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Executive Summary

For hundreds of years, the higher education sector has played an important role in society, beginning with the education of clergy and vocational training, expanding into research during the 19th century, and developing further to include a “third mission” of directly meeting society’s needs through application of research. In recent years, higher education institutions have also begun to directly collaborate with community stakeholders through a “co-creation” model, an extension of the third mission.

Higher education is well-positioned to leverage all of these missions to create solutions to the complex and urgent global problems caused by climate change. This paper describes seven key distinctives of the higher education sector that have emerged from these missions, and how they are being applied directly to address climate challenges. These distinctives are not entirely unique to the sector, but are areas of sector-specific strength. Articulating these distinctives clearly can help other sectors working on climate issues better understand how cross-sector climate action could be effectively and efficiently accomplished. We provide background on these distinctives, examples of these distinctives at a variety of institutions, and conclude with future opportunities.
Introduction

The goal of this paper is to understand key distinctives of the higher education sector that can help accelerate climate solutions across all of society. These distinctives are built on two foundational concepts: the multiple missions of higher education and complementarity between sectors.

THE MULTIPLE MISSIONS OF HIGHER EDUCATION

Higher education has long played an important role in society. The modern university began in late medieval times with an original mission to educate and train individuals to enter a profession, beginning with theology and the clergy and expanding into law and medicine (Arbo and Benneworth 2007). This education and training feature, or what can be more generically described as knowledge transfer, formed the first and earliest mission of higher education. The mission of the sector remained largely unchanged until the Humboldtian reforms in the early 19th century which introduced the basic concepts of academic freedom and foundationally shaped the modern research university as a place where the autonomous pursuit of new knowledge takes place (Bongaerts 2022). This established research, or knowledge creation, as the second mission of higher education.

While these two traditional missions of transferring knowledge and independently creating knowledge has served higher education well, eventually there became increased interest in higher education institutions serving needs outside of the institution, and thus a “third mission” emerged (Compagnucci and Spigarelli 2020). As Trencher et al (2014) describe, “the concept of a third mission is somewhat ambiguous. Yet in principle, it refers to diverse activities not covered by the first mission (education) and second mission (research) such as technology transfer, continuing education and social engagement in the form of public access to lectures and cultural assets, voluntary work and consultancy... From this perspective, the term ‘social contribution’ is a useful synonym for describing the core notion of the third mission.” This third mission opens the possibility for higher education to respond directly to timely and salient issues facing society by applying the knowledge that is being created and transferred.

Solutions to problems caused by climate change, as an issue that spans geographies, disciplines, and sectors, is one of the most obvious and important topics to apply all three of higher education’s missions. Climate science continues to mature as an area for increasing knowledge, and a better understanding of the global physical systems will allow us to better predict what future conditions will be like. Climate-smart technologies in the fields of renewable energy, transportation, buildings, and manufacturing are highly dependent on new knowledge breakthroughs to provide meaningful solutions that can be deployed at scale. A new climate workforce and climate leaders being sent out into a litany of professional fields must be trained and educated on the importance of addressing climate considerations in their vocations. If this climate knowledge creation or transfer is done independently of social needs, however, it is largely an “academic” pursuit and therefore responsiveness and co-production of these knowledge domains with community participation is a key third element.

COMPLEMENTARITY WITH OTHER SECTORS

The missions of higher education are an important foundation for understanding why higher education is well-positioned to serve a distinct role in helping society address climate change. It doesn’t help us understand how the higher education sector fits with and among other sectors that are also taking climate action seriously. This is where sector complementarity becomes important. Complementarity recognizes that all of society’s sectors (e.g. higher education, health care, business,
cultural institutions, governments, civil society, etc) contain sector-specific strengths.

Some of these strengths are completely unique. Governments, for example, are the only sector that can pass and enforce laws that everyone must follow. Understanding how to best harness this legislative and regulatory power is obviously critical for climate action, and cannot be replicated by any of the other sectors. Other strengths are not unique, but take a different form between sectors. As we discuss below with higher education, the research enterprise is a key distinctive, but a significant amount research is also done by the private sector as well. The reason for the research in higher education, however, is not solely driven by the same market forces as much of what happens within industry. Therefore, the form of the activity serves a different role in the search for climate solutions within higher education than it does in private enterprises.

