

**Implementing Sustainability in Large Public Organizations:  
Impacts of Bureaucracy**

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Elizabeth J. Keysar

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**Implementing Sustainability in Large Public Organizations:  
Impacts of Bureaucracy**

**Approved by:**

**Dr. Michael Elliott, Chair**  
School of City and Planning  
*Georgia Institute of Technology*

**Dr. Gordon Kingsley**  
School of Public Policy  
*Georgia Institute of Technology*

**Dr. Marc Kodack**  
Office of the Assistant Secretary of the Army  
for Installations, Energy and Environment  
*United States Army*

**Dr. William Drummond**  
School of City and Regional Planning  
*Georgia Institute of Technology*

**Dr. Brian Stone**  
School of City and Regional Planning  
*Georgia Institute of Technology*

Date Approved: March 7, 2013

*To Ron Webster,  
for showing me working in a bureaucracy is a source of joy and laughter,  
and not for the faint of heart.  
You are missed.*

*and Mannette Messenger,  
for believing in the impossible and inspiring us all to do the same.  
Your influence guided all that follows here.*

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## **LIST OF ABBREVIATIONS**

AASHE	Association for the Advancement of Sustainability in Higher Education
DOE	United States Department of Energy
FORSCOM	United States Army Forces Command
GHG	Greenhouse Gas
GRI	Global Reporting Initiative
HVAC	Heating , Ventilation and Air Conditioning
LEED	Leadership in Energy and Environmental Design
ORNL	Oak Ridge National Laboratory
POC	Point of Contact
R&D	Research and Development
SCI	Sustainable Campus Initiative
STAR	Sustainability Tracking, Assessment and Rating Tool
UNH	University of New Hampshire
U.S.	United States

## **SUMMARY**

Environmental Planning theory tells us that continued improvement in environmental outcomes will require new approaches that are voluntary; behavior change will come from within organizations, not imposed from outside. The concept of sustainability fits in this new phase of environmental planning and policy. Sustainability programs are being used by organizations to ensure options are available for continued success into the future. Approaches to implementing sustainability are characterized as integrated, holistic, collaborative, pluralistic, strategic, interactive, place-based, future-oriented, systems-based and adaptive.

Large public organizations are structured to make rational decisions on complex issues based on standardized criteria with a high degree of accountability in often politically-charged contexts. In order to meet these requirements, public organizations have formal structures that divide functions by specialization, strictly define roles and responsibilities, implement hierarchical and vertical control mechanisms, and enforce standardization. Departmentalization and specialization are necessary as organizations grow in size or as tasks grow in complexity, but bureaucratic methods of coordination such as hierarchy, task standardization and formalized procedures may not be adequate to achieve policy goals related to sustainability.

Literature on sustainability indicates that in order for organizations to be successful in achieving sustainability goals, they must create an organizational context that produces innovative ideas (considered a strength of organic or learning organizations), along with an organizational context that effectively manages and implements continuous change (considered a strength of bureaucratic organizations). Contingency theory predicts that new structural and cultural attributes should be present in bureaucratic organizations attempting to become more sustainable, as sustainability establishes new goals and objectives which cannot be met with

business as usual. Effectively striking this balance appears to be a key component of making progress in sustainability for large public organizations.

The research completed through this doctoral dissertation addresses gaps in the literature regarding the implementation of sustainability goals in large public organizations. In particular, this research explored the seeming contradiction between bureaucracy and sustainability and determined the extent to which bureaucratic structures, processes and cultures affect the ability of practitioners to implement the sustainability goals and objectives of the organization for which they work. Implementation of sustainability requires both innovation *and* continual organizational change management. This research examined how organizations manage to be both simultaneously by asking the question: How have large public organizations implemented sustainability programs?

The research design is a multiple case study that uses replication to support theory development. Cases consisted of three large public organizations that have adopted sustainability goals and established programs for achieving these goals. The cases were selected amongst large complex organizations with significant commitments to sustainability goals and objectives in their strategic plan and/or master plan and their campus-like settings. Data was collected through direct observation, open-ended interviews and document review.

The data were analyzed based on a conceptual framework that predicts the types of activities and attributes organizations will exhibit to successfully achieve sustainability goals. This framework is based on previous research in success factors for organizational change and innovation as well as research on sustainability implementation. A baseline of outcomes associated with implementing sustainability was used to determine where the organizations are experiencing success and where they have had limited progress. Similarities and differences

between the organizations were explored and similarities found to far outweigh differences. Conclusions are presented about how the organizations have created cells of innovation in otherwise bureaucratic cultures. The results have implications for the implementation of sustainability in other large public organizations, as well as larger implications for emerging approaches in environmental planning and environmental policy.

The results demonstrate that sustainability implementation in these organizations is dependent upon leadership support, cross-functional teams, orientation to the external environment, effective management systems and consistent support over time. Bureaucratic organizations are structured to effectively accomplish the core mission, but if they also want to be more sustainable, they must adopt and promote more organic attributes to enable change, learning and innovation.



# **CHAPTER 1**

## **INTRODUCTION**

A recurring theme in the environmental planning and policy literature is that approaches to addressing environmental problems are undergoing an evolution, even a paradigm shift (e.g. Colby, M.E., 1991; Daniels, 2009; Hart, 1999; Mazmanian & Kraft, 2001; Nattrass & Altomare, 1999; Vig & Kraft, 1997; Wondelleck & Yaffee, 2000). Starting in the 1970s, the predominant response to environmental concerns was characterized by Command and Control (CAC): top-down, regulatory-based, technocratic, end-of-pipe solutions based on environmental media (air, water, soil, waste). This phase was characterized by adversarial relationships between the federal government and the regulated entities. The next phase is characterized by devolution of compliance oversight to the states, implementation of pollution prevention programs, and more economically efficient responses to environmental problems. Partnership-building, stakeholder involvement and dispute resolution are encouraged. The final, emerging period reflects the changing perception about the nature and complexity of environmental problems. Environmental managers are increasingly aware that these issues cannot be addressed outside the economic and social context that causes them. Communities, businesses, government and nongovernmental organizations, and individuals must be more engaged in managing these problems; it is no longer possible to regulate the needed behavioral changes. This third phase is commonly linked with the concepts of sustainability and sustainable development.

Literature regarding this trend in environmental policy and planning theorizes that implementing sustainability will require responses that are integrated, holistic, collaborative, pluralistic, strategic, interactive, place-based, future-oriented, systems-based and adaptive (Beatley & Manning, 1997; Carley & Christie, 2000; Krizek & Power, 1996; Larson, et al, 2000;

Norton, 2005; Randolph, 2004; Sharp, 2009; Wondelleck & Yaffee, 2000). Outcomes of processes based on these principles are not as clear as the previous approaches which had relatively straightforward mandates outlined in legislation, such as:  $x$  part per million for a certain contaminant. The outcome ‘sustainable development’ is more about taking actions to ensure desired activities can be continued into the indefinite future. It is about wise use of natural resources to ensure their continued availability, or simply protecting options for future generations. These goals are vague and hard to operationalize – even amongst sustainability experts. The thousands of books, articles and websites that have been written are testimony to the many ways this concept can be interpreted and applied. This, in and of itself, is not necessarily a problem – think of terms like democracy and liberty. The concept can inspire and guide action, but it does not lend itself well to clearly defined tasks and associated roles and responsibilities which are the hallmarks of bureaucratically structured organizations.

