improved living standards to billions of people" "approximately 1.3 billion people have no access to modern energy services. Many natural systems, such as the world's oceans, stand at the edge of ecological collapse. Global greenhouse gas emissions continue to rise, triggering feedback loops that threaten the world's agricultural and public health systems and destabilizing many economies, states, and ecosystems."

With this as a start, many vision statements then direct attention to their aspirational vision for their local and global communities: "Safeguard the planet's life-support systems and enhance wellbeing for present and future generations;" "to clarify and secure the common interest of sustainable human societies and the natural world that supports them;" "find solutions for the ever-growing demand for food, water, and energy while ensuring a safe, productive, and sustainable environment for all global citizens;" "We envision a world in which sustainable agriculture feeds the world; renewable energy powers healthy homes, efficient transportation and flourishing businesses; every person has access to food, water and shelter; oceans, lakes and rivers are clean and healthy; communities have vibrant economies, neighborhoods and cultures; and thriving ecosystems support thriving economies and societies. Overall, humanity restores, replenishes and renews resources for the benefit of all living things."

Finally, some offer more specific dimensions on which these visions can be achieved: "As scholars, our research is characterized by collaborative empirical approaches that cross traditional disciplinary boundaries. As educators, we work with students to engage with the deep complexity of human-environment interactions;" "Foster sustainability solutions through the discovery and application of new and existing knowledge that spans natural, social, economic, and technological boundaries, and is meaningful and useful to stakeholders;" "There was a time when environmental scientists and leaders had to alert the public to threats and risks. Now is not that time. We know the problems—it's time for solutions;" "developing the next generation of global leaders and building transformative partnerships across the state, region and globally."

-- INSERT FIGURE 16 ABOUT HERE --

How do these institutes **define the term sustainability**? While eight of the seventeen institutes do not employ an official definition, and some do not use the term as all -- stating that the term is "overused and losing its meaning," that "there are multiple definitions," or that it "varies from one project to another" -- Figure 17 is a word cloud of commonly used terms by those that have defined the term. Five institutes define sustainability in terms that balance the needs of "human societies and the natural world that supports them;" or to "safeguard our planet's life-support systems and enhance well-being for present and future generations." Four institutes define sustainability by the Brundtland Commission definition: "meeting the needs of the present without compromising the ability of future generations to meet their own needs." One respondent views their institute's strength as the "breadth of mission in that it encompasses all of sustainability, described in our context as being built on three pillars: energy, economy, and environment."

-- INSERT FIGURE 17 ABOUT HERE --

Diversity, equity and inclusion fits prominently within the mission and vision of these institutes. One institute embeds it within their mission statement, while the others develop separate plans which they describe as a "key enablers to success," an "essential values of our Institute," "of central importance,

fitting with the goals and mission of the university," or "a core value" that "should be at the center of our work." For some institutes, a separate Diversity and Inclusion Action Plan is required by their university and is quite detailed with trackable actions which they report out annually. The goals of such plans point out that sustainability solutions require "ensuring that each member of the community thrives" through "individual empowerment." References to environmental justice are also mentioned in research that "evaluates the ethical tradeoffs of the imposition of environmental costs, and the costs of environmental regulation, on low income populations." Others see this as critical in creating a "university experience that is rich in perspectives with opportunities to learn from each other and succeed in a diverse world."

6. Research

Institutes are close to evenly split in their focus on **basic versus applied research**, with an average of 44% basic research and a median of 50% (see Figure 18). As shown in Table 4, those more focused on applied research:

- have larger staffs on average,
- have fewer participating faculty (0% appointment) but more core (100% appointment) and joint faculty (≤50% appointment),
- tend to be older,
- have slightly smaller annual expenditures,
- conduct twice as much research in partnership with external stakeholders.

-- INSERT FIGURE 18 and TABLE 4 ABOUT HERE –

There is a range of approaches to **disciplinary** (relating to one branch of knowledge), **interdisciplinary** (relating to more than one branch of knowledge) or **transdisciplinary** (combines interdisciplinary with outside stakeholders) research. But interdisciplinary work is the dominant focus. Nine institutes focused more than 50% of their research portfolio on interdisciplinary work, five focused on more than 50% transdisciplinary research and only one institute focused on more than 50% disciplinary research. On average, 54% of the institute research in this sample focus on interdisciplinary research, while 34% focus on transdisciplinary and 12% focus on disciplinary research. Most institutes (14 out of 17) report that they do not employ a **specific methodological framework** for collaborative research projects.

Respondents report that, on average, 48% of their research is conducted in **collaboration with external stakeholders**. One respondent notes that none of its research involves external collaboration, seven report between 10% and 25%, three report between 40% and 50%, four report between 80% and 90% and two report 100% of their work is done in collaboration with external stakeholders.

Institutes report a two-pronged approach to **identifying research projects**; top down or bottom up. In the former prong, respondents report that their institute will make top down investments in project coordination to pursue external calls for proposals and to pursue sponsored research projects with industry, foundations or government agencies. In some cases, the Director will identify such projects and draw in faculty and other potential collaborators, issue competitive calls for proposals or disperse seed grant funding for cross-campus inter-disciplinary projects. In the latter prong, respondents report that projects are brought to the institute's attention by faculty interest or internal working groups. Selection of final projects is done through an internal peer review process. Research projects identified

can range from very specific, such as "projects must be energy-related, interdisciplinary in nature, and transformative in scope," to very "broad spectrum of research".

Institutes provide multiple types of **services to support faculty**, most notably grants administration and management with some focusing on both pre- and post-award, while others focus only on post-award support. In both cases, respondents report a strong emphasis on bringing faculty together around specific project themes to catalyze the creation of research teams. From there, services may include a range of assistance that spans funding opportunity identification, proposal preparation, project tracking, expenditure and outcome reporting, writing and editing support, and communications. Some report that they will go further by providing buyouts or teaching reductions for faculty or by hiring post-docs to help research projects succeed. One respondent states "be a source and not a sink," further noting that the key to success is to "foster an identity in which the unit serves, at least in part, as a source for campus and community partners…rather than acting as a sink or resource-hungry 'destination' for all things environmental." Consistent with that service focus, one respondent reports a "lot of services not related to grants. Managing grants is tricky because it can create competition with colleges."

> "*be a source and not a sink*"

In identifying their **topics of research**, every respondent identifies water, climate, and environment (see Figure 19). The next three in descending order are energy, food, and environmental justice. Some respondents note that there were strong related institutes in other schools (such as business or law) and that their role was to support that work, not develop their own proficiency. In terms of **geographic scale**, respondents report that most institutes focus their work at the global or US national levels (see Figure 20). The next three in descending order are US State, non-US national and US binational.

-- INSERT FIGURES 19 and 20 ABOUT HERE --

7. Education

According to the survey, every institute offers educational content to at least one **level of student**. While four institutes offer content to 5 levels of student and 4 institutes offer content to only 1, on average, institutes serve 3 levels of student. Doctoral students are the most common target of educational content (See Figure 21), closely followed by Post-Doctoral fellows and undergraduates.

-- INSERT FIGURE 21 ABOUT HERE --

Just under half the sample in this study, eight institutes, offer no **degrees, certificates or minors** (see Figure 22). Of the remaining, two offer certificates only, one offers a degree only (bachelors), three offer certificates and degrees (bachelors, masters and doctoral), two offer certificates and a minor, and one supports a minor only. As shown in Table 5, those that offer degrees:

- have significantly more physical space,
- have fewer participating faculty but more core and joint faculty,
- tend to be older,
- have slightly larger annual expenditures, and spend more on instructional and education services.

-- INSERT TABLE 5 ABOUT HERE –

Some respondents see educational programming and degrees as an asset, as one notes, "Our undergraduates give us substance within the university (we are not just a grant bringing unit, we need a sustainable structure, we are involved across the board) and fund-raising power outside it." But others explain their reasons for avoiding such programs, as this respondent notes, "Because we offer a certificate in environmental studies as opposed to a major, the strongest disciplinary scholars are still able to be actively involved in our program. (i.e., we are not competing with the academic departments for 'majors')." Another respondent states that they provide "educational programs that do not compete with other units. All 300 majors in the Institute are double majors and therefore do not 'raid' tuition from other units." Some prefer a hybrid approach, such as "administering competitive co-curricular

> "administering competitive co-curricular fellowship programs across all university academic levels that draw students from across all university units."

fellowship programs across all university academic levels that draw students from across all university units" or "linking research participation of undergraduates to mentorship by graduate students is a very successful approach. We are proposing to formalize this broadly by having as an objective the training of graduate students to mentor undergraduates in research and thus more fully engage a cohort of students in a meaningful immersion experience."

-- INSERT FIGURE 22 ABOUT HERE --

The most common **resources provided to students** were research assistantships and internships, followed by scholarships/fellowships and travel awards (see Figure 23). This is seen by some respondents as a way to provide service to other units on campus through, for example, "TA or RA positions for students across campus, endowed rotating chairs that are given to faculty in other campus units, therefore offsetting other unit costs."

-- INSERT FIGURE 23 ABOUT HERE --

Approaches to **course development** are divided, with seven relying on academic units to develop their curricula, four providing course offerings in-house, and four offering a blended portfolio of both. Two respondents report that they do not have curricular responsibilities and try to avoid such activities.

Of those that offer their own courses, **faculty compensation** is provided through a variety of monetary and non-monetary rewards including salary, summer salary, overbase

> "Teaching compensation is complicated. This is among our greatest fiscal challenges."

payments and course buyouts. Respondents also report that they either fully list or cross list courses in the home department of the instructor. As a result, "tuition dollars from courses go to the home department that pays the professor of record." Some institutes negotiate some exceptions. One respondent notes that their institute "receives tuition for engineering masters students on a per student stipend basis." Another receives 90% of tuition from the graduate professional program, 80% of tuition from summer courses after passing a designated threshold retained by campus. As the respondent explains "teaching compensation is complicated. This is among our greatest fiscal challenges."

8. External Engagement

There appears to be strong agreement on both the **internal and external stakeholders** that are relevant to institute activities (see Figure 24). Externally, most respondents rank the government, donors, the

scientific community, the general public, non-profit organizations and business highly. Some mentioned in the "other" category include: alumni, prospective students and research sponsors. Other higher education institutes were ranked as relevant by only 5 institutes. Internally, most respondents rank faculty, Deans, Provost, students, office of the President and other internal institutes highly. Some mentioned in the "other" category include: campus sustainability, alumni relations, development and internal staff. All institutes that report to the Provost list that office (as well as the Dean or President if reporting to both) as an important internal stakeholder. Paradoxically, only 5 out of 7 institutes that report to the Vice President of Research list the Vice President as an important stakeholder.

Alumni are a particularly challenging stakeholder as they usually identify with their home department and not an institute, as one respondent notes, "the flip side of the advantages to focusing on research and not granting degrees is that we have no natural alumni base for fund-raising (i.e., every alum got their degree from some other unit)." But one respondent notes that "we are overcoming this obstacle by growing sustainability and energy networks across the University and through the Certificate program" and another adds that "we are passionate about our undergraduates and include them in the research mission. This helps us raise money with alumni."

> *"the flip side of the advantages to focusing on research and not granting degrees is that we have no natural alumni base for fund-raising."*

-- INSERT FIGURE 24 ABOUT HERE --

To **engage with stakeholders**, all institutes employ seminars, and most employ external speakers, symposia and conferences (see Figure 25). Some mentioned in the "other" category include: alumni networking events and roundtable discussions involving external stakeholders and institute researchers. On average, institutes use between 4 and 5 of these activities in their engagement efforts. But some respondents report challenges in reaching multiple stakeholder groups with one event. One writes that "our projects for corporate partners are often very specialized, which can limit student involvement (since few students can quickly establish the requisite expertise)."

-- INSERT FIGURE 25 ABOUT HERE --

To **disseminate information**, nearly all institutes use social media and direct engagement (see Figure 26). Bulletins/newsletters and traditional media are still valued by 15 and 13 institutes respectively, and research reports produced either alone or in collaboration with research partners are used by 12 and 9 institutes respectively. Some mentioned in the "other" category include: face to face engagement (particularly with donors and alumni), "Chatham house rule" convening and a professionally managed journal. On average, institutes use between 4 and 5 of these tools in their outreach efforts.