This doesn’t imply that similarities between sectors aren’t important, they are. It’s essential that many sectors have physical infrastructure and can learn from each other about ways for buildings, energy systems, and vehicles can transition away from being powered by fossil fuels. When thinking about complementarity between sectors, it’s therefore critical to not identify areas of identical overlap, but instead consider the ways the sectors are different. This can then drive partnerships, produce joint activities, and increase the efficiency and effectiveness of the entire system.
Top Distinctives of Higher Education

We recognize we are identifying a limited number of distinctives and this is an invitation to criticism about the ones we leave out. There are valid reasons for others not included below, but our goal is to get stakeholders inside of higher education and potential collaborators outside of higher education, thinking about how these distinctives can create synergistic opportunities for the future.

We discuss the following seven distinctives as key characteristics of the higher education in more detail below:

1) Knowledge Creation
2) Knowledge Transfer
3) Credentialing
4) Trusted Voice
5) Trusted Convener
6) Living Laboratory
7) Loyal Alumni

1. KNOWLEDGE CREATION

Institutions of higher learning are some of the most significant new knowledge and exploration generators. One of the primary responsibilities of the faculty, particularly at larger universities, is to research and investigate subject areas and create novel contributions to a given field. This research serves as the basis for discoveries and innovations. Many mottos of universities include Latin words for “knowledge” and “truth,” such as Scientia, and Veritas. As we discussed in the introduction, the creation of new knowledge is one of the core missions of the sector.

There are many ways that knowledge creation happens at a higher education institution, and the structure varies according to each discipline. While the outcome of formal research often includes an output in a peer-reviewed journal, many other forms of dissemination of the knowledge generated by the institutions exist such as white papers, public presentations, or online tools. Formal research is often categorized as “basic” or “applied”. Basic research entails general study and investigation of the field or topic area. Sometimes basic research can be considered theoretical, as it works to understand a concept. Applied research differs as it is centered on the application of the research. Applied research can include developing new products, policy, or other things that can be used.

One important note about the knowledge creation distinctive is that higher education’s research is often based on the intellectual curiosity of the researcher. The downside to this is that sometimes the research only benefits a small number of academics. The upside is that the freedom to pursue this exploration is not bounded by additional forces, such as markets or consumer demand. This basic research may create early-stage opportunities and surprising solutions independent of any external pressure, which then others in the private sector or industry may find a way to capitalize. In this way, the knowledge creation distinctive plays and important complementary role to the industry-sponsored research which often operates under a different set of constraints.
2. KNOWLEDGE TRANSFER

Academic institutions are long-standing repositories of knowledge. These institutions were created with the original mission of transferring this knowledge to future generations. Scholars study, train, and teach at these institutions. Over time the focus areas expanded from subjects such as religious study and medicine, to ones such as natural science, engineering, and other humanities. The act of education itself is a discipline.

One of the primary responsibilities of higher education is disseminating this knowledge, and it has many different pathways to do so. The most common and familiar way this happens is through educating undergraduate students, but many higher education institutions have formal and informal programs for other types of “life-long learners” such as executives or elementary school children. Higher education institutions are leaders in educating and preparing individuals for the real world through courses, training programs, and other educational opportunities. Society is often shaped based on the education people receive in these institutions and therefore, it is integral that institutions are equipped to prepare people to address the problems and challenges we face now and in the future.

3. CREDENTIALING

Higher Education institutions also serve as key “gatekeepers” for signaling to broader society what types of knowledge a graduate holds. Topical content, delivered in the form of structured courses, is packaged together to form a curriculum. Curricula support “majors” and other types of categorized degrees that are the most common and powerful form of a credential issued by higher education. As a result, higher education institutions became knowledge brokers in disciplines, determining standards and criteria for what constitutes a sufficient body of knowledge.