Large public organizations are structured to make rational decisions on complex issues based on standardized criteria with a high degree of accountability in often politically-charged contexts. In order to meet these requirements, public organizations have formal structures that divide functions by specialization, strictly define roles and responsibilities, implement hierarchical and vertical control mechanisms, and enforce standardization. Departmentalization and specialization are necessary as organizations grow in size or as tasks grow in complexity, but bureaucratic methods of coordination such as hierarchy, task standardization and formalized procedures may not be adequate to achieving policy goals related to sustainability (Carley & Christie 2000; Doppelt, 2003; Francis & Lerner, 1996; Sharp, 2009). Important implementation challenges may exist due to limitations inherent in an organization’s structure, culture, and management systems. If the organization of interest is a “public machine bureaucracy,”

(Mintzberg, 1979) public managers may be very limited in their ability to address non-routine problems and non-routine policies, such as a ‘sustainable military installation’ or a ‘green campus.’ Public organizations typically have risk-adverse and compliance-based cultures. Departmentalization by specialty is a classic feature of bureaucracy; “multiple solitudes characterize the landscape of overspecialization, ensuring that communication, adaptation, and creativity are institutional rarities” (Francis & Lerner, 1996, p. 151). There is an apparent contradiction between the bureaucratic mode of organizing and the demands of sustainability.

Successful implementation of sustainability goals and policies must overcome this apparent contradiction between bureaucracy and sustainability. Implementing environmental programs based on the principles of sustainability is fraught with difficulties (e.g. Doppelt, 2003; Keysar, 2009; Koontz & Bodine, 2008; Lachman, et al., 2001; Lachman, et al., 2008; Stone, 2006; Wondelleck & Yaffee, 2000). One major problem is how to reconcile these ideas within a regulatory infrastructure based on separation by media. Another problem is that these efforts require time and resources to implement; they require strategic planning, cross-functional interaction, stakeholder involvement, consensus building, and then monitoring results to make mid-course corrections. It is a challenge just to determine what indicators are useful for tracking success; are outcomes improving due to the new approach or to some other reason? How does an agency, community, or organization know that their sustainability programs are worth the resources dedicated to them (making the business case)? Another challenge is the linkages amongst all scales that sustainability affects – the tag line ‘think globally, act locally’ indicates that individual actions must be linked with larger trends in organizations, communities, regions, nations and the globe. For instance, concerted effort by an organization to become more sustainable will require its supply chain to also make changes, and its social-cultural system to

also embrace these values and make changes (Bertels, et.al., 2010; Starik & Rands, 1995; Stubbs & Cocklin, 2008). If not, then the organization is limited to what it can do on its own.

Environmental planners typically operate within a functional stovepipe, but sustainability is about meeting economic, community and environmental needs simultaneously – so another major problem is moving these ideas beyond the ownership of environmental programs. In a compliance-based culture that values specialized technical expertise, environmental planners will require new skill sets and a new perspective of the nature of the problems they seek to solve. As noted by Donald Schön (1983):

Significant organizational learning -- learning which involves significant change in underlying values and knowledge structure -- is always the subject of an *organizational predicament*. It is necessary to effective organizational adaptation, but it disrupts the constancies on which manageable organizational life depends. (p. 328)

It is not clear that these difficulties can be overcome. There is a lack of research on how the theoretical ideas of sustainability can be put into practice. Practitioners have many ideas and recommendations, but there is little empirical support for these claims. “What is needed at this point therefore is a clearer matching up of the theoretical virtues of more sustainable systems with the experience of sustainability initiatives in the field” (Mazmanian & Kraft, 2001, p. xiii).

Given these new demands on public organizations, environmental planning literature has little to contribute at the organizational level. The literature that addresses integrated, collaborative and participatory approaches for implementing sustainability typically does so over large geographic areas focusing on multiple agencies, organizations and stakeholders. Inter-organizational interaction tends to be the focus, not intra-organizational structure and dynamics (Cairns & Crawford, 1991; Carley & Christie 2000; Frieder, 1997; Mazmanian & Kraft, 2001). There are prescriptive works that describe how physical planning and policies can help shape

more sustainable communities, but these rarely address the organizational characteristics that the government agencies need to enable the necessary innovations to occur (i.e. Beatley & Manning, 1997; Leuenberger, D.Z. & Bartle, J. 2009; Ravitz, 2000). Although research has been focused on business sustainability (i.e., Bertels, et.al. 2010; Willard, 2002), there is little analysis of the implications of sustainability for large public organizations, even though these organizations form the basis to many inter-agency efforts and have tremendous influence through land-use management, building construction and operation, education, research and development, government purchasing, and environmental regulations.

Many public organizations operate campus-like settings in support of their missions, and these settings resemble small cities in the types of activities and planning problems faced. These organizations must procure raw materials such as energy and water, manage real estate, and provide housing, commercial retailers, dining services, and more. Organizations that run campuses, especially those with residential areas, must cope with a wider range of environmental issues and require more complex and interactive environmental solutions. For these, sustainability initiatives are more central to the success of environmental goals. Understanding how these organizations address sustainability will be very helpful to cities that attempt to implement similar programs.

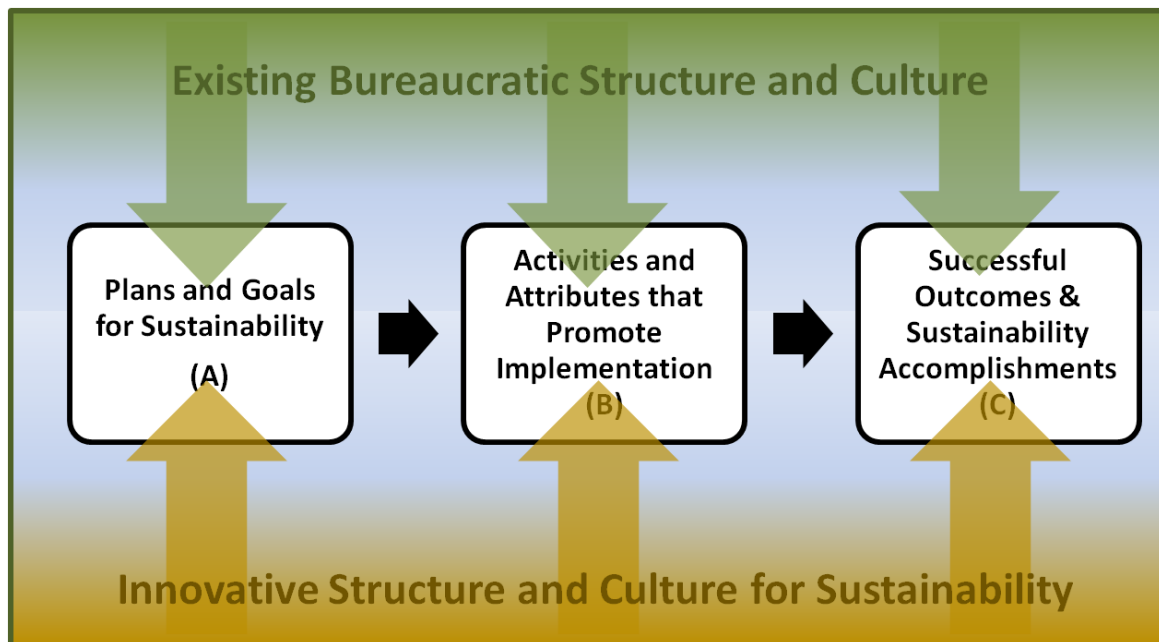
This research into organizational capacity to promote sustainability is informed by the propositions from contingency theory. Contingency theory for organizations predicts that organizations adapt over time to changing circumstances -- such as its setting, size or strategy -- responding in a way that ensures continual effectiveness (Donaldson, 2001). Sustainability theorists predict that the implementation of sustainability will require *both* innovation and continual organizational change management. This implies creating an organizational context