-- INSERT FIGURE 26 ABOUT HERE --

Only eight institutes report that they play a role in compiling and submitting **data for sustainability rating systems** on behalf of the University. Nine did not. All institutes report that their university is registered with the Association for the Advancement of Sustainability in Higher Education (AASHE) Sustainability Tracking, Assessment & Rating System (STARS) but only ten are active (8 are rated gold, 2 are rated silver).

9. Campus Facilities and Operations

Twelve institutes report that they **pursue projects with campus facilities and operations**, using the university campus as a learning laboratory, assisting campus facilities staff to implement broader climate action plans, and advancing the efficiency, effectiveness and cost of campus operations. The **modes of engagement** used by these twelve include support student team projects (used by 10 institutes), advising the facilities staff (8), collaboration with facilities staff (8) and conducting research on the campus (8). In one case, the institute Director co-chairs the campus sustainability committee. One respondent reports that the Director of campus sustainability has taught a course on campus sustainability projects and issues.

Again, of these twelve, the areas of engagement include a focus on greenhouse gas reductions, building improvements, waste reduction, dining services and procurement (see Figure 27). Only four respondents report engagement on issues related to finance, suggesting that the divestment movement is not having an influence on institute activities.

-- INSERT FIGURE 27 ABOUT HERE --

While most institutes report constructive partnerships with campus operations, **some tensions to overcome** include differing priorities in stakeholders and missions between institute and campus operations, "differing views of acceptable risk when implementing projects," "limited funding from university administration," and "the complexity of a decentralized campus structure where individual schools have responsibility for their individual operations." To make these kinds of collaborations work, respondents identify the importance of "clearly defined responsibilities that are distinct and complementary," and close collaboration to make sure that the needs of both organizations are met.

10. Conclusion

At one time, the concept of a central school, department or institute to address environmental sustainability on a college campus made sense. This was an empirical topic that required focused and concentrated attention within one unit. Today, environmental sustainability research and teaching can be found in virtually any unit on campus, including business, law, architecture, sociology, psychology, engineering and so forth. In recognition of this changed reality, cross-campus, multi-disciplinary sustainability institutes have begun to emerge as new forms of organizational innovation to harness and direct the competencies that lie across the campus structure. This is a model that is not exclusive to sustainability, though the topic lends itself quite nicely to the format. As one institute respondent explains, "The environmental enterprise is inherently inter- and transdisciplinary, and thus must be a cross-campus enterprise. It is heavily research oriented, but it is not exclusively research oriented." Another writes, "Higher education is changing fast, environmental challenges are growing, and only those universities who embrace campus-wide partnership and innovation will ultimately succeed."

This report is intended to offer guidance for those who want to create new cross-campus sustainability institutes or benchmark and improve those that already exists.   A key objective is to create a guide for institute Directors on how to make the most of their position. As described by respondents in this survey, the attributes of a successful Director focus on the ability to work with multiple constituents and negotiate for outcomes while possessing very little coercive power. Skills in the art of persuasion are mentioned often, as are a sense of humility and a lack of desire to "build one's own private empire." They need to be able to collaborate well, which means having an appreciation for multiple disciplines and multiple constituencies both inside and outside the university. This involves an understanding of the language, interests, and values of these constituencies and being able to craft collaborative partnerships

that mutually benefits all parties. They must be able to develop a "clear and compelling value proposition and communicate that proposition" to overcome any resistance that may arise. This resistance comes usually in the form of a concern that the institute is competing with other units for funds, faculty and students. Finally, an effective Director should have the academic credentials that are necessary to gain respect across the campus but also possess an appreciation for the importance for multidisciplinary approaches to sustainability research and education.

Here are a collection of skills, attributes and traits that a Director must possess in the words of Directors themselves.

SUSAN: CAN YOU PUT THESE IN BOXES AND LAY THEM OUT IN AN ENGAGING FASHION:

"The primary tool for a Director is persuasion - there is little power and few sanctions available if one is running the show transparently. Hence, a Director must be prepared to pursue a strong but inclusive vision - that means putting self-interest to one side. For this reason, as inaugural Director, I put a term limit in our by-laws, to ensure that there is less incentive to create a personal empire of some sort. At the same time, the Director must be prepared to argue convincingly for that vision if his or her goals are to be realized."

"Engagement and relationship management is the most critical skill. An effective Director needs to get broad-based buy-in from central administration, deans, faculty, funders, and external partners. S/he also needs to stay focused on the big picture issues and not the weeds. This requires a talented and skillful staff who can get the work done with only general oversight."

"Success depends on working with a huge range of campus units and external partners, all of whom may need/want different things. To be effective, you have to listen to what partners' value and determine how to meet your goals within those multiple objectives."

"The ability to speak the languages of the whole campus (and of non-academics!) is paramount. Moving smoothly between multiple scholarly and non-scholarly cultures is its own skill (one I wish I had better mastered)."

"A Director at an Institute with University-wide scope must be much more open-minded about the fundamental importance of a multidisciplinary approach to sustainability and energy work. This will likely involve advocacy for subject-areas outside the expertise of that Director, and s/he must be willing to work closely with other colleagues to accurately represent the scope of work at the University, and pursue opportunities as they arise."

A successful Director should have "substantial private sector experience and a vast network, both of which are incredibly powerful in helping to generate success. S/he should also have excellent management skills that s/he is flexing to the academic environment."

"The ability to convey a compelling and attractive vision that invites participation."

"Strong scholarly credentials, in addition to the ability to work with public and private sector partners, and creates visibility and respect across campus."

"The Director of the institute must be an experienced leader in academics, research, proposal development, human resource management, as well as in their own discipline. This person must be well-connected in the university and across the world, but focused enough to have a vision and the persistence to keep the institute on track."

"The ability and bandwidth to manage administrative tasks, such as speaking about the institute's vision and mission, meeting with potential donors, and working on agreements with the university's administration/decision makers."

"The most important attribute is for the Director NOT to be interested in building his or her own empire. That would create tension with other units on campus and create animosity. The Director has to be a skilled collaborator and negotiator. For the external facing mission of the institute, he or she has to be fluent in the decision-making of other sectors of the economy so that they can structure projects and create deliverables that provide the correct content in a timely manner."

"Dedication to building relationships, understanding and trust across campus, combined with an ability to collaborate on campus and off to brainstorm and implement exciting new programs that really make a difference on campus, and to society."

"Willingness and ability to cooperate with many other unit leaders using only the power of persuasion."

"Vision around how the Institute can engage in the world while also moving University culture toward more effective knowledge production and dissemination."

"Vision, diplomacy and recognition as an outstanding scholar in his/her field."

"A track record of significant interdisciplinary research funding and impact to earn the respect of faculty and other team members. The ability to listen to and understand widely varying disciplines and perspectives on problems, solutions, and success. Both commitment to and implementation of open communication and transparency. A sense of humor, coupled with a strong sense of humility. Sufficient self-confidence to withstand strong criticism. Honest respect for many different kinds of contributions, and a joy in complementing and honoring other people's success."

While the institutes and their Directors in this report are on the vanguard of a new form of cross-disciplinary approach to research and teaching, one that breaks down the traditional disciplinary, administrative and financial silos of a university, there is still much to learn, innovate and overcome.

When asked to list their ongoing challenges and failures, respondents first cite the need to establish more and better relationships with constituencies around campus. Relationships with faculty and Deans lead the list. One respondent writes that "historically it has proven challenging to formally engage the leadership of academic units in a sustained manner.

> *"I have had to learn HR processes on the run - this has meant that in the early going especially I did not handle things as smoothly as I might have."*

This is due to many factors including decentralized organizational structures, difficulty coordinating schedules, and leadership turnover." Another adds that "I have had to learn HR processes on the run - this has meant that in the early going especially I did not handle things as smoothly as I might have. We have not managed to engage with engineering and computer science really substantively." Similarly, one respondent writes "we have not done as well as we would like in engaging scholars from the social sciences and humanities."

A second ongoing challenge is drawing in secure sources of funding. One respondent writes that "to date, we have not secured permanent base funding either through a large operating endowment or a permanent university budget line-item" while others add that they need "to have more grants approved at the federal level," "catalyze a major multi-million-dollar campus Center grant," or "secure a major endowment for general operations."

Overall, respondents continue to strive for the right balance of service to campus units and external constituencies. One respondent writes that "We have not done as well as we would like in building durable infrastructure for sustainability; in taking solutions to the real world." Others write that "we cannot find a faculty member with the track record, time, and enthusiasm to even submit a proposal for major opportunities. We know that some of this has to do with the many other stressors on faculty time and the need for work-life balance, but we are eager to find ways to be more helpful in addressing this barrier," "while we've made slow progress, [we have] yet to fully dispel the 'competitive' factors for faculty incentives to submit sponsored research proposals through their home departments" and one final respondent writes of the challenge of "finding an organizational and funding model that works within the university's existing infrastructure."

Overcoming these challenges will be constant struggle as this new organizational model evolves to reflect the "unique circumstances, strengths and resources of the existing Institute and its organizational context within the university," as stated at the outset of this report. In some ways, missteps in this effort have led to legacy challenges. One respondent writes that "there are historical grudges having to do with the financing and establishment of [our institute]." Another adds that "we did not engage the faculty quickly enough, or at a deep enough level, creating some resentment

But in the end, respondents see the opportunities as vast for this endeavor. One respondent sees the institute's objective as "becoming the 'front door' of the environment on behalf of other environmental units." Another sees the overall goal as even grander, one in which "we are on the front lines of fostering 'one university' (a daunting challenge in a very decentralized university) and engaging community partners. Both have been priorities of the institute from the beginning (in 2010). The university formally adopted similar priorities in 2013." But the pursuit of such a grand challenge is institute Directors relish. In the words of one respondent, "For someone who enjoys learning new things, collaborating with great faculty, and service to society, being Director of an interdisciplinary institute for energy, environment, and/or sustainability is perhaps the

> *"this is the best job I ever had."*

best possible job. It is also a great responsibility that I think all of us take quite seriously." Another respondent described it simply that "this is the best job I ever had."

Survey and Data

Data provided only for quantitative answers.

1. University name:
2. Institute name and webpage:
3. Institute Faculty Director(s) name, email and phone number:
4. Institute Managing Director name email and phone number (if applicable):
5. Name, email and phone number of person filling out survey:
6. To whom does the institute Director report directly? (Select all that apply)
   - Provost …………………………………………………………………………… 4 (24%)
   - Vice Provost ……………………………………………………………………… 1 (6%)
   - Provost & Dean ………………………………………………………………… 2 (12%)
   - Provost & VP of Research …………………………………………………. 2 (12%)
   - Provost & Vice Provost ……………………………………………………. 1 (6%)
   - VP of Research ………………………………………………………………… 7 (41%)
7. What is the total percent of administrative FTE currently allocated for institute Director(s)?
   - 100% FTE …………………………………………………………………………. 5 (29%)
   - 60% FTE ……………………………………………………………………………. 1 (6%)
   - 50% FTE ……………………………………………………………………………. 4 (24%)
   - 33% FTE ……………………………………………………………………………. 1 (6%)
   - 25% FTE ………………………………………………………………………….. 1 (6%)
   - 17% FTE ……………………………………………………………………………. 1 (6%)
   - 10% FTE …………………………………………………………………………… 2 (12%)
   - 8% FTE ……………………………………………………………………………… 1 (6%)
   - 7% FTE ……………………………………………………………………………… 1 (6%)
8. Does your institute have single Director or co-Director model?
   - Director …………………………………………………………………………. 15 (88%)
   - Co-Director ……………………………………………………………………… 2 (12%)
9. What kind of physical space does your institute occupy?
   - University Owned Building Shared with Other Units ……………….. 12 (70%)
   - University Owned Building that is Solely for the Institute ……….. 2 (12%)
   - Multiple Buildings Leased by the University ………………………….. 2 (12%)
   - No Dedicated Space ……………………………………………………………. 1 (6%)
10. How many square feet does your institute occupy?
    - 30,000-39,999 sf ………………………………………………………………. 1 (6%)
    - 20,000-29,999 sf ……………………………………………………………….. 3 (18%)
    - 10,000-19,999 sf ……………………………………………………………….. 5 (29%)
    - 1-9,999 sf …………………………………………………………………………. 7 (41%)
    - 0 sf …………………………………………………………………………………… 1 (6%)
11. What type of advisory boards does your institute use?
    - Both an internal and external advisory board ……………………… 9 (53%)
    - Internal advisory board but no external board …………………….. 4 (24%)
    - External advisory board but no internal board …………………….. 3 (18%)
    - No board …………………………………………………………………………… 1 (6%)