A credential issued by higher education isn’t only an a formal degree such as a bachelors of science (B.S.), masters of arts (M.A.), or doctor of philosophy (Ph.D.). Certificates or diplomas are also received after completing individual courses, training, or a series of educational offerings. Any of these credentials allow individuals to demonstrate to current or future employers that they are trained or experts in a subject area or field. This is a key element of social mobility and workforce competitiveness for individuals.

4. TRUSTED VOICE

Historically, higher education has been one of the most trusted public voices across all sectors in society. This was born out of its unique role generating and disseminating new knowledge. They have been integral in helping the general public understand the world around us in a wide range of outlets from written publications to expert testimony to public events.

In more recent times, skepticism about the reliability of any voice from an institutional authority has risen and the high levels of trust in higher education has begun to diminish, dropping 20 points in 8 years of public polling (Gallup 2023). While a concerning trend, the diversity of ways that individuals and entities within higher educational institutions can speak into the public domain remains extremely distinct and valuable.

Higher education institutions clearly have deep influence over the millions of students studying on campus through the faculty and instructors directly involved in education. The institutional influence extends far past these student populations, however, to alumni, community members, research collaborators, and members of the various other physical and virtual communities that regularly
interact with the institution’s resources. Particularly in topic-specific areas like the environment, technology, health, or engineering, the knowledge created by higher education experts is commonly one of the first places non-experts look to for a trusted source of information, if that is a priority for them.

5. TRUSTED CONVENER

Higher education has institutional relationships and connections that range from local stakeholders to collaborators across the globe. These include other higher education institutions, industry collaborators, and governments. Faculty and academic staff within higher education institutions consistently work with global colleagues in a highly collegial fashion not found across many other sectors. Outside of traditional academic collaborations, other groups such as elected officials, policy makers, business leaders, and (arguably most importantly!) the general public will utilize a higher education institution’s long-standing reputation as a neutral convener and fixture in the community to discuss issues of immediate relevance, interest, or concern.

This convening function happens in many different ways. Higher education institutions host conferences that bring together multiple partners and interested parties allowing groups and individuals to forge new connections and technical partnerships. Public presentations with well-known experts or entertainers often generate follow-up discussions and classroom debate about the topics presented. Small, focused roundtables on more sensitive topics can effectively leverage the knowledge capacity and subject matter expertise of the faculty to answer difficult questions facing a given party.

The key element of this distinctive is that higher education institutions calling the convenings are not often seen as having an agenda in the same way that other sectors may. Businesses, for example, may have a market interest in bringing groups together. Governments may have a regulatory requirement to do so. Trust in higher education’s convening power allows for them to be a key partner in advancing relationships and discussions for the public good.

6. LIVING LABORATORY

Higher education institutions are a wonderful testing grounds for solutions. Many campuses are analogous to mini-cities with physical infrastructure such as transportation, residential housing, and commercial real estate that are centrally controlled by campus administration. Because of this, higher education institutions can serve as what is commonly called “living laboratories” with “operational, academic partners, sustainable data collection/analysis, formal and informal learning activities, and measurable outcomes” (MIT Office of Sustainability). While the built environment provides fertile ground for testing, there are also social and behavioral tests that can be co-designed with the members of campus.

These living laboratories often involve a number of stakeholders on campus for monitoring and assessment. For example, some physical intervention may allow students to collect data on a new technology while simultaneously learning research methods part of a course. Faculty may want to test a prototype outside of the lab, but “in the field” and by understanding the campus as a test bed, there can be ways to accelerate innovative solutions that wouldn’t happen otherwise. The pedagogical and research core functions of the sector naturally extend into turning campus into a living laboratory.
7. LOYAL ALUMNI

The relationship between a higher education institution and its alumni is special. All students that graduate from an institution instantly become part of an alumni network. The affinity that this affiliation creates is not similarly shared when someone transitions from a job, leaves the workforce altogether during retirement, or even passes through earlier stages of K-12 education. Many college and university students are attending these institutions at very formative years of early adult development, and this creates lasting memories that extend far beyond the classroom.