that produces innovative ideas (considered a strength of organic or learning organizations), along with an organizational context that effectively manages and implements continuous change (considered a strength of bureaucratic or mechanistic organizations). Contingency theory predicts that new structural and cultural attributes should be present in bureaucratic organizations attempting to become more sustainable, as sustainability establishes new goals and objectives which cannot be met with business as usual. Effectively striking this balance appears to be a key component of making progress in sustainability for large public organizations.

### **1.1 Purpose and Objectives**

The purpose of this doctoral dissertation is to address gaps in the literature regarding the achievement of sustainability goals in large public organizations in order to strengthen the link between theory and practice. In particular, it is the objective of this research to explore the seeming contradiction between bureaucracy and sustainability and determine the extent to which bureaucratic structures, processes and cultures affect the ability of these public organizations to implement their sustainability goals and objectives. The available literature predicts that the implementation of sustainability requires *both* innovation and continual organizational change management. Large public organizations successfully implementing sustainability programs should therefore have adapted their bureaucratic attributes (which manage gradual change) with the addition of sustainability attributes (to enable innovation), as shown in Figure 1. Evidence of the duality of organizational types should be evident in how the plans and goals are established (A), the activities and attributes conducted to promote sustainability (B), and the success of the programs (C). Case studies of organizations that have adopted sustainability goals and objectives should reveal that these organizations have implemented changes in organizational

activities and attributes in order to accomplish sustainability objectives, as consistent with contingency theory for organizations.



**Figure 1. Interaction between Organizational Characteristics and Sustainability Implementation**

This research examines how these organizations manage to be both innovative and bureaucratic simultaneously by asking the question: *How have large public organizations implemented sustainability programs?* This question was approached in a multiple case study approach guided by three main research questions:

1. Are bureaucratic organizational characteristics present?
2. Are attributes and activities that enable innovation present?
3. Has the sustainability program been successful?

## **1.2 Contribution to Environmental Planning Theory and Practice**

This research seeks to articulate issues associated with implementing the new approaches in environmental planning and policy by examining the organizational context in which environmental planners operate. It, therefore, is cross-disciplinary in nature, using an organizational or public administration lens to examine the practical difficulties of implementing the ideas and principles of sustainability to improve environmental outcomes. If regulations will no longer be the primary driving force for fixing environmental problems, then what is the role of an environmental planner? These planners will become embedded within organizations -- they will no longer dictate behavior from the outside. Environmental planning must be informed by the concepts and research findings from the public management, organizational change and organization theory literature to enable a broader understanding of what organizations will face as they seek a more sustainable future for their operations, missions and the states and nations they serve. This dissertation contributes to environmental planning theory and practice in several ways:

1. It provides a pragmatic view of establishing a sustainability program within a large public organization to include: critical steps to take, challenges that can be expected, and lessons for enabling success.
2. It articulates how large public organizations have made changes to adapt to shifting perceptions of environmental problems, as consistent with contingency theory.
3. It examines the concept of sustainability as an approach for addressing environmental issues and improving outcomes from an organizational perspective.



### **1.3 Outline of Document**

Chapter 2 of this dissertation presents the theoretical background for the ongoing transition in environmental planning and policy and the implications of these changes for public organizations. This chapter also presents the framework used in this research to evaluate if organizations were successful in implementing environmental sustainability. Chapter 3 explores literature on bureaucratic characteristics, change management, and innovation in organizations and how this points to expected organizational attributes and activities that would be present in organizations successful at implementing sustainability programs. This literature provides the basis for the semi-structured interview questions used in the research. Chapter 4 describes the case study research method used and data collection procedures.

Chapter 5 presents the case study reports, answering questions about how the case studies implement their sustainability programs. In this chapter the bureaucratic characteristics of the case studies are examined. In Chapter 6 results associated with presence or absence of the expected attributes and activities are covered. Chapter 7 presents results for the evidence of success in the programs, as well as the challenges faced. Chapter 8 summarizes the data analyses, which includes common themes found across the cases and how organizational theory helps explain the findings. Chapter 9 provides conclusions for large public organizations as they seek to improve outcomes associated with their sustainability programs. This chapter also presents the limitations of this research and additional research questions that were raised for environmental planners as they continue to transition from Command and Control to voluntary efforts driven by the concept of sustainability.

## **CHAPTER 2**

### **THEORETICAL BACKGROUND - ENVIRONMENTAL PLANNING AND SUSTAINABILITY**

The theoretical background guiding this research begins with the proposed theory that environmental policy tools and planning approaches are undergoing a transition to more voluntary, pro-active, holistic, collaborative and sustainability-focused methods. The literature proposes this transition because the command-and-control, end-of-pipe solutions, although successful, are not adequate to address more complex environmental issues such as climate change, biodiversity loss and natural resource scarcity. It is implied, then, that the newer approaches should enable more successful outcomes for environmental issues over earlier approaches. This chapter reviews literature about the transition from command-and-control to sustainability, sustainability and organizations, assessing sustainability outcomes, and the need for innovation and change in support of sustainability programs. This literature provides the basis for the research questions, data collection and data analysis.

#### **2.1 Transitions in Environmental Policy and Planning Approaches**

There is a great deal of overlap between the fields of practice called environmental planning and environmental policy. The roles of an environmental planning professional and an environmental policy professional are often described as very similar or the same. Environmental Planners respond to policy, such as the Clean Air Act or the Clean Water Act, but they also set policy through the planning documents, such as land use restrictions through zoning. Environmental policy professionals write policy, but they also analyze and implement it, such as analysts and regulators at the United States (U.S.) Environmental Protection Agency.

Although this dissertation is focused on environmental planning professionals, the distinction is hardly a clear one.<sup>1</sup> And both sets of literature point to new or evolving approaches to managing environmental problems. The literature also makes clear that each successive approach builds on and relies upon the institutional framework created by earlier approaches. Calling these approaches new is not meant to imply that one type of response has replaced another, or even that there are clear distinctions between approaches; many are actually combinations of several approaches. The linkages between environmental planning approaches and environmental policy tools for environmental protection are shown in Table 1. The ideas of sustainable development and sustainability fit within the integrative category of approaches. Organizations implementing sustainability integrate environmental considerations into all aspects of decision-making in a voluntary manner – as best practice.

For the purposes of this research it is important that the new goals and policies of the organizations studied fit within the voluntary, beyond compliance, collaborative, cross-functional, integrative realm of environmental planning and management approaches as shown in Table 1 and outlined in the literature. Sustainability goals and programs meet this requirement.