12. Does your institute house separate research centers? i.e. Is your institute akin to a holding company with multiple, independent (or quasi-independent) research centers?
- No separate research centers   ……………………………………………… 7 (41%)
- 1-2 separate research centers   ……………………………………………… 3 (18%)
- 4-5 separate research centers   ……………………………………………… 5 (29%)
- 8 separate research centers   …………………………………………………… 2 (12%)

13. What are the metrics of success that your institute reports? (These could include quantitative or qualitative: number and/or quality of publications; impact on corporate practices; impact on public knowledge or behavior; impact on government management or policy; earned media; other media; dollars raised in support of mission; numbers of courses or numbers of students served, etc.)
- Research Performance………………………………………………………… 15 (88%)
- Students Impacted………………………………………………………. 13 (76%)
- Grants ……………………………………………………………………. 13 (76%)
- Publications   ………………………………………………………. 12 (71%)
- General Revenue ……………………………………………………… 10 (59%)
- Course Development…………………………………………………… 10 (59%)
- Media Attention………………………………………………………… 9 (53%)
- Engagement ……………………………………………………………… 8 (47%)
- Faculty   ………………………………………………………………… 8 (47%)
- Impact ……………………………………………………………………. 7 (41%)
- Staff   …………………………………………………………………… 6 (35%)
- Diversity   ……………………………………………………………… 5 (29%)
- Awards and Honors………………………………………………………… 4 (24%)
- Intellectual Property   ……………………………………………………. 2 (12%)

14. How many staff does your institute employ?

	Total	Full Time	Part Time
University of Arizona	28	21	7
Boston University	7	6	1
Brown University	11	7	4
Cornell University	8	6	2
Duke University	45	40	5
University of Illinois, Urbana-Champaign	8	5	3
Johns Hopkins University	5	1	4
University of Michigan, Ann Arbor	52	26	26
University of Minnesota	60	45	15
Northwestern University	23	14	9
Pennsylvania State University	20	20	0
Princeton University	13	11	2
Stanford University	31	31	0
Texas A&M University	9	9	0
University of California, Los Angeles	12	12	0
Vanderbilt University	1	1	0

- <u>University of Wisconsin</u> ……… <u>44</u> ……………………… <u>36</u>   ……………………… <u>8</u>
- *Average*   ……………………… *22* ……………………… *17*   ……………………… *5*

15. What are the roles of the staff at your institute? (Select all that apply)
- Director   ……………………………………………………………………… 17 (100%)
- Administrative ……………………………………………………………………… 17 (100%)
- Finance   ……………………………………………………………………… 16 (94%)
- Communications   ………………………………………………………………… 16 (94%)
- Research Management   ……………………………………………………… 15 (88%)
- Social Media   …………………………………………………………………… 15 (88%)
- Education/Outreach   ………………………………………………………… 13 (76%)
- Assistant Director   …………………………………………………………… 12 (71%)
- IT/Graphic Design   ……………………………………………………………… 11 (65%)
- Development   ……………………………………………………………………… 10 (59%)
- Traditional Media Relations ……………………………………………… 10 (59%)
- Other*………………………………………………………………………………………… 4 (24%)

*Postdocs, student services, corporate engagement, facilities management.

16. How many faculty are engaged with your institute?

	Total	Core	Joint	Participating	External	Lecturer	Other*
Cornell University	492	4	2	486	0	0	0
University of Michigan, Ann Arbor	281	1	1	276	0	3	0
University of Arizona	275	5	0	270	0	0	0
Texas A&M University	241	0	0	241	0	0	0
University of Wisconsin	185	12	6	160	0	2	5
Stanford University	162	10	2	150	0	0	0
Northwestern University	133	2	6	125	0	0	0
Princeton University	131	8	2	110	1	10	0
Pennsylvania State University	122	62	3	56	0	1	0
University of Minnesota	90	0	0	90	0	0	0
University of California, Los Angeles	83	8	50	15	5	5	0
Johns Hopkins University	66	0	2	60	0	2	2
Duke University	62	8	2	50	2	0	0
University of Illinois, Urbana-Champaign	59	1	3	55	0	0	0

- Boston
  University……………. 40………….. 1………….. 0 ………. 39 ………….. 0 …………. 0 …………. 0
- Brown
  University……………. 38………. 10…………. 0 ………. 24 …………. 2 …………. 2 …………. 0
- Vanderbilt
  University ……… 22 …………. 2 …………. 0 ………. 12 …………. 8 …………. 0 …………. 0
- *Average …………. 146 …………. 8 …………. 5 …….. 131 …………. 1 …………. 1 …………. 0*

*This question did not have a response section for ”other.”

17. What level of faculty engagement does your institute receive from the various disciplines at your University? – *N/A (0), Not (1), Slightly (2), Moderately (3), Very (4), Extremely (5)*

<u>Average Rating</u>

- Physical Science …………………………………………………………………4.5
- Engineering …………………………………………………………………4.2
- Environmental Science …………………………………………………………4.2
- Social Science …………………………………………………………………3.8
- Professional …………………………………………………………………3.4
- Public Health …………………………………………………………………2.9
- Humanities …………………………………………………………………2.9
- Agriculture …………………………………………………………………2.8
- Computer Science …………………………………………………………………2.6
- Architecture and Urban Planning …………………………………………2.6
- Journalism …………………………………………………………………1.8
- Education …………………………………………………………………1.8
- Medical Science …………………………………………………………………1.8
- Veterinary Science …………………………………………………………………1.1

18. How do you rate the importance of the various disciplines in your University toward the efforts of your institute? – *N/A (0), Not (1), Slightly (2), Moderately (3), Very (4), Extremely (5)*

<u>Average Rating</u>

- Physical Science …………………………………………………………………4.6
- Social Science …………………………………………………………………4.5
- Engineering …………………………………………………………………4.5
- Environmental Science …………………………………………………………4.5
- Professional …………………………………………………………………4.2
- Public Health …………………………………………………………………3.7
- Humanities …………………………………………………………………3.6
- Agriculture …………………………………………………………………3.5
- Computer Science …………………………………………………………………3.2
- Architecture and Urban Planning …………………………………………3.0
- Education …………………………………………………………………2.8
- Medical Science …………………………………………………………………2.7
- Journalism …………………………………………………………………2.4
- Veterinary Science …………………………………………………………………1.6

19. What are the expectations and responsibilities of the faculty engaged with your institute? (Select all that apply)
- Research …………………………………………………………………17 (100%)

- External Engagement 13 (76%)
- Committee Participation 12 (71%)
- Annual Meetings/ Seminars 12 (71%)
- Teaching/Course Development...11 (65%)
- Fundraising 6 (35%)
- Annual Evaluations 3 (18%)
- Other* 2 (12%)

*Student services, institute fundraising, research collaborations.

20. How does your institute ensure that engaged faculty meet these expectations and responsibilities?

21. How does your institute solicit/engage/attract potential faculty? In other words, how do you get them involved? (Select all that apply)
- Research Funding 17 (100%)
- Access to Communications Support 17 (100%)
- Access to Grant Preparation Support 16 (94%)
- Access to Developmental Support 11 (65%)
- Research or Teaching Assistants 10 (59%)
- Time Buy-Outs 8 (47%)
- Tenure Track Positions ....7(41%)
- Partial Positions ....7(41%)
- Course Development Support 5 (29%)
- Research, Teaching, or Service Awards 2 (12%)
- Funding for External Learning Opportunities 2 (12%)
- Other* 3 (18%)

*Provide user facilities and building space, IT and student support, and match on grants.

22. How does your institute coordinate activities across diverse faculty communities? In other words, how do you keep them involved?

23. When was your institute created?
- Pennsylvania State University 1963
- University of Wisconsin 1970
- University of California, Los Angeles 1990
- Princeton University 1994
- Stanford University 2004
- Duke University 2005
- Cornell University 2006
- University of Michigan, Ann Arbor 2006
- University of Minnesota 2006
- Vanderbilt University 2008
- Texas A&M University 2009
- University of Arizona 2010
- Johns Hopkins University 2010
- Northwestern University 2013
- University of Illinois, Urbana-Champaign 2013
- Brown University 2014
- Boston University 2016

24. What are your institute's total annual expenditures?

- N/A 1 (6%)
- < $1M 3 (18%)
- $1 – 4 M...3 (18%)
- $5 – 9 M...7 (41%)
- $10 – 25M 3 (18%)

25. Identify the proportion of your institute's annual revenue that comes from the following sources (proportions should add to 100%):

	Institutional Appropriations	Government Grants	Other Grants	Expendable Gifts	Endowment Income	Tuition and Fees	Other*
Pennsylvania State University	100%	0%	0%	0%	0%	0%	0%
Johns Hopkins University	89%	0%	0%	11%	0%	0%	0%
University of Minnesota	66%	0%	33%	0%	0%	1%	0%
University of Illinois, Urbana-Champaign	48%	3%	9%	0%	40%	0%	0%
Texas A&M University	40%	30%	0%	0%	0%	30%	0%
University of Wisconsin	40%	25%	2%	10%	10%	6%	7%
Vanderbilt University	40%	55%	5%	0%	0%	0%	0%
University of Michigan, Ann Arbor	30%	21%	19%	28%	2%	0%	0%
Boston University	30%	0%	40%	0%	0%	0%	30%
University of California, Los Angeles	30%	40%	0%	20%	10%	0%	0%
Duke University	30%	5%	40%	5%	20%	0%	0%
University of Arizona	25%	70%	0%	5%	0%	0%	0%
Brown University	20%	30%	5%	35%	10%	0%	0%
Princeton University	15%	25%	25%	20%	15%	0%	0%
Stanford University	10%	20%	0%	60%	10%	0%	0%
Cornell University	9%	0%	2%	29%	60%	0%	0%

- Northwestern
  University … 6% ……….. 80% ………. 0% …….. 5% ………. 7% ……….. 1% ………. 0%
- *Average………… 37% …….. 24% ………. 11% …….. 13% ………. 11% ……….. 2% ………. 2%*

*Returns on grant expenditures, corporate partnership money for research projects.

26. What is the approximate breakdown of your revenue sources between restricted (i.e., research grants, use-specific gifts) and unrestricted (i.e., flexible) funds? (proportions should add to 100%):

	Restricted	Unrestricted
Princeton University	90%	10%
Northwestern University	85%	15%
Vanderbilt University	85%	15%
University of Wisconsin	85%	15%
University of Michigan, Ann Arbor	80%	20%
University of Arizona	75%	25%
Boston University	70%	30%
Stanford University	70%	30%
University of California, Los Angeles	70%	30%
Texas A&M University	60%	40%
University of Illinois, Urbana-Champaign	52%	48%
Brown University	50%	50%
Duke University	45%	55%
University of Minnesota	40%	60%
Cornell University	2%	98%
Johns Hopkins University	0%	100%
Pennsylvania State University	0%	100%
Average	*56%*	*44%*

27. Are institutional appropriations fixed or negotiated annually?

- Fixed ……………………………………………………………………….7 (41%)
- Negotiated Annually ………………………………………………………6 (35%)
- Other* …………………………………………………………………………4 (24%)

*5 year fixed followed by renegotiation, mixture of fixed and negotiated, appropriations that "float" on changes in enrollments.