Alumni participate in discussions, visits, and the admissions process, along with serving as large sources of revenue through their direct giving. Alumni are some of the largest funders to institutions and help these organizations meet their long-term missions and goals. Many higher education institutions work hard to build a sense of belonging for their former students. The high commitment and affinity to the high functioning of their former institution is not seen in many other sectors and as a result, support for the institution’s mission and strategy can be very powerful.
Applying the Seven Distinctives to Climate Action and Solutions

We have presented general principles describing each these distinctives. In many cases, it is easy to see how to apply these distinctives to climate solutions. Below we discuss these applications further, including a number of specific case studies.

GENERAL APPLICATIONS

- New knowledge on climate solutions is critically important to understand how we can better mitigate and adapt to the problems caused by climate change.

- Transferring knowledge about climate solutions to future leaders and other stakeholders creates a better educated culture about what can be done to address the challenge.

- Credentialling graduates and other professionals, signals to those in the workforce what a climate solutions professional is and can be.

- Society needs a reliable and trusted voice on key questions that many individuals are asking about climate solutions, particularly as factual information about climate is increasingly difficult to discern.

- Bringing people and groups together to share in productive and civil dialogue about climate action creates vested interest in shared outcomes that benefit all involved.

- Testing climate solutions using the campus infrastructure allows for on-campus daily users and off-campus visitors to have a better understanding of what leading edge climate solutions can look like.

- Engaging with alumni, many of whom serve in leadership positions across other sectors, on the importance and urgency of climate action ensures that support can flow back towards the key other functions.

CASE STUDIES

There are number of specific case studies below that illustrate these distinctives:

DISTINCTIONS 1, 4
[Knowledge Creation, Trusted Voice]

OHIO STATE CARBON FARMING

In 2022, the Ohio State University began a $15M project to evaluate how carbon farming can be a “nature-based” solution to climate change. Many carbon sequestration research involves computer modeling to figure out how effective different interventions are. In this case, the research team is going to be working with farmers, land managers, and other stakeholders across the US and in South America to directly measure how much carbon dioxide can be stored in agricultural land and how that could inform policies such as generating carbon credits to incentivize farmers to increase that storage through agricultural practices.

UNDERGRADUATE CLIMATE CHANGE EDUCATION FOR ALL AT UC-SAN DIEGO

Many institutions offer courses, and increasingly degrees, in climate and climate-adjacent fields. University of California, San Diego has taken an innovative approach to how it embeds climate into the educational experience for all students. In 2021, the Committee on Campus Climate Change proposed a requirement of climate change education for all undergraduate students at the university. In early 2023, the Committee completed a series of recommendations about this requirement including designs of how it could be implemented. Modeled after the University’s Diversity Equity and Inclusion (DEI) core requirement, the criteria ensured that graduation requirements were not increased, but instead that climate change content would be embedded within existing curriculum across all colleges and majors. This proposal was approved by the academic senate in 2023 to be implemented with the incoming class starting in fall 2024 making it the first University in the California system, and one of the few in the country, to have such a requirement.


COLORADO SCHOOL OF MEDICINE DIPLOMA IN CLIMATE MEDICINE

Credentialling often happens in a way that maintains isolation between disciplines and institutional siloes. The intersections between climate and health allow for that type of credentialing model to be challenged. One example of this is the Colorado School of Medicine, which offers a Diploma in Climate Medicine for physicians and health care professionals. Participants receive hands-on training and professional credentials to “be a credible, knowledgeable, and influential voice in advancing smart, patient-centric policy in climate and health.” The program includes week-long certificates in Foundations and Updates in Climate Medicine; Developing Sustainable Hospital Systems; Disaster Response and Recovery; Community Resilience: Energy Innovation & Healthy Infrastructure; and Global Challenges. The certificates and diploma are open for any healthcare physician and professional to apply.

https://medschool.cuanschutz.edu/climateandhealth/diploma-in-climate-medicine
Distinctive 4
[Trusted Voice]