---

<sup>1</sup> “Environmental planning applies the process of planning to environmental protection and problem solving. This may entail any of the human-environmental interactions such as natural hazards, human environmental health, natural resource use, productive natural system, and ecosystems.” (Randolph, 2004, p. 17)

“Most environmental planners work in the government sector for local, regional, state, or federal agencies. However, professional planners are increasingly working in the private sector for development firms and consultants, and in the civil sector for land trusts and other environmental groups. The role of the planner can be: as technician or information source; as a facilitator of public involvement, builder of community support, champion of citizen empowerment; as a regulator; as a negotiator among interests, mediator of conflicts; as a political adviser, politician; as a designer, visionary; or as an advocate.” (Randolph, 2004 p. 29-33)

“Environmental planning involves shaping a community or region by protecting and improving air and water quality; conserving farming, forestry and wildlife resources; reducing exposure to natural hazards; and managing the natural features and built environment that makes a place livable and desirable. Good, effective planning produces a sustainable quality environment that stands the test of time. Environmental planning has become a profession with highly trained and dedicated men and women from a variety of educational backgrounds including land use and community planning, geography, geology, hydrology, biology, botany, zoology, chemistry, landscape architecture, climatology, public policy, economics, law, and journalism. Environmental planners represent hunting and fishing groups; wildlife conservation organizations; watershed associations; land trusts; developers; corporations; consulting firms; and local, regional, state and federal government agencies.” (Daniels & Daniels, 2003, p. xix)

<b>Table 1. Transitions in Environmental Planning and Policy</b>			
<b>Environmental Planning Approaches</b> (Randolph, 2004)		<b>Environmental Protection Tools</b> (Dietz & Stern, 2002)	
Reactive	Actions taken to correct prior environmental damages	Command and Control (regulations, standards)  Market-Based Approaches (externality taxes, permit markets)	Explicit external controls are placed on behavior:  Those who do not do as prescribed face specific tangible sanctions
Proactive	Actions taken to explicitly enhance environmental quality	Technology Research & Development Planning Requirements  'New' Tools Education Provision of Information	The 'new' approaches rely more on implicit sources of behavioral control, so that the resulting behavior is likely to be perceived as voluntary
Integrative	Early and substantive consideration of environmental and social factors in the formulation of development plans and projects	'New' Tools Voluntary Measures  Best Professional Practices (codes, norms)	

## 2.2 Sustainability and Organizations

Literature on implementing sustainability in organizations shares a common theme of revolutionary change because the existing linear production model and associated separation of production from the environment and social realms is fundamentally flawed. This section reviews this literature in order to establish that sustainability implementation in organizations will require continuous and ongoing innovation and change, simply due to the nature of the concept.

Sustainability advocate Bob Willard (2002) explains that sustainability in organizations means that all aspects of the triple bottom line are incorporated into the business model. The triple bottom line involves *economic prosperity*, which is “not just about individual corporations being profitable over the short term...it’s also about multilevel, interdependent economies being healthy and sustainable for the long term” (p. 5). It also implies *environmental stewardship*

which requires less harm to the environment in reducing natural resources use and waste generation as well as cleaning up contaminated sites. The final element of the triple bottom line is *social responsibility* which calls for “a global view of society and seeks to ensure that resources and wealth are more equitably shared among the citizens of the world” (p. 7). This includes observing human rights, improving working conditions, adhering to business ethics, making charitable contributions, and supporting public health (ibid). Willard stresses the integration of these three areas as the basis of organizational sustainability: “They are part of the same whole, not separate from each other. When people talk about ‘trading off’ or ‘balancing’ economic progress against environmental and social impacts versus ‘integrating’ these three dimensions, it betrays a lack of understanding of sustainable development” (p. 8).

Brian Nattrass and Mary Altomare (1999) call for a “new management framework” focused on building organizations that are “learning organizations” because there is no other way to fully integrate “natural systems and natural laws into the frame of their business reality” (p. 14). The sustainable organization, according to Nattrass and Altomare, is one that understands how global trends in natural resource availability, along with increasing demand for these resources, will have on its success. It then directs its activities in such a way that meets the four system conditions (based on the Natural Step<sup>2</sup>) to proactively plan for and address these challenges. The sustainable organization seeks to: 1) reduce its use of substances extracted from the Earth’s crust; 2) reduce its production of man-made substances that end up as waste in ecosystems; 3) reduce the environmental impacts it causes through overharvesting or other forms of ecosystem manipulation; and, 4) ensure resources are used fairly and efficiently in order to meet basic human needs worldwide (p. 23). In order to meet these challenges, sustainable

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<sup>2</sup> The Natural Step is a nonprofit organization that developed a set of scientific principles and framework to achieve a more sustainable society. Refer to: <http://www.naturalstep.org/>

organizations must change the metaphor of “organizations-as-machine” into the “learning organization,” which will require a “fundamental shift in corporate culture, in the way people interact and collaborate, in the way they think and view their internal systems and interrelationships, and in the way they organize work” (p. 11).

Bob Doppelt (2003) believes sustainability is ultimately about “protecting our options” and the approach adopted by an organization to become more sustainable “must fit its needs, geography and cultural backdrop” (p. 49). Nonetheless, Doppelt argues there are several core elements that define sustainability from an organizational perspective. Sustainable organizations make the “fundamental shift from a linear take-make-waste production model to a circular borrow-use-return approach.” This means understanding that all waste generated goes somewhere in nature and thus the concept of waste must be eliminated. Any byproducts of production must be feedstock or “nourishment for something else” (p. 47). Sustainable organizations understand that sustainability requires improved social equity. Sustainable organizations move beyond compliance and pollution prevention as guiding forces because these approaches do not “address the whole – the interactions among the elements and processes of ecosystem or the interrelationships between ecology, commerce, communities and cultures” (p.51). Organizations that move beyond compliance and pollution prevention and understand these linkages will focus on “becoming thoroughly good, not less bad” and will *redesign* products, processes, services and physical spaces to conform to the circular model. They will “*replace* environmentally harmful materials, substances and energy sources with those that are safe for the environment and people” (p.53). They will *reduce* raw material inputs and *refine* production and processes to greatly increase efficiency. Sustainable organizations will *recirculate* all of the by-products into new processes or products or back into nature. Doppelt

notes, “in many ways, sustainability and traditional management approaches *are as different as peace and war*” (ibid, emphasis added).

Mark Starik and Gordon Rands (1995) describe a sustainable organization based on the effects of its activities and its respective responsibilities to other entities. “Sustainable organizational activities [do] not alter physical, chemical and biological factors (or political, economic, social or cultural conditions) such that the carrying capacity for otherwise sustainable entities would be dramatically reduced or eliminated” (p.909). These authors stress the open systems perspective and that sustainability for organizations must be recognized as just one level of multiple systems interacting at multiple levels and scales from the individual, to the organization, to the political-economic, the social-cultural and finally the ecological. At the individual level of interaction, sustainable organizations must foster a sustainability ethic and must also ensure that the “*innovative potential*” of the organization is “attracted to, fostered by, and unleashed within” the organization (p. 920. emphasis added). At the organizational level of interaction, sustainable organizations should interact with other organizations to promote inter-organizational cooperation that will “advance the adoption of shared pro-sustainability values” (p. 922). In the political-economic level of interaction, sustainable organizations participate in professional groups to lobby government for sustainability-friendly policies and incentives, as well as to assist other organizations as they adopt sustainability goals. They lead by example, “changing internal marketing and procurement policies to [emphasize] sustainable products and thus enlarge the markets for such products” (p. 925). At the social-cultural level, sustainable organizations “provide information to various media about their own [sustainability] performance and other environmental issues in order to encourage people to adopt pro-

[sustainability] values” (p. 927). Finally, at the ecological level, the organizational relationship with nature implies the design of environmentally benign products and processes.