28. Are there any innovative funding models that your institute employs?

29. Identify the proportion of your institute's budget that is used in the following areas (proportions should add to 100%):

- Research ……………………………………………………………….…17 (100%)
- General Administration ………………………………………………17 (100%)
- Instructional and Educational Services ……………………………11 (65%)
- Operations and Maintenance ………………………………………9 (53%)
- Equipment ……………………………………………………………….2 (12%)
- Other* ……………………………………………………………………7 (41%)

*Campus sustainability, internal and external engagement, communications, development.

30. Exclusive of administrative expenses, how do your annual expenses break down across the following areas (proportions should add to 100%):

- Research Program Support ……………………………………………14 (88%)
- Direct Student Support ………………………………………………12 (75%)

- Academic Program Support ……………………………………………………11 (69%)
- Direct Faculty Support ……………………………………………………11 (69%)
- Co-Curricular Education Program Support ……………………………….9 (56%)
- Campus Sustainability Support ………………………………………….6 (38%)
- Other* ……………………………………………………………………………6 (38%)

*Engagement, marketing and communication expenditures, and development.

31. Please provide the mission statement for your institute. If possible, please provide your precise language.

32. Please provide the vision statement for your institute. If possible, please provide your precise language.

33. How does your institute define "sustainability"? If possible, please provide your precise language.

34. How do diversity, equity, and inclusion fit with your institute's mission and vision?

35. What percentage does your institute focus on applied and basic research projects (proportions should add to 100%)?
- 100% Applied/0% Basic ……………………………………………………. 4 (24%)
- 51-99% Applied/1-49% Basic …………………………………………………. 4 (24%)
- 50% Applied/50% Basic ……………………………………………. 2 (12%)
- 1-49% Applied/51-99% Basic …………………………………………………. 6 (35%)
- 0% Applied/100% Basic …………………………………………………. 1 (6%)
- *Average …………………………………………………. 56% Applied/44% Basic*

36. What percentage of the research at your institute considered disciplinary, interdisciplinary or transdisciplinary, (proportions should add to 100%)?
- 0% Inter-Disciplinary ……………………………………………………1 (6%)
- 1-50% Inter-Disciplinary ……………………………………………………… 7(41%)
- 51-99% Inter-Disciplinary …………………………………………………. 8(47%)
- 100% Inter-Disciplinary …………………………………………………… 1(6%)
- *Inter-Disciplinary Average ……………………………………………………. 54%*
- 0% Trans-Disciplinary ……………………………………………………2 (12%)
- 1-50% Trans-Disciplinary …………………………………………………11 (65%)
- 51-99% Trans-Disciplinary …………………………………………………3 (18%)
- 100% Trans-Disciplinary …………………………………………………1 (6%)
- *Trans-Disciplinary Average …………………………………………. 34 %*
- 0% Disciplinary ……………………………………………………………….8 (47%)
- 1-50% Disciplinary …………………………………………………………….8 (47%)
- 51-99% Disciplinary …………………………………………………………1 (6%)
- 100% Disciplinary ……………………………………………………………0 (0%)
- *Disciplinary Average ………………………………………………. 12%*

37. Can you estimate the percentage of your research that is conducted in collaboration or partnership with external stakeholders (i.e. government, non-profits, corporations)?
- 0% ……………………………………………………………………………1 (6%)
- 10 – 25% ……………………………………………………………………7 (41%)
- 40 – 50% ……………………………………………………………………3 (18%)
- 80 – 90% ……………………………………………………………………4 (24%)
- 100% ……………………………………………………………………2 (12%)

38. How does your institute identify research projects to pursue/support?

39. Please describe the types of services (if any) that your institute provides to support university faculty in securing and administering research grants?

40. Does your institute employ a specific methodological framework for collaborative research projects (such as integrated assessment)? (This could include projects across academic disciplines or between your institute and non-academic research partners and stakeholders).
   - No …………………………………………………………………………………………14 (82%)
   - Yes ……………………………………………………………………………………….3 (18%)

41. What topics are the themes of research projects at your institute? (Select all that apply)
   - Environment …………………………………………………………………………17 (100%)
   - Climate …………………………………………………………………………………17 (100%)
   - Water …………………………………………………………………………………17 (100%)
   - Energy …………………………………………………………………………………15 (88%)
   - Food ……………………………………………………………………………………14 (82%)
   - Environmental Justice ……………………………………………………………13 (76%)
   - Health …………………………………………………………………………………12 (71%)
   - Business ………………………………………………………………………………9 (53%)
   - Urbanization ………………………………………………………………………8 (47%)
   - Transportation ……………………………………………………………………8 (47%)
   - Other* ………………………………………………………………………………3 (18%)

*Environmental history/governance/anthropology, land stewardship, infrastructure, ocean and coastal policy, ecosystem services and state policy, boarder and transboundary environmental science.

42. At what geographic scale do the research projects supported by your institute focus (proportions should add to 100%):
   - Global/International Issues …………………………………………………16 (94%)
   - U.S. Regional/National Issues ………………………………………………16 (94%)
   - U.S. Local/State Issues …………………………………………………………13 (76%)
   - Non-U.S. Regional/National Issues ………………………………………11 (65%)
   - U.S. Bi-National Issues …………………………………………………………6 (35%)
   - Non-U.S. Local/State Issues……………………………………………………4 (24%)
   - Non-U.S. Bi-National Issues …………………………………………………2 (12%)

43. To what level of student does your institute offer educational content? (Select all that apply)
   - Ph.D. ……………………………………………………………………………………13 (76%)
   - Undergraduate ……………………………………………………………………12 (71%)
   - Postdoctoral Fellows ……………………………………………………………12 (71%)
   - Masters …………………………………………………………………………………9 (53%)
   - Executive Education ………………………………………………………………5 (29%)
   - High school …………………………………………………………………………1 (6%)

44. What degrees are offered by your institute? (Select all that apply)
   - No Degree ……………………………………………………………………………8 (47%)
   - Certificate …………………………………………………………………………7 (41%)
   - Bachelor's Degree …………………………………………………………………3 (18%)
   - Masters (or Professional) Degree ……………………………………………2 (12%)
   - Doctoral Degree ……………………………………………………………………2 (12%)

- Associates Degree 0 (0%)
- Other*..3 (18%)

*Sustainability minors.

45. What kinds of resources does your institute provide for students? (Select all that apply)
- Internships 14 (82%)
- Research Assistantships 14 (82%)
- Scholarships and Fellowships 12 (71%)
- Travel Awards...10 (59%)
- Professional Development and Training 9 (53%)
- Teaching Assistantships 7 (41%)
- Study Abroad 3 (18%)
- Career Placement 2 (12%)
- Other* 4 (24%)

* Social enterprise and entrepreneurship seed funding, research funding, learning events, course search help.

46. Does your institute create and offer its own portfolio of course offerings, or does it facilitate course development in other academic units?
- Only Academic Unit Course Offerings 7 (41%)
- Only Own Course Offerings ....4 (24 %)
- Both Academic and Own ....4 (24 %)
- Other* ....2 (12 %)

*Provide funding to academic units for course development and avoid issues associated with curriculum. No curricular responsibility, but our activities often enhance curriculum.

47. How are faculty rewarded for teaching course content for your institute? (Select all that apply)
- Salary 8 (47%)
- Overbase 3 (18%)
- Course Buyouts 3 (18%)
- Summer Salary 3 (18%)
- Other* 7 (41%)

*Institutes that offer no courses and therefore no faculty reward necessary.

48. How are the following challenges resolved when offering multi-disciplinary courses?

49. Who does your institute consider to be its internal stakeholders? (Select all that apply)
- Deans 16 (94%)
- Faculty 16 (94%)
- Provost 15 (88%)
- Students 14 (82%)
- Office of the President 12 (71%)
- Other institutes 11 (65%)
- Office of the Vice President 9 (53%)
- Other* 4 (24%)

* Operational units dealing with campus sustainability, alumni relations, development, institute staff.

50. Who does your institute consider to be its external stakeholders? (Select all that apply)
- Local/State/Federal Government 16 (94%)
- Donors 15 (88%)
- Scientific Community 15 (88%)

- Non-Profit Organizations 14 (82%)
- General Public 14 (82%)
- Local/National Businesses 13 (76%)
- Other Higher Education Institutes 5 (29%)
- Internal Organizations 3 (18%)
- Other* 3 (18%)

*Prospective students, alumni, research sponsors/funders.

51. What kind of activities does your institute host to engage stakeholders? (Select all that apply)
- Seminars 17 (100%)
- External Speakers 16 (94%)
- Symposia 15 (88%)
- Conferences 14 (82%)
- Workshops 12 (71%)
- Forma Affiliation 8 (47%)
- Other* 2 (12%)

*Regional alumni networking events, roundtable discussions and other convening opportunities to meet with researchers.

52. What kinds of tools does your institute use to disseminate information to stakeholders? (Select all that apply)
- Direct Engagement 16 (94%)
- Social Media 16 (94%)
- Bulletins/Newsletters 15 (88%)
- Traditional Media 13 (76%)
- Research Reports, White Papers and Briefs 12 (71%)
- Collaborative Release of Information 9 (53%)
- Other* 3 (18%)

*Face-to-face engagements, "Chatham house rule" convening, internally produced magazine.

53. On behalf of the University, does your institute play a role in compiling and submitting data for sustainability rating systems (i.e., AASHE STARS)?
- No 9 (53%)
- Yes 8 (47%)

54. Does your institute pursue projects with campus facilities and operations?
- Yes 12 (71%)
- No 5 (29%)

55. How does your institute interact with campus facilities and operations? (Select all that apply)

Of the 12 Institutes that responded Yes to Q54
- Support Student Team Projects 10 (83%)
- Advise 9 (75%)
- Collaborate 8 (67%)
- Conduct Research 8 (67%)
- Provide Funding for Research 3 (25%)
- Other* 3 (25%)

*Provide reports, explore use of campus infrastructure in collaboration with education/research initiatives ("living laboratory"), Director co-chairs campus sustainability committee, interacts with facilities but not among listed options.

56. On which areas does your institute engage campus facilities and operations? (Select all that apply)

Of the 12 Institutes that responded Yes to Q54

- Greenhouse Gas Reductions…………………………………………………….9 (75%)
- Building Improvements ………………………………………………………….7 (58%)
- Waste Reduction   ………………………………………………………………….6 (50%)
- Dining Services   …………………………………………………………………….6 (50%)
- Procurement   ……………………………………………………………………….5 (42%)
- Grounds   …………………………………………………………………………………4 (33%)
- Finance   …………………………………………………………………………………..4 (33%)
- Transportation   ……………………………………………………………………….3 (25%)
- Changes in Operational Activities   …………………………………………3 (25%)
- Retail Branded Products   ………………………………………………………..0 (0%)
- Other*   …………………………………………………………………………………….3 (25%)

*Occupant knowledge and behaviors, "living laboratory."

57. What are areas of synergy between your institute and campus operations?
58. What are sources of opposition or tension between your institute and campus operations?
59. What advice can you provide regarding forming a new institute?
60. What advice can you provide regarding improving an existing institute?
61. What are the key elements of your institute's structure and model that aid in producing widespread benefits within and beyond the university?
62. What sources of synergy does your institute enjoy with other parts of the University?
63. What are the key challenges associated with your institute's structure and model?
64. What sources of opposition or tension does your institute experience with other parts of the University?
65. Does your Institute have dedicated development/fundraising staff?

- Yes ……………………………………………………………………………………….12 (71%)
- No   …………………………………………………………………………………………5 (29%)

66. What are some examples of your institute's successes?
67. What are some examples of your institute's failures?
68. Are there special skills or attributes that you think are critically important for a successful Director at your institute (as opposed to an institute with a more standard reporting structure within a school)?
69. If you had to select one key element of your institute (i.e. structural, programmatic, etc.) that differentiates you from most of your peers, what would that be?
70. In this last question, feel free to elaborate on topics we may have missed, offer advice to other institute Directors, or tell war stories.
71. If you lacked the space to complete any questions, please provide the question number and continue your answer below.