COLUMBIA UNIVERSITY’S CLIMATE DEREGULATION AND REREGULATION TRACKER

As regulatory rollback became a theme during the Trump Administration, it was critical to know what climate regulations were being proposed to be eliminated. Columbia Law School and Climate School Sabin Center for Climate Change Law created the Deregulation Tracker. The repository included information and news on proposed executive and legislative to deregulate environmental protection. Sorted by date, one can follow the ongoing proposals, become informed, and take action. The repository was a quick reference for individuals looking to engage with this information. During the Biden Administration, the center created a Reregulation Tracker, which goes through executive and legislative proposals seeking to advance environmental protection.

https://climate.law.columbia.edu/climate-deregulation-tracker

https://climate.law.columbia.edu/content/climate-reregulation-tracker

Distinctive 5
[Trusted Convener]

TEXAS SOUTHERN UNIVERSITY CO-HOSTS THE HBCU CLIMATE CHANGE CONFERENCE

For the past nine years, the Bullard Center for Environmental and Climate Justice at Texas Southern University co-hosts the HBCU Climate Change Conference each year along with the Deep South Center for Environmental Justice. The purpose of the conference is “to bring together HBCU faculty and students, researchers, climate professionals and environmental justice and community residents impacted by toxic facilities and severe weather events related to climate change in order to bridge the gap between theory and the experiential realities of climate change.” Additionally, high school students are able to participate and learn about climate science. With the multitude of stakeholders present the HBCU Climate Change Conference serves a good example how to bring together a broad range of interested stakeholders to learn about and engage in climate action.

CONCORDIA UNIVERSITY’S PLAN/NET ZERO

In April 2023, Concordia University launched an ambitious new initiative called Plan/Net Zero, which is designed to transform the way that its highly urban campus in downtown Montreal is integrating climate goals with various forms of its infrastructure, educational assets, and research. While much of the focus is on electrification, buildings, and physical infrastructure, Concordia has also leveraged its business school’s expertise to create new incubators, financing models, and policies to encourage a more robust cleantech startup ecosystem. Part of the plan brings in Concordia’s “Volt-age” research program where many applied solutions are being developed in the domains of electrification, smart buildings, and net-zero communities and supported with a $123M multi-year grant from the Canadian government.

https://www.concordia.ca/sustainability/net-zero.html

CONSORTIUM OF UNIVERSITY ALUMNI FOR A SUSTAINABLE PLANET

In 2023, four alumni groups that were focused on climate action at Harvard, MIT, Yale, and Stanford joined together to form CUSP – the Consortium of Alumni for a Sustainable Planet. The group held its first event in June 2023 to discuss the implications of the Inflation Reduction Act. While there are many announcements about alumni donating to a single institution to create centers or programs on climate change, including billions of dollars at these institutions to create structures such as the Doerr School of Sustainability or the Salata Institute of Climate and Sustainability, the model for this consortium is to “recognize the incredible resources and abilities that alumni groups have” to solve the climate crisis. While just getting started, the large-scale mobilization of thousands of volunteer alumni is an interesting approach to scale impact across institutions.

https://cusp.world/
Future Directions

Higher education institutions have been integral in shaping our world and creating solutions to some of the largest challenges facing society. By identifying some of the sector’s distinct strengths (knowledge transfer, knowledge creation, credentialing, trusted voice, trusted convener, living laboratory, loyal alumni), there may be a better appreciation for how other sectors such as business, government, health care, or cultural institutions can partner either with individual higher education institutions, with the sector overall, to accelerate climate solutions. While these partnerships are already happening, if each sector identified their own set of distinctives, then we could map together a system of cross-sector climate collaborations that minimized redundancy and maximized each other’s respective strengths. With sufficient resourcing to support such an effort, this system-wide distinctive mapping could then be used as a tool for locally-based or nationally-scaled climate strategies. It will take all of society’s sectors acting together to accomplish the vast challenge of creating climate solutions at the speed and scale that is required.
References


Second Nature is committed to accelerating climate action in, and through, higher education.

We do this by mobilizing a diverse array of higher education institutions to act on bold climate commitments, to scale campus climate initiatives, and to create innovative climate solutions. We align, amplify, and bridge the sector’s efforts with other global leaders to advance urgent climate priorities.

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