Sustainability for organizations implies altering the fundamental premises that are the basis of success. The organization's effect on social, environmental and economic outcomes are equally important and mutually reinforcing. As noted by Bertels, Papania & Papania (2010), sustainability is different from other change efforts in that is "part of a broader social agenda that extends beyond the organization" (p. 10). The levers for change may not be controlled by the organization, rather these may be in its supply chain or stakeholders. Sustainability will require significant inter-organizational collaboration. Drivers may be external, internal or both. It may not be possible to directly link the benefits of sustainability to existing values. These authors note that sustainability may require "paradigm-breaking business models or approaches."

These few examples of how sustainability will impact organizations support that significant change is necessary for organizations that embrace this concept and its principles. The organization will need to have a comprehensive view of its operations that looks beyond outcomes of the technical core and recognizes the organization as part of multiple interacting systems on multiple scales. Organizations need to be able to learn and adapt; to experiment and take risks. As it turns out, these are characteristics the same as those outlined as necessary for successful innovation in the organizational theory literature.

### **2.3 Sustainability as Innovation**

The literature on sustainability for organizations consistently describes how a new way of thinking and operating is required by the principles of sustainability. In any organization, the changes needed to become more sustainable are significant and will take a long time to implement – these authors imply nothing short of total transformations. The problems



sustainability seeks to address, such as climate change and resource scarcity, need short-term and decisive action; innovation is needed for significant results to be achieved. Current models of decision-making, problem definition and organizing are what created many of the problems in the first place. Using the same models will not achieve the results needed. For instance, accounting procedures in organizations do not include values such as ecosystem services, these are therefore underpriced and over-exploited. New accounting practices are needed, and not just within single organizations but within the market place. Buying products produces waste at the end of the life cycle, switching to buying services instead enhances efficiency, recycling and reuse. The organization would therefore not buy carpet, but buy the floor covering service. Organizations will need to adapt, experiment and learn. Incremental changes won't be enough.

Innovation can be defined as "a significant departure from existing practices or technologies" (Kimberly and Evanisko, 1981) and is often closely associated with the organization's adaptive learning capacity. Factors that limit organizational learning also inhibit innovation (Tolbert & Hall, 2009, p. 201) and these include high levels of formalization and incremental learning. Organizations good at incremental learning are good at exploiting the organization's existing knowledge base. This inhibits innovation as "members become used to making small alterations in organizational practices and procedures and [view] this as the right way to go about changing the organization" (ibid). Damanpour (1991) defines innovation as "a means of changing an organization, whether as a response to changes in its internal or external environment or as a preemptive action taken to influence an environment" (p. 556), and is therefore part of what contingency theory predicts organizations would do to remain successful. Sustainability requires what Damanpour refers to as "nonroutine and ultimate innovations"

which are "radical innovations that produce fundamental changes in the activities of an organization and represent clear departures from existing practices" (p. 561).

Stephen Osborne and Kerry Brown (2005) conducted an extensive literature review and argue that the difference between change and innovation in public service organizations is significant, because they require different implementation strategies. According to these authors, change is "the gradual improvement and/or development of the existing services provided by the public [organization] and/or their organizational context. It represents continuity with the past" (p.4). In contrast, an innovation is "the introduction of new elements into a public [organization] – in the form of new knowledge, a new organization, and/or new management or process skills. It represents discontinuity with the past" (ibid).

Based on years of experience with institutions of higher education as they pursue sustainability goals, Leith Sharp describes three waves to sustainability implementation. The first wave is about goals and visions; the institution formally recognizes a need to reduce their overall environmental impacts and proceeds to set goals to do this. The focus during this wave is on implementing "show-case" projects, such as LEED buildings, major energy projects, or recycling programs. In the second wave, the university sector began to move beyond projects and towards institutionalizing the programs – seeking to build the professional capacity needed to "ensure ongoing progress" (Sharp, 2009, p. 2); hiring personnel, creating a formal program, and allocating resources. The third wave, argues Sharp, must focus on organizational change management and understanding the "unconscious habit and irrationality" of how organizations operate. Because "very few people, at even the most senior levels, actually know how [the universities] truly function." According to Sharp

The fact that few individuals understand the broader institutional context, its systems and behaviors, has dire consequences for our efforts to navigate towards

sustainability. This is because the demands of sustainability are system-wide and involve changing organizational culture, behaviors and the entire institutional context” (ibid).

Sharp also found that the most successful sustainability efforts at institutions of higher education were those that sustained a “pragmatic balance” between “appearing rational (strategic plans, business models, operational structures, and formal decision-making forums) and operating irrationally (organic, adaptive, chaotic growth networks and trust)” (Sharp, 2002, p. 142). The need for innovation is apparent from Sharp's research, as is the need to manage incremental change.

This dissertation proposes that the implementation of sustainability requires both innovation and continual organizational change management. This implies both creating an organizational context that produces innovative ideas, considered a strength of organic or learning organizations, along with an organizational context that effectively manages and implements gradual change, considered a strength of bureaucracy (Osborne & Brown, 2005, p. 130). But, it is obviously “not quite that easy to switch back and forth from bureaucratic to organic structure” (Light, 1998, p. 16), so organizations that manage to be both simultaneously should also be able to achieve greater success in sustainability implementation. Or, as Doppelt (2003) describes, implementing sustainability requires “skillfully link[ing] incremental improvements with major innovations” (p. 147). This expectation informed the framework for collecting and analyzing the case study data.

## **2.4 Case Study Organizations**

Cases selected for this research are implementing voluntary and proactive environmental planning approaches through their sustainability programs. They have set sustainability goals, have established a sustainability program, and promote their efforts widely such that they are

considered leaders in sustainability amongst their peers. The organizations are large and public, in order to explore the interaction between bureaucracy and innovation for sustainability. These organizations conduct operations in a campus-like setting and manage real property in support of their specific missions to provide a rich context of environmental issue areas over those organizations that simply occupy office buildings. The case studies are the U.S. Army Fort Bragg, the U.S. Department of Energy Oak Ridge National Laboratory (ORNL), and the University of New Hampshire, Durham (UNH).

## **2.5 Environmental Outcomes in Organizations**

The new approaches in environmental planning and policy have emerged to improve environmental outcomes. Organizations which adopt sustainability goals should therefore see improvements in environmental areas of concern, such as lower water use, lower energy use, improved water discharge quality, less erosion, less solid waste, or lower use of hazardous materials. Organizational effectiveness is the ability of an organization to accomplish the goals it has set for itself. This research examined organization's ability to meet sustainability goals they have set for themselves. Contingency theory indicates an organization will adapt its structure and culture as needed to successfully achieve its goals as new goals are adopted or as other contingencies change, such as the size, strategy or setting. A basic assumption of this dissertation is that the goals related to sustainability represent a significant change. In order to meet new desired performance outcomes, shifts in structure and culture should be evident. This chapter examines how sustainability outcomes can be measured.