About the Authors

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Jessica L. Axson is a Post-Doctoral Fellow in both the Ault Research Group in the Department of Environmental Health Sciences, within the School of Public Health at the University of Michigan, Jessica was also awarded a Dow Sustainability Fellowship. Her research focuses on environmental and health aspects of particulate matter, including natural and engineered nanomaterials. She earned her PhD in Chemistry at the University of Colorado, Boulder.

Inset – Earth Institute at Columbia University

Created in 1996, with Jeffrey Sachs as director from 2002 until 2016, the Earth Institute at Columbia University is an outlier in our sample of institutes on a number of dimensions, most notably the number of centers and institutes within it. Where seven of the other 17 institutes have no separate research centers under their direction and the rest have between 1 and 8 centers, the Earth Institute has 15 research units, 5 research programs, and 5 joint research units. One of these is the Lamont–Doherty Earth Observatory, a research institution specializing in the earth sciences since 1949 which consumes about 40% of the Institute's annual expenditures. The Institute director reports to the Provost is paid out of the central university budget. The institute has a 54 member internal advisory board and a 10 member external advisory board. Yet, many of the individual units have advisory boards of their own. All of these elements suggest that the Earth Institute is more of an umbrella organization for many independent units rather than a stand-alone institute as are the others in this study.

With an annual budget of $135 million, the Earth Institute is again an outlier in our sample, its scale dwarfing other institutes, with annual expenditures ranging in size from $350,000 to $25 million, and an average of $7 million. The Institute receives 65% of its budget from government grants, 10% each from endowment income and institutional appropriations (which are fixed). Seventy percent of their budget is restricted, 60% to 70% is directed towards research, of which 80% is applied and 70% is conducted in collaboration with external stakeholders. Topics of focus include: Energy, Environment, Climate, Water, Food, Health, Environmental Justice, Urbanization, Business, and Transportation. Forty percent of this work is directed at the global level.

A third dimension in which the Earth Institute is an outlier in this study is physical space. Where overall institutes occupy space that ranges from 0 to 31,000 square feet with an average 11,000 square feet, the Earth Institute occupies 450,000 square feet in an upstate estate (called the Lamont campus), 20,000 square feet in its headquarters in New York City and leases an additional 30,000 square feet. Several of its labs and faculty occupy school space. The institute has a staff of 199 full time employees (compared to staffing levels at the other institutes which range from 1 to 60, and an average of 22). They have overall 750 FTEs that include both standard staff (director, assistant director, administrative, finance, development, communications, IT/graphic media, social media, traditional media relations, and education/outreach) and researchers from the natural and social sciences. The Institute lists 54 core faculty and 54 participating faculty.

Education is directed at all levels: high school, undergraduate, masters, Doctoral, Post-Doctoral Fellows, and Executive Education. However "at Columbia only schools give academic credit and degrees. We work with schools as partners in our educational programs" so the institute "designs courses and programs and work with schools to offer them." The Institute "advises, collaborates, and supports student team projects directed at campus operations with a focus on building improvements (i.e. energy footprint), climate reductions (i.e. greenhouse gas emissions), grounds, and waste reduction (i.e. recycling)."

Upon completion of the survey, the Earth Institute respondent noted that "we have been designed to integrate schools so some of the questions were not appropriate and my responses will not tell the complete picture." For this and the reasons stated above, we have treated the Erath Institute separately in this study.

Tables

Table 1

Differences between Institutes that Report to the Provost versus those that Report to the Vice President of Research

* Shaded boxes represent areas of significant difference

Sample Split on Reporting Relationship		Inst. Awarding Tenure	# Lecturers Engaged	Inst. with own course offerings	% Annual Revenue by Source					% Revenue Sources by Restriction		Year of Formation
					Institutional Appropriations	Government and Other Grants	Expendable Gifts	Endowment Income	Tuition and Fees	Restricted	Unrestricted	
Provost (n=10)	Ave	50%	3	30%	40%	30%	16%	13%	1%	51%	49%	1997
	Min	-	1	-	9	0	0	0	0	0	10	1963
	Max	-	10	-	100	60	35	60	6	90	100	2014
	St. dev	-	3	-	30	22	12	18	2	38	38	17
Vice President of Research (n=7)	Ave	29%	0	14%	32%	41%	10%	8%	5%	65%	35%	2010
	Min	-	0	-	6	12	0	0	0	40	15	2004
	Max	-	0	-	66	80	60	40	30	85	60	2016
	St. dev	-	0	-	21	25	22	15	11	15	15	4

Table 2

Differences between Institutes with Low, Medium and High levels of Director Compensation

* Shaded boxes represent areas of significant difference

Sample Split on Director Compensation (FTE)		Annual Expenditure ($ million)	Year of Formation	# Staff	% Annual Revenue by Source					% Revenue Sources by Restriction	
					Institutional Appropriations	Government and Other Grants	Expendable Gifts	Endowment Income	Tuition and Fees	Restricted	Unrestricted
Low (n=7)	Ave	$4.1	2008	9	32%	36%	14%	12%	0%	52%	48%
	Min	$0.35	1990	1	6	0	0	0	0	0	15
	Max	$9.0	2016	23	89	80	35	60	1	85	100
	St. dev	$3.6	9	7	28	29	14	21	0	37	37
Medium (n=5)	Ave	$10	2000	19	45%	27%	13%	10%	6%	51%	49%
	Min	$2.0	1963	8	10	0	0	0	0	0	25
	Max	$25	2013	31	100	70	60	40	30	75	100
	St. dev	$10	21	11	34	27	26	17	13	30	30
High (n=5)	Ave	$8.6	1996	43	36%	39%	13%	9%	1%	68%	32%
	Min	$6.0	1970	13	15	27	0	0	0	40	10
	Max	$12	2006	60	66	50	28	20	6	90	60
	St. dev	$2.6	15	18	19	9	11	8	3	24	24

Table 3

Differences between Institutes with Low versus High Levels of Staffing

* Shaded boxes represent areas of significant difference

Sample Split on Staffing		% Director FTE	Space (square feet)	% Budget for Inst. Services	% of Institutes with Specific Staff Roles										
					Director	Asst. Director	Administration	Finance	Development	Communication	IT/Graphic Media	Social Media	Traditional Media	Education & Outreach	Research Management
Lower half (n=11)	**Ave**	**34%**	**9,245**	**8%**	**100%**	**64%**	**100%**	**91%**	**36%**	**91%**	**45%**	**82%**	**36%**	**64%**	**82%**
	Min	*7*	*0*	*0*	-	-	-	-	-	-	-	-	-	-	-
	Max	*100*	*25,000*	*25*	-	-	-	-	-	-	-	-	-	-	-
	St. dev	*29*	*9,061*	*9*	-	-	-	-	-	-	-	-	-	-	-
Upper half (n=6)	**Ave**	**83%**	**14,200**	**15%**	**100%**	**83%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
	Min	*50*	*4,000*	*0*	-	-	-	-	-	-	-	-	-	-	-
	Max	*100*	*31,000*	*36*	-	-	-	-	-	-	-	-	-	-	-
	St. dev	*26*	*10,785*	*14*	-	-	-	-	-	-	-	-	-	-	-

Table 4
Differences between Institutes that Focus more on Applied versus Basic Research

* Shaded boxes represent areas of significant difference

Sample Split in Type of Research		# Staff	# of Affiliated Faculty						Year of Formation	Annual Expenditure ($ million)	% of Research with External Stakeholders
			Total	Core	Joint	Participating	External	Lecturers			
Basic (n=9)	**Ave**	**15**	**177**	**4**	**2**	**169**	**0**	**2**	**2008**	**$7.7**	**33%**
	Min	*5*	*38*	*0*	*0*	*24*	*0*	*0*	*1994*	*$0.36*	*0*
	Max	*31*	*492*	*10*	*6*	*486*	*2*	*10*	*2014*	*$25*	*100*
	St. dev	*10*	*143*	*4*	*2*	*145*	*1*	*3*	*6*	*$7.8*	*35*
Applied (n=8)	**Ave**	**30**	**111**	**12**	**8**	**87**	**2**	**1**	**1996**	**$6.2**	**65%**
	Min	*1*	*22*	*0*	*0*	*12*	*0*	*0*	*1963*	*$0.35*	*25*
	Max	*60*	*281*	*62*	*50*	*276*	*8*	*5*	*2016*	*$10*	*100*
	St. dev	*23*	*85*	*21*	*17*	*90*	*3*	*2*	*19*	*$3.8*	*29*

Figures

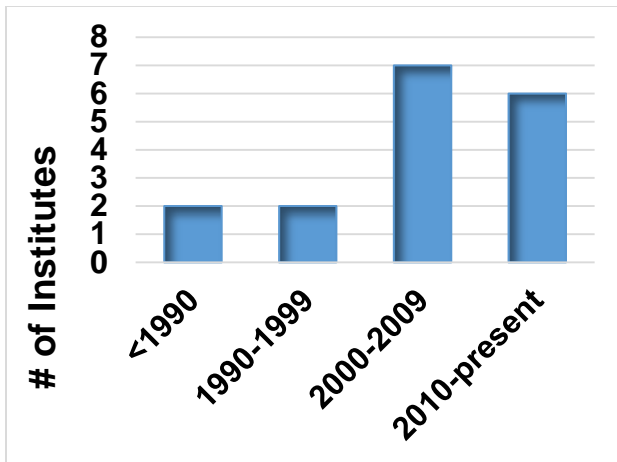**Figure 1: Founding Date for Institutes in this Study**

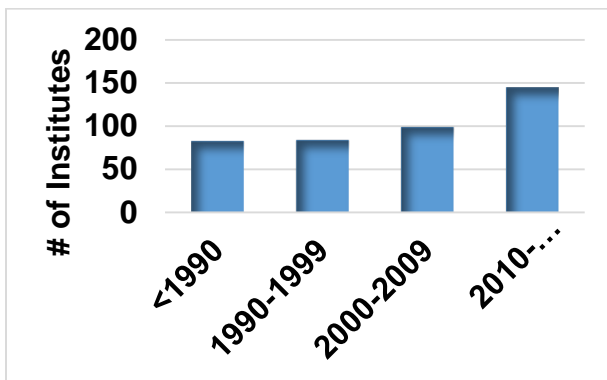**Figure 2: Founding Date for Institutes in NCSE Study**
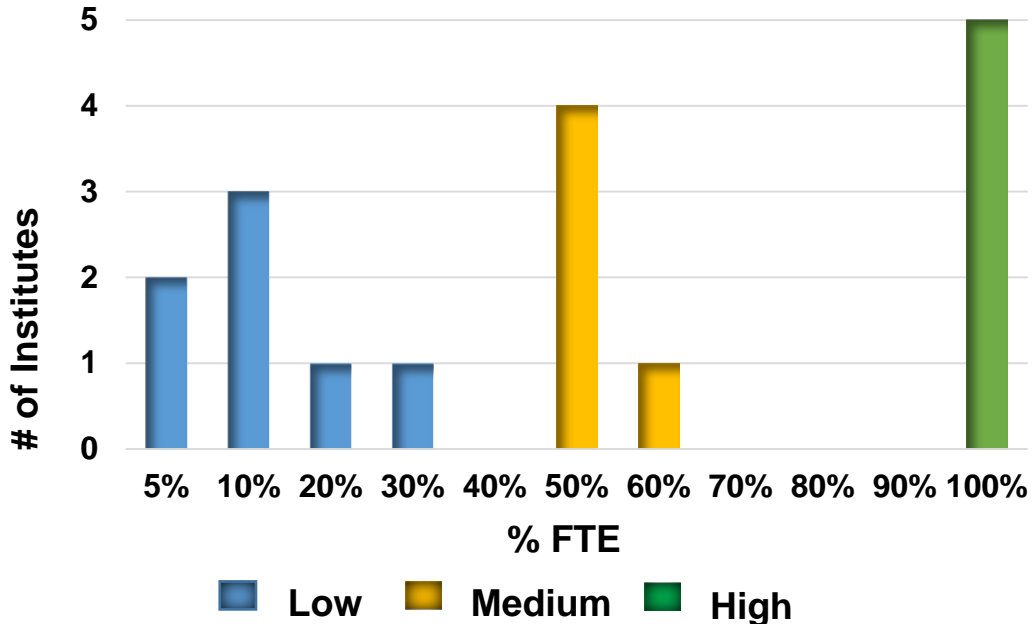
Figure 3: FTE Allocation for Institute Directors
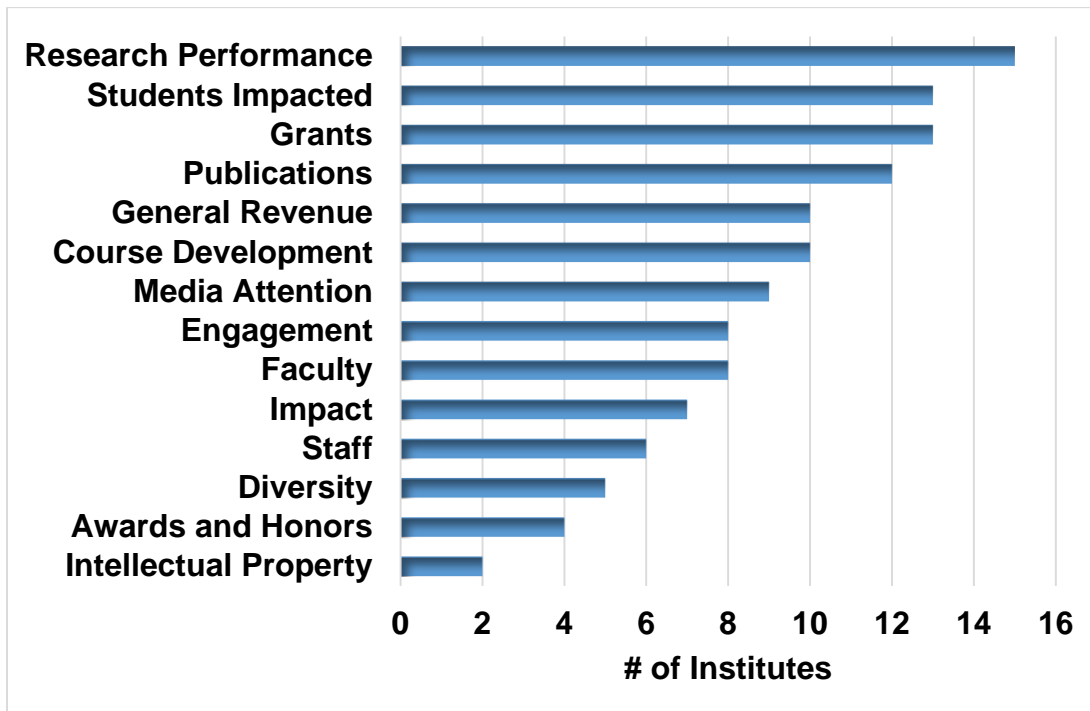