The measurement of organizational effectiveness is fraught with difficulties (summarized by Tolbert & Hall, 2009, p. 187-198). Effectiveness measures depend on developing criteria based on an established set of standards with awareness of the stakeholder's concept of what it is

the organization should be accomplishing, all of which can be very subjective. What does it mean to become more sustainable? Measuring effectiveness also requires a knowledge about cause and effect relationships which, even in more clear-cut cases, is lacking. With sustainability, cause and effect quickly becomes a complicated web of relationships. Because of the “quite formidable difficulties in assessing and interpreting outcome measures” (Scott, 2003, p.365) evaluation of organizational effectiveness often relies on other measures, such as structural and process measures, based on the assumption that certain structural attributes or procedural activities will lead to improved outcomes. This research is based on this same assumption, that certain attributes and activities can be implemented by the organization to improve sustainability outcomes -- evidence of these attributes and activities is evidence of success. The research design explored both of these types of measures; interview questions allowed study participants to score the level of progress being made in sustainability in order to explore the outcomes associated with their programs. The interview protocol also had many questions focused on structural and process measures, as well. This chapter reviews how *outcome success* will be assessed and the next chapter reviews how the *structural* and *process* measures will be assessed.

There are hundreds of articles, books and web sites that define and describe sustainability as a concept and as an operating principle.<sup>3</sup> Definitions depend on the organization or field of expertise that is applying the concept. The ambiguity of the term may be one of the reasons it is adopted, but also may be one of the challenges to implementing it.<sup>4</sup> There are common threads

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<sup>3</sup> Good summaries can be found in Doppelt, 2003; Edwards, 2005; and Krizek & Power, 1996

<sup>4</sup> “Like other transformative ideas, the concept of sustainability promises to remake the world through reflection and choice, but its potential to engage people’s hopes, imagination, and sense of responsibility may depend more on strategic ambiguity than on conceptual precision and clarity. Mobilizing ideas appear to be most effective when they serve as condensational symbols that defy narrow definition, encourage coalition building among diverse interests, and permit just enough comprehension and social absorption to promote convergent political acts. The symbol of sustainability, arguably, is sufficiently ambiguous to be embraced by diverse interests, yet coherent enough to inspire movement in a particular direction.” (Hempel, 2001, p. 44)

to sustainability and sustainable development<sup>5</sup> about obligations to future generations, limits to what nature can supply and absorb, and interconnections between social, environmental and economic actions. In order to document the level of success for the case studies and answer the research question: *Has the sustainability program been successful?*, literature was reviewed that describes sustainability for federal organizations and rates sustainability achievement in organizations. This research did not attempt to define what the best or ideal sustainability goals would look like, but it was necessary to collect data along a common set of environmental areas. Four sources of sustainability outcomes, specific to organizations, were used to create a list of expected topical areas for outcomes. A subset of this list was selected to provide the basis for the data collection. Table A-1 in Appendix A lists the areas and goals from each source in a tabular format that captures areas of overlap and was used to generate the list of topical areas for outcome evaluation. Each of those sources from the literature are briefly described in the next few paragraphs. The other approach used for evaluating success looked at the extent to which the concept of sustainability has been integrated both into the core mission of the organization as well as beyond the environmental or facilities operations aspects of the organization.

The first resource is the most recent guidance on improving agency sustainability performance from the federal government – President Obama’s Executive Order 13514. This Executive Order, adopted October 8, 2009, requires each agency to have a Senior Sustainability Officer and a Strategic Sustainability Performance Plan which requires the achievement of the sustainability goals and targets established by the Executive Order.<sup>6</sup> The Executive Order defines “sustainability” and “sustainable” as “to create and maintain conditions under which humans and nature can exist in productive harmony, that permit the fulfilling of the social,

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<sup>5</sup> Sustainable development is typically used as an action that supports the end state of sustainability. In this research I will use the terms interchangeably.

<sup>6</sup> EO 13514 is published in the Federal Register, Volume 74, Number 194, pages 52117 -52127.

economic, and other requirements of present and future generations.” There are multiple goals ranging from reduction of greenhouse gas emissions to reduction of water use, and the focus of the Executive Order is clearly on improving environmental outcomes.

The second source for outcomes associated with sustainability is the rating tool developed by the Association for the Advancement of Sustainability in Higher Education (AASHE). This association of universities and colleges seeks to advance sustainability by providing resources, conducting forums, developing networks, and facilitating professional development. AASHE defines sustainability “in an inclusive way, encompassing human and ecological health, social justice, secure livelihoods, and a better world for all generations” (<http://www.aashe.org>). AASHE developed a standardized rating instrument for institutions of higher education to evaluate their progress towards more sustainable outcomes, called the Sustainability Tracking, Assessment & Rating System (STARS). This tool is based heavily on green building rating tools, such as Leadership in Energy and Environmental Design (LEED) by the U.S. Green Building Council. The tool has four categories with points associated with various activities. The categories are: Education and Research; Operations; Planning, Administration and Engagement; and Innovation. Institutions earn credit for outcomes associated with environmental issues as well as incorporating sustainability into curriculum, encouraging diversity in employment practices, and adoption of sustainability-based plans and strategies.

The College Sustainability Report Card is an initiative of the Sustainable Endowments Institute and is “designed to identify colleges and universities that are leading by example in their commitment to sustainability” (<http://greenreportcard.org>). Each college or university earns a “grade” on a “green report card” which is shared through a database on the public

website. The green report card is an evaluation of campus operations and endowment investments and has results for approximately 300 public and private universities with the largest endowments in Canada and U.S. The Institute defines sustainability using the Brundtland Commission definition: “Sustainability means meeting the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on the Environment, 1987). There are nine categories in this report card: Administration, Climate Change and Energy; Food and Recycling; Green Building; Student Involvement; Transportation; Endowment Transparency; Investment Priorities; and Shareholder Engagement. As in the AASHE STARS tool, environmental outcomes are one category amongst others related to outside engagements, investment transparency and supportive administrative actions.

The final source for the sustainability outcomes baseline is the Global Reporting Initiative (GRI). GRI uses a multi-stakeholder consensus-seeking process to establish a transparent sustainability reporting system for all types of organizations. The GRI reporting is based on the belief that traditional financial reporting does not tell the full story of an organization’s performance. The “sustainability reporting” GRI advocates is “synonymous with citizenship reporting, social reporting, triple-bottom line reporting, and other terms that encompass the economic, environmental, and social aspects of an organization’s performance” (<http://globalreporting.org>). There are optional reporting standards and guidelines for individual sectors. For this dissertation, only the core reporting requirements for all organizational types were referenced. The base GRI tool is heavily skewed towards organizations that manufacture some type of product, so inputs, supply chains and manufacturing metrics play a big part of the recommended reporting process. There is also a focus on the economic relationship to sustainability indicators and the interaction with the customer.



A list of topical areas for results associated with sustainability was developed based on this review, refined and used for data collection, shown in Table 2. The list specifically focuses on environmental outcomes associated with operations, such as waste generated, energy used, water used and sustainable acquisition (green procurement). These areas were selected because they: 1) are common across all literature sources; 2) represent environmental aspects of sustainability that the organizations are taking actions in, and 3) focus on outcomes that are affected by all organizational functions (i.e. cross-functional in nature) in order to observe variation in implementation success for these organizations. This is further explained in the Methods, Chapter 4. It does not include administrative actions, such as developing a sustainability plan, which were highlighted in some of the sources. This is because these items fall under attributes and activities that organizations should be undertaking in order to achieve the improved outcomes, or the process measures (see next Chapter for details). Furthermore, this list does not include social indicators such as human rights, labor practices and transparency; or economic indicators, such as economic impact to the surrounding communities, jobs created, or the use of local suppliers. This was done because the underlying questions of this dissertation are driven by challenges associated with implementing new approaches in *environmental planning and policy* (see problem statement in Chapter 1).

<b>Table 2. Topical Areas for Success Ratings</b>			
Energy	Waste	Water	Acquisition

The interview protocol included several questions designed to evaluate the extent to which the organizations are successful based on the topical areas listed in Table 2. Study participants were asked to score the level of success in each of these areas based on a scale of

"no progress" to "goal achieved." They were also encouraged to provide comments on why they responded as they did.

This dissertation also examines the extent to which sustainability principles have been incorporated (or not) into the core mission of the case study organizations, such as the development of sustainability curriculum at universities or the military's use of green ammunition in training as another indication of success. This was done through a specific interview question, but also through other case study data sources. Similarly, questions were included that evaluated the extent to which sustainability has been integrated outside of the environmental area or the facilities operations area at the case studies as another indicator of success. A program that is limited to these functional areas will have less of an affect throughout the organization, and thus low levels of integration are associated with lower levels of success.

### **CHAPTER 3**

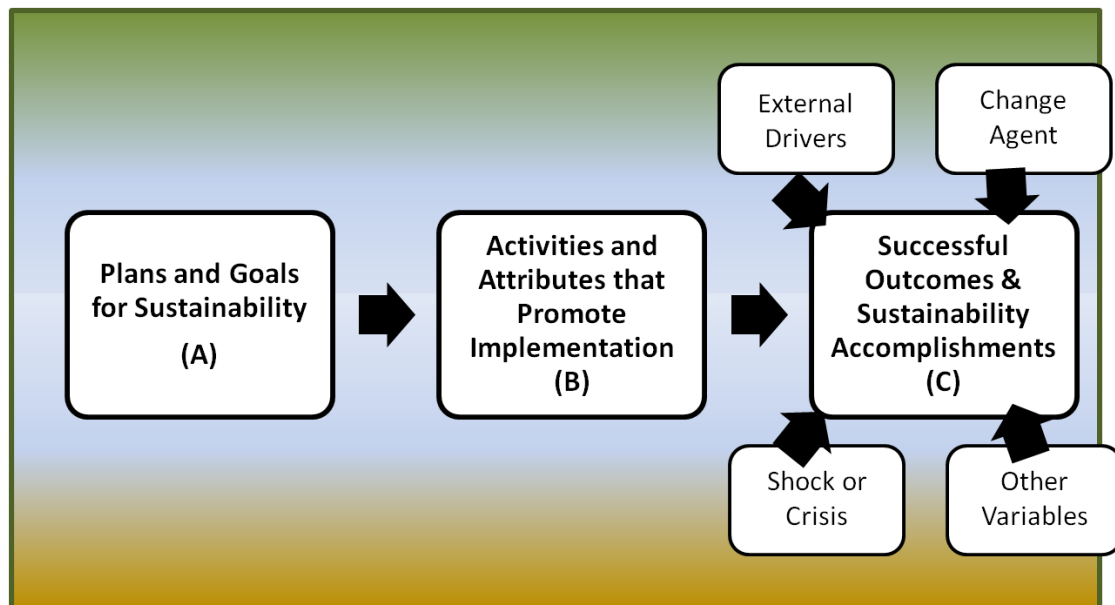
#### **THEORETICAL BACKGROUND - ORGANIZATIONS**

Given the need for innovation and change implied from the literature on sustainable organizations, it was necessary to incorporate literature on maintaining and managing organizational change. This chapter summarizes applicable literature drawn from the study of organizations. As this research used the organization as the unit of study, it was necessary to apply concepts and theoretical frameworks from the field of organizational theory in a cross-disciplinary approach. "The study of organizations is both a specialized field of inquiry within the discipline of sociology and an increasingly recognized focus of multi-disciplinary research and training" (Scott, 2003, p. 9). This research did not attempt to test a specific theory associated with organizations, rather it sought to apply relevant concepts from this rich, complex body of knowledge on organizations as distinct social structures.

A description of contingency theory provides a conceptual foundation, which is expanded by describing what is meant by a 'bureaucratic organization,' what is meant by public and also an appreciation for why large bureaucratic and public organizations have challenges conceiving and implementing innovative activities. This background literature explains the challenges organizations will face as they attempt to be both innovative and continuously improving. Contingency theory predicts that an organization's ability to meet new demands is contingent upon its ability to adapt its structure and culture to these new circumstances.

The assumption that certain organizational attributes and activities will lead to improved outcomes is extremely common in organizational management and change literature. When it is difficult to measure outcomes, process measures focus on the "quantity or quality of activities

carried on by the organization based on the assumption that it is known what *activities* are required to ensure effectiveness” (Scott, 2003, p. 366). Structure measures focus on the capacity of the organization to perform the work and include “all measures based on organizational features or participant characteristics presumed to have an impact on organizational effectiveness” (ibid, p. 367). These same assumptions form the basis of the conceptual framework guiding this research and the assumed relationships are supported by the existing literature (Figure 2). The focus of this research is on the factors related to organizational attributes and activities. There are other factors, such as external drivers, shock or crisis, change agents, costs, or technology maturity, that will also affect success. The case study approach used helps bring some of these other factors to light.



**Figure 2. Proposed Causal Chain**

### **3.1 Organization Theory and Bureaucratic Organizations**

All large organizations must divide work into smaller units since it is impractical or impossible to do everything yourself. Organizations are “social structures created by individuals to support the collaborative pursuit of specified goals” (Scott, 2003, p.11). Organizations enable complexity to be addressed as its subunits focus on particular problems and develop substantive expertise.

There are several different theories that explain the underlying basis of why certain organizational characteristics emerge; this doctoral dissertation is based on contingency theory. Contingency theory is a very pragmatic approach to explaining organizations. It assumes a certain level of rationality in that the organizational members are, in fact, interested in achieving the goals of the organization and ensuring that the organization continues to thrive. It is therefore similar to rational models of planning theory. Decision-makers consciously structure coordination and control mechanisms to achieve success and make changes as needed. Thus, the more successful organizations are those that have a better match or fit – the mix of structure and culture is well-suited to what they are trying to accomplish and the environment they operate in. Research summarized by Tolbert and Hall (2009) demonstrates relationships between coordination and control mechanisms and: 1) the size of the organization; 2) the type of work products; 3) the level of interdependency between work units; 4) the level of uncertainty of the work tasks; and, 5) the nature of the environment to which the organization must relate. This body of research and resulting contingency theory helps explain why large public organizations are hierarchical, highly formalized, and functionally segmented. Bureaucratic structures and cultures are the best fit for success in large organizations in stable environments with low-level

uncertainty associated with tasks and a low level of interaction required between functional units. This is true for the case study organizations, indicating that bureaucratic characteristics have helped these organizations to succeed.