Figure 4: Institute Performance Metrics
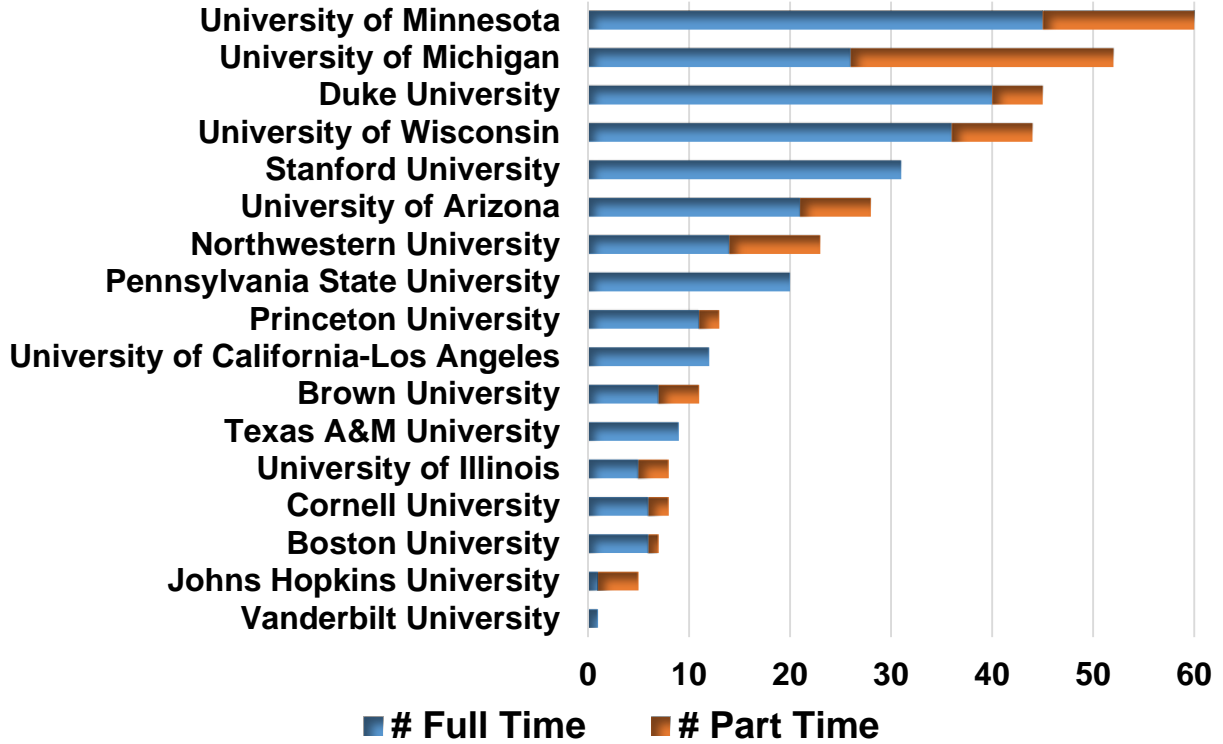
Figure 5: Institute Staffing Levels

Horizontal bar chart showing number of full time (blue) and part time (orange) staff by university:

University
University of Minnesota
University of Michigan
Duke University
University of Wisconsin
Stanford University
University of Arizona
Northwestern University
Pennsylvania State University
Princeton University
University of California-Los Angeles
Brown University
Texas A&M University
University of Illinois
Cornell University
Boston University
Johns Hopkins University
Vanderbilt University

Legend: ■ # Full Time   ■ # Part Time

Figure 6: Institute Staffing Roles

Horizontal bar chart, x-axis "# of Institutes":

Role
Administrative
Director
Communications
Finance
Research Management
Social Media
Education/Outreach
Assistant Director
IT/Graphic Media
Traditonal Media Relations
Development
Other

Figure 7: Faculty Engagement

Legend: Participating Faculty (blue), Core Faculty (gold)

Universities (top to bottom): Cornell University, University of Arizona, University of…, Northwestern…, Pennsylvania State…, University of…, Duke University, Boston University, Vanderbilt University

X-axis: 0, 50, 100, 150, 200, 250, 300, 350, 400, 450, 500

Figure 8: Disciplines Engaged with the Institute

Legend: Slightly (blue), Moderately (gold), Extremely (green)

Disciplines (top to bottom): Physical Science, Engineering, Environmental Science, Social Science, Professional, Public Health, Humanities, Agriculture, Computer Science, Architecture & Urban Planning, Journalism, Education, Medical Science, Veterinary Science

X-axis: 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0
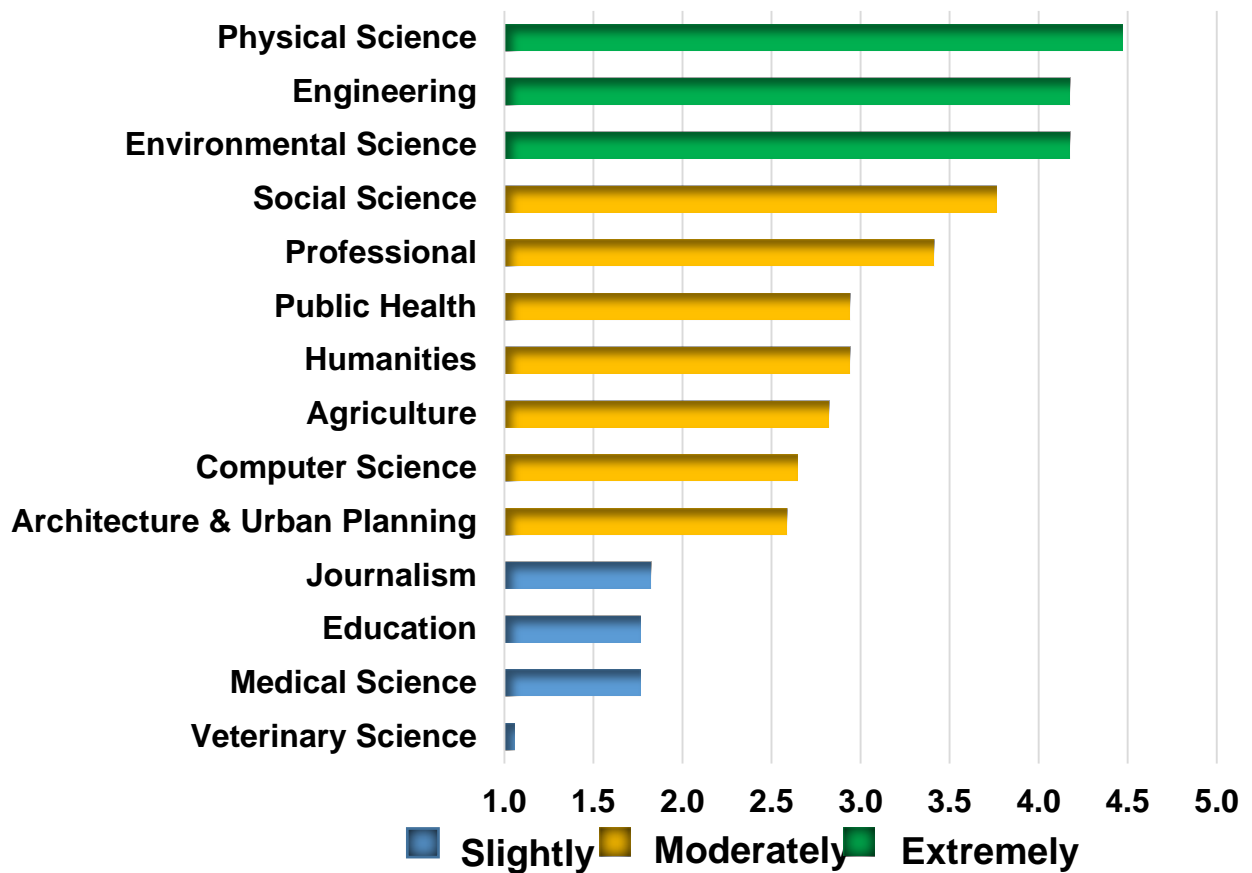
Figure 9: Disciplinary Importance to the Institute
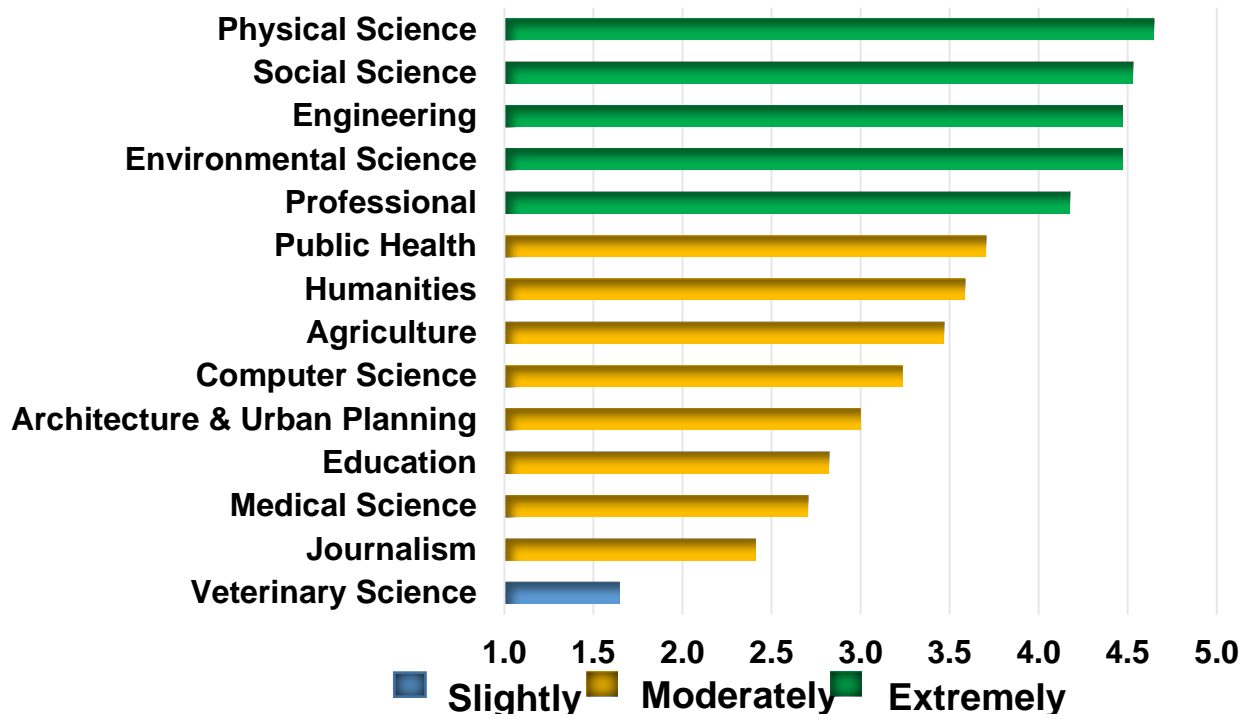
Figure 10: Ratio of Importance to Engagement

Horizontal bar chart showing the ratio of importance to engagement by field.