Because the fit of the organizational characteristics leads to high performance, organizations seek to attain fit. For this reason, organizations are motivated to avoid the misfit that results after contingencies change, and do so by adopting new organizational characteristics that fit the new levels of the contingencies. Therefore the organization becomes shaped by the contingencies, because it needs to fit them to avoid loss of performance. Organizations are seen as adapting over time to fit their changing contingencies so that effectiveness is maintained. This contingency theory contains the concepts of a fit that affects performance, which, in turn, impels adaptive organizational changes. (Donaldson, 2001, p.2)

In order to address the contingency of environmental turbulence, organizations conduct boundary spanning activities to include buffering and bridging. Boundary spanning allows the organization to adjust to constraints that are not controlled by the organization (Mezner & Nigh, 1995). Buffering is used to describe how an organization protects its technical core from external interference. For any organization, it is not difficult to identify "one or more central sets of tasks around which an organization is constructed" (Scott, 2003, p. 199). Organizations seek to protect this technical core using many tactics; information management is one example. Environmental compliance can be considered a buffering activity; environmental planners buffer the influence of the regulatory agency on mission accomplishment. Other support functions could be considered buffering, as well, such as public affairs. Public affairs is also considered a bridging activity where the organizations "quickly identify changing social expectations in order to promote conformance with those expectations" (Mezner & Nigh, 1995, p.976). The presence of these activities is consistent with contingency theory as the organization is sensitive to changes in external environment and adjusts in order to effectively address these. It also may

explain sustainability programs if the primary drivers for the program is external. It is for this reason that boundary spanning theories are considered as part of this dissertation.

Although the theoretical framework used for this dissertation asserts that organizations are rational systems based on contingency theory, it is important to note there are other organizational theories to explain structure and function of organizations, including resource dependency, transaction costs, institutionalism, and population ecology. Resource dependency theory assumes that the forces behind organizational activities are all about ensuring a steady flow of resources such that decision-makers can maximize their autonomy, and thus centers on power relationships. Transaction cost theory predicts individuals coming together in organizations in order to manage market transaction costs. Institutionalism explains organizations structure and function based on external social forces that have powerful effects on human behavior – the decision-makers create work environments based on what these outside influences tell them about how the organization should operate. Population ecology seeks to predict large-scale changes of certain organizational types over time based on competition between organizations. The theory is based on the assumption that “organizations are characterized by a high degree of inertia, and adaptation to environmental changes is a rare phenomenon” (Tolbert & Hall, p. 178). As the name implies, the paradigm draws on the principles of ecology and predicts that a certain number of organizations will fail as new organizational forms replace them.

### **3.2 Characteristics of Bureaucratic Organizations**

It is common to refer to anything government as bureaucracy (e.g. Wilson, 1989). The term is often a negative descriptor for the organizational type; it implies inflexible rules, inefficient operations, and impersonal service (Bozeman, 2000; Johnston, 1993). In many cases,

the ‘bureaucracy’ is the problem. It represents misplaced incentives, misguided goals and lack of achievement. These problems could be solved, critics claim, if only the government would behave more like a business, with economic efficiency an essential decision criteria (e.g. Baden & Stroup, 1981; Osborne & Gaebler, 1992). Bureaucracy can also be defined as “the existence of a specialized administrative staff” (Scott, 2003, p. 45) and as such is just one variable of many describing an organization: the proportion of administrative personnel to production personnel. In this research, the term is used to describe a certain combination of structure, coordination, and control mechanisms found in many organizations, public and private. And, consistent with Bozeman (2000) this dissertation will *not* take the view that bureaucracy is “inherently pathological.” “Bureaucracy is not so much a menace or a blight on the human spirit as a means of getting things done” (p. 13).

Organizational structure is also often equated with ‘bureaucracy.’ The more structured organizations are more bureaucratic; “Bureaucracy, in a sense, is another word for structure” (Perrow, 1972, p. 50). In this perspective, structure (bureaucracy) enhances efficiency by controlling and coordinating behavior; specifying the types of interactions between members of the organization for the good of the whole. Too much flexibility and freedom within the organization and it is no longer an organization – too little and it becomes “inflexible and unwieldy, stifling the very activities the organization was set up to enhance” (Bozeman, 2000, p. 26). In the context of this research, bureaucratic is defined as highly formalized, standardized and inflexible. The concept of structure can include non-bureaucratic forms as well, such as Burns & Stalker’s (1961) organic form or Heckscher’s (1994) interactive form. Bureaucratic is used here as an adjective to describe a set of characteristics related to structure, process and culture. It is important to note that all organizations have variations on structure and individuals



within an organization will have varying perceptions about how bureaucratic their work environment is. The extent of bureaucratization is not the focus of this study; rather, it is meant to capture these characteristics in order to understand if the expected dualism is present for implementation of sustainability programs.

In this research, bureaucratic follows Max Weber's<sup>7</sup> conceptualization of a distinctive *type* of administrative structure and expands on Weber to include a set of characteristics applied to an entire organization. It includes characteristics described by Burns & Stalker (1961) as “mechanistic.” Bureaucracy, rather than a general adjective for all things government, is defined by this research as a system for designing an organization based on the rational system model of organizations (Scott, 2003), also referred to as Technical Rationality (Schön, 1983). It is fundamentally about the division of labor into manageable and controllable units with defined roles and responsibilities in which each individual is responsible for his/her job. The characteristics of a bureaucratic organization are defined as follows.

The primary characteristic of a bureaucratic organization is the *segmentation of duties by fixed job descriptions*. In a bureaucratic structure, “jurisdictional areas are clearly specified: the regular activities required of personnel are distributed in a fixed way as official duties” (Scott, 2003, p. 46). Job descriptions include roles and responsibilities to increase predictability and efficiency (Tompkins, 2005, p. 49). Specific job descriptions mean the employee knows exactly what is expected of him/her, and they can be held accountable for those activities.

The bureaucratic segmentation also follows lines of *functional specialization* so that like tasks are grouped together. A bureaucratic structure therefore has specialized subunits based on process or function. This establishes operational continuity, encourages individual competencies to increase, and allows economies of scale to be realized.

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<sup>7</sup> Descriptions of Max Weber's “ideal type” used in this document are based on Scott, 2003, and Tompkins, 2005.

The third characteristic is *hierarchy of authority* with vertical reporting and supervision chains. Each level is the responsibility of the next higher level through a clearly delineated chain of command. Control of activities is based on the superior-subordinate relationships, each supervisory level having the responsibility of those employees immediately below it. Decisions made at the highest levels are passed down for those below to implement. The decisions made at the lowest levels are therefore focused on the immediate task environment and are short-term in nature. Strategic and long-term considerations are the responsibility of those in the highest levels of the organizational structure, and only these individuals are aware of the goals and objectives for the organization as a whole. Information is passed up and down through the hierarchy in vertical lines of communication from subordinate to superior.

The fourth characteristic of a bureaucratic organization is a *high level of formalization* in the form of rules, regulations and standards. Formal social structures are those in which “the social positions and the relationship among them have been explicitly specified and are defined independently of the personal characteristics and