Field	Ratio
Physical Science	~1.05 (Well Represented)
Engineering	~1.07 (Well Represented)
Environmental Science	~1.07 (Well Represented)
Architecture & Urban Planning	~1.16 (Moderately Represented)
Social Science	~1.20 (Moderately Represented)
Humanities	~1.22 (Moderately Represented)
Computer Science	~1.22 (Moderately Represented)
Professional	~1.23 (Moderately Represented)
Agriculture	~1.23 (Moderately Represented)
Public Health	~1.26 (Moderately Represented)
Journalism	~1.32 (Moderately Represented)
Medical Science	~1.53 (Under Represented)
Veterinary Science	~1.56 (Under Represented)
Education	~1.60 (Under Represented)

Legend: Under Represented (blue), Moderately Represented (gold), Well Represented (green)

Figure 11: Faculty Expectations and Responsibilities

Figure 12: Total Annual Expenditures

Figure 13: Sources of Revenue

Figure 13: Sources of Revenue — Horizontal bar chart showing # of Institutes for each revenue source:
- Institutional Appropriations: 17
- Government Grants: 12
- Expendable Gifts: 11
- Other Grants: 10
- Endowment Income: 10
- Tuition and fees: 4
- Service Fees: 1
- Other: 2

# of Institutes

Figure 14: Distribution of Expenditures

Figure 14: Distribution of Expenditures — Horizontal bar chart showing # of Institutes for each expenditure category:
- General Administration: 17
- Research: 17
- Instructional & Education Services: 11
- Operations & Maintenance: 9
- Equipment: 2
- Other: 7

# of Institutes

Figure 15: Word Cloud of Mission Statement

Figure 16: Word Cloud of Vision Statement

Figure 17: Word Cloud of Sustainability Definition

Figure 18: Basic and Applied Research

Figure 19: Topics of Research

Horizontal bar chart titled "# of Institutes" showing number of institutes by research topic:
- Water: 17
- Climate: 17
- Environment: 17
- Energy: 15
- Food: 14
- Environmental Justice: 13
- Health: 12
- Business: 9
- Transportation: 8
- Urbanization: 8
- Other: 3

Figure 20: Geographic Scale of Research
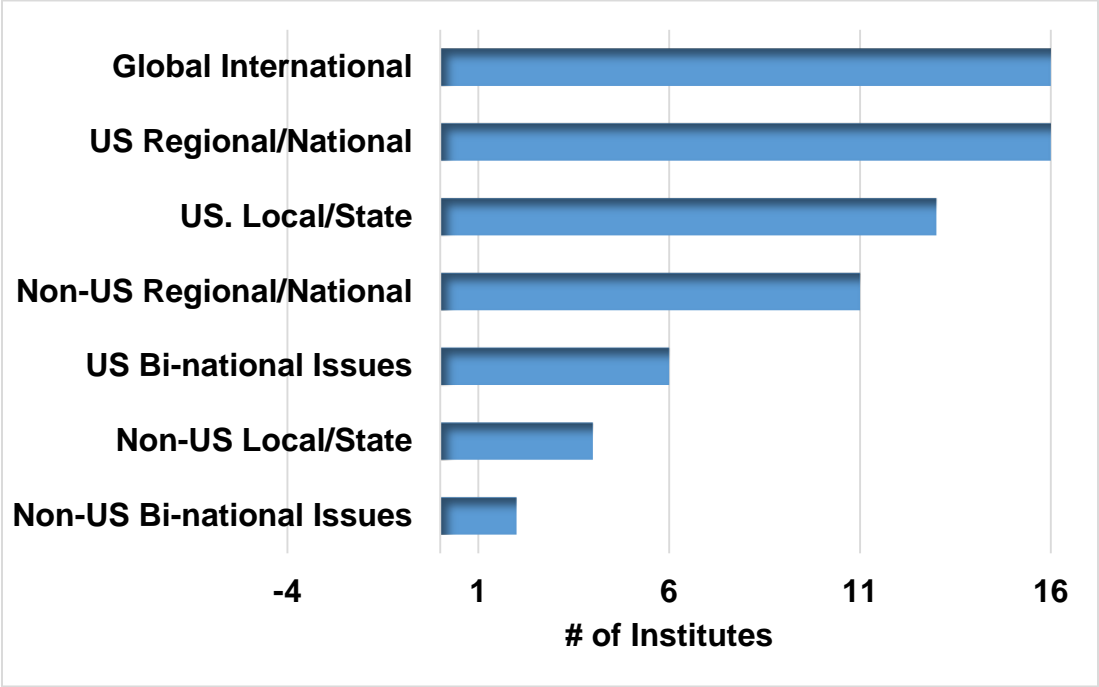
Figure 21: Level of Students Receiving Educational Content
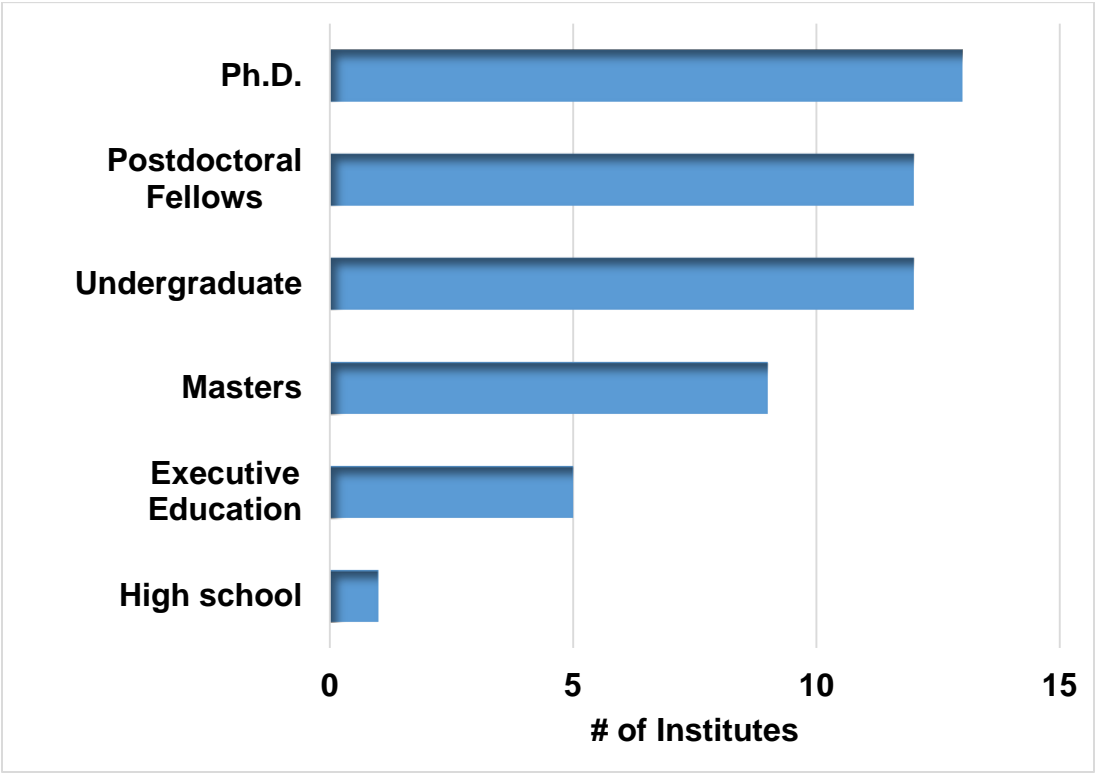
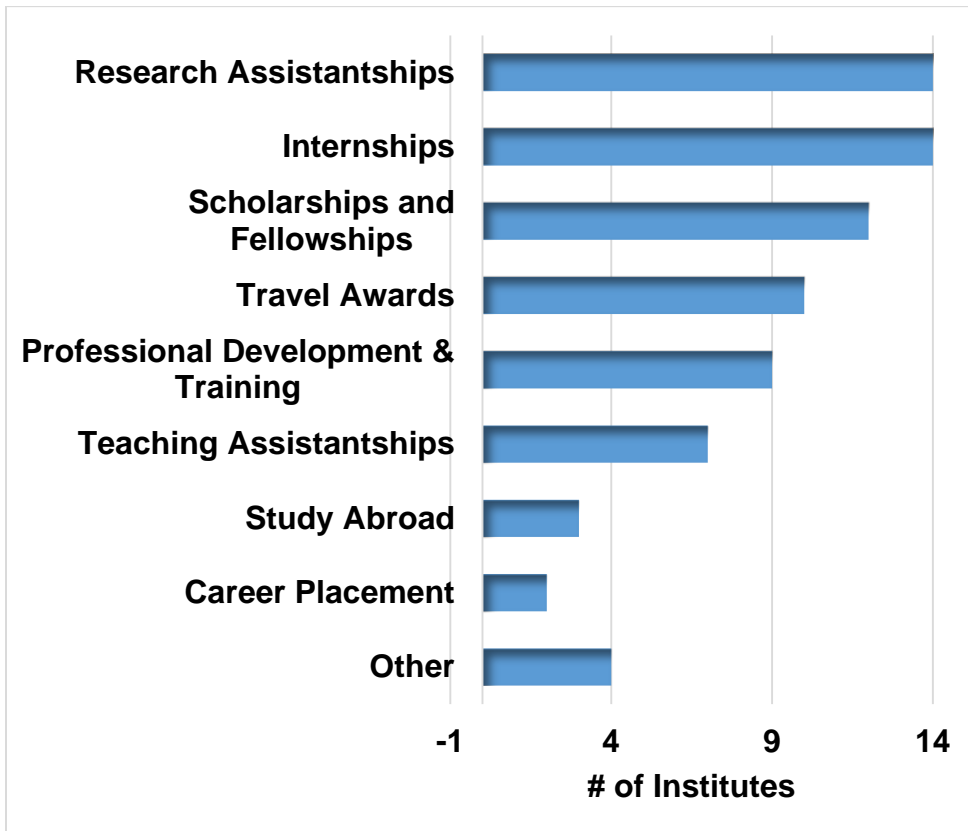**Figure 22: Degrees Offered**
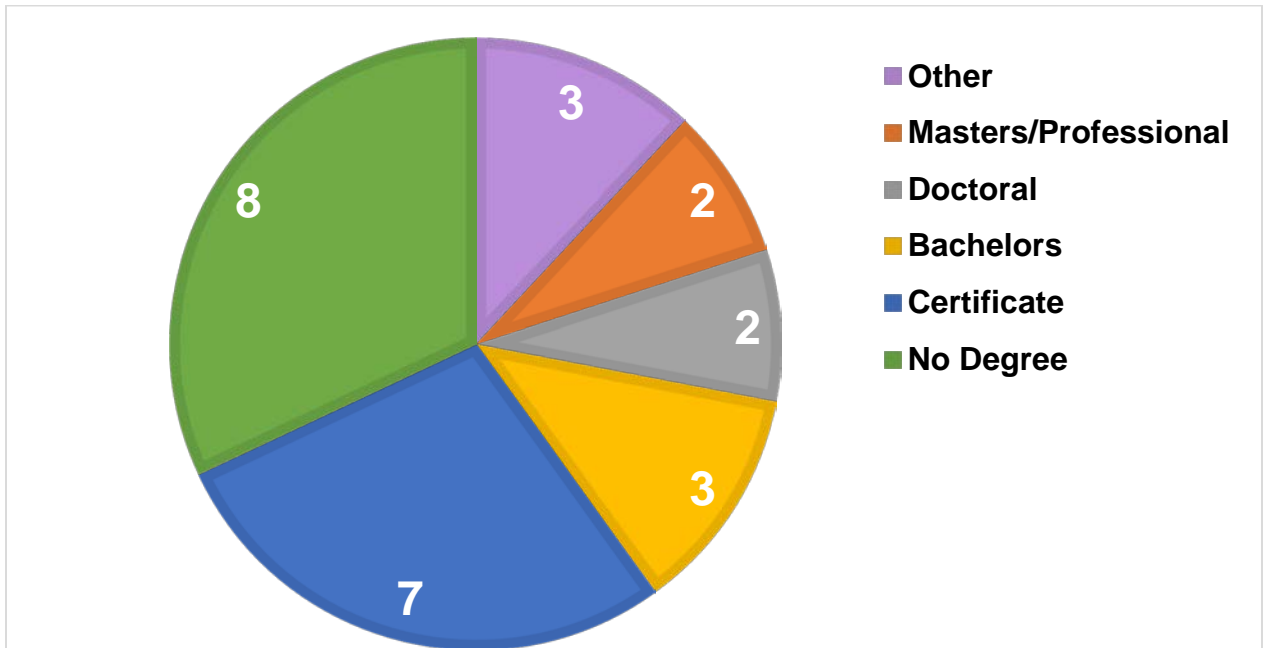
Figure 23: Resources Provided to Students

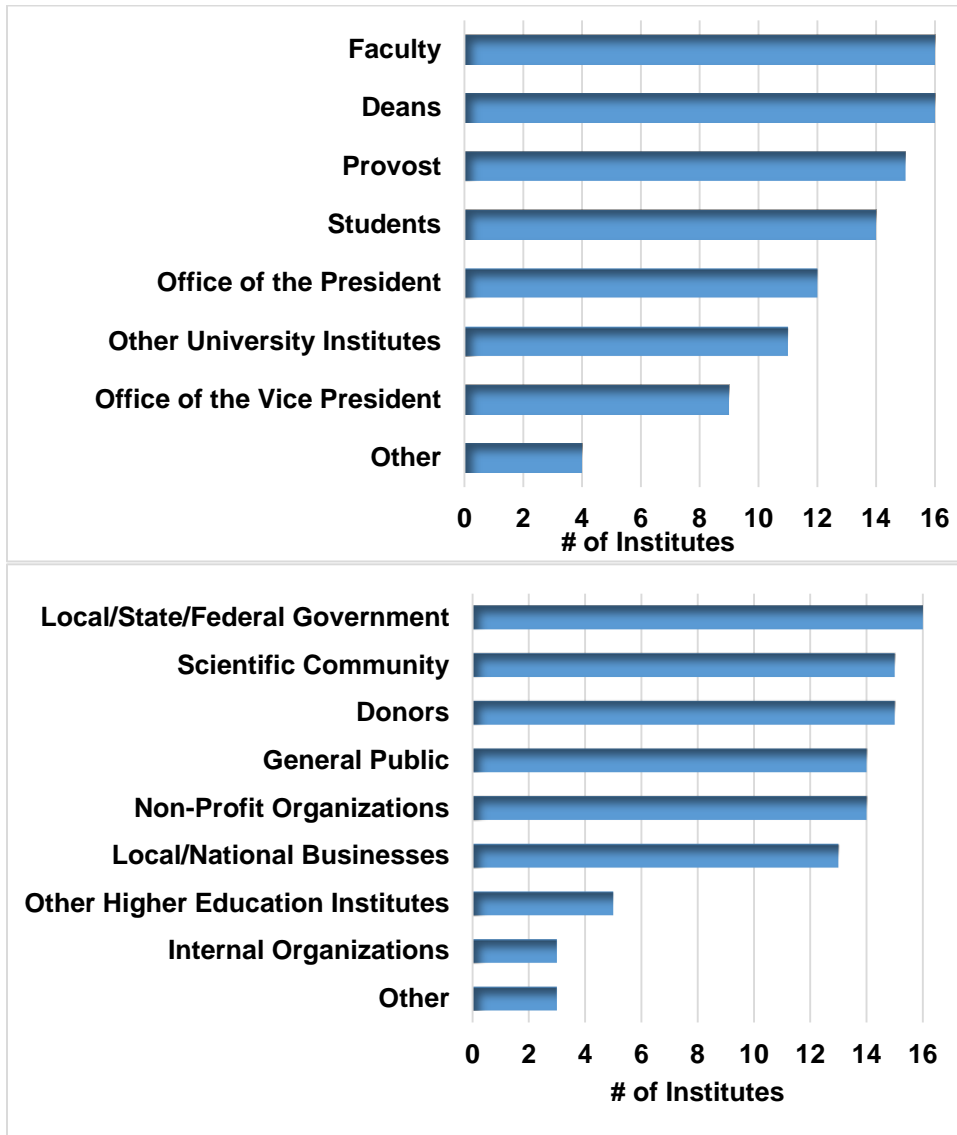**Figure 24: Internal and External Stakeholders**

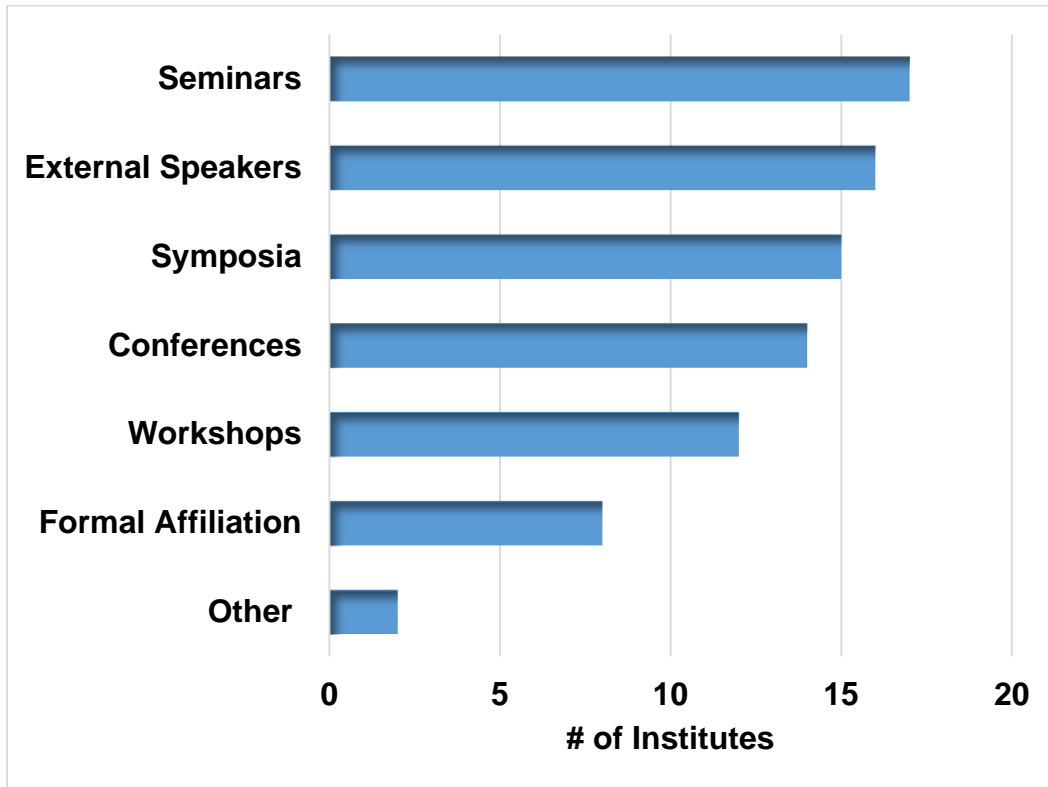**Figure 25: Tools of Engagement**
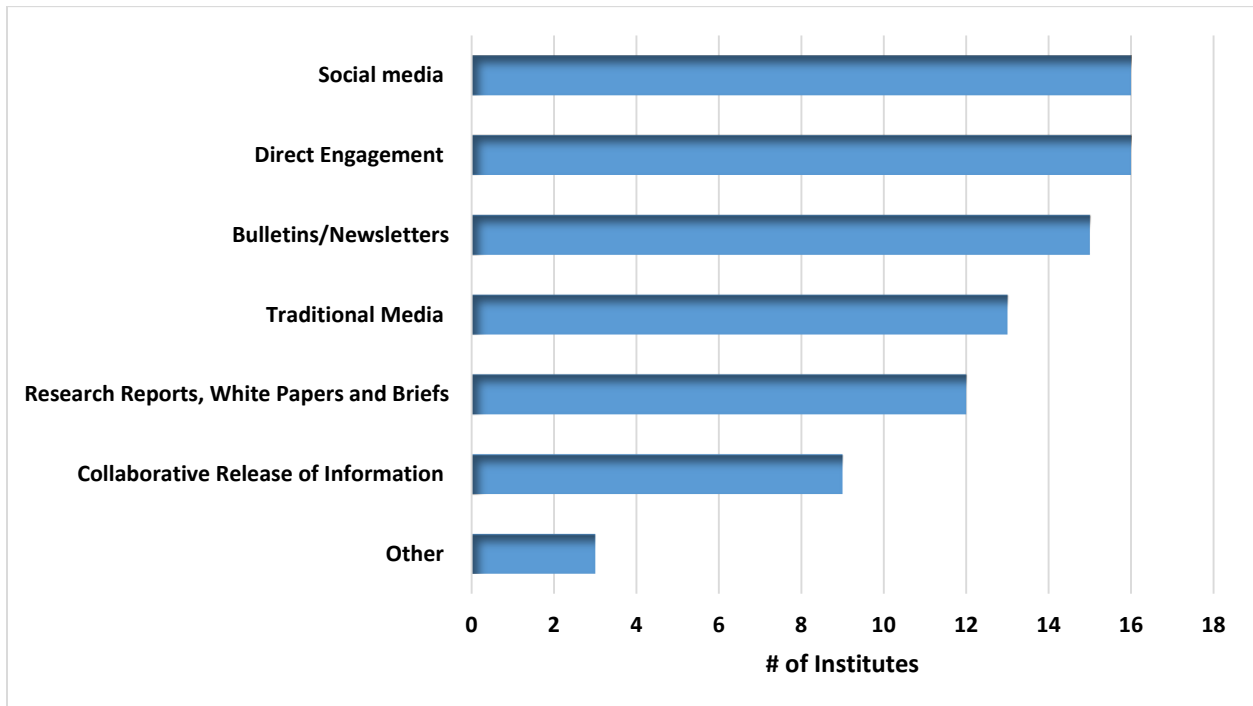

Figure 26: Tools for Disseminating Information

Figure 27: Areas of Engagement with Campus Facilities

Greenhouse Gas Reductions: 9
Building Improvements: 7
Dining Services: 6
Waste Reduction: 6
Procurement: 5
Finances: 4
Grounds: 4
Operational Activities: 3
Transportation: 3
Other: 3

X-axis: # of Institutes (0, 2, 4, 6, 8, 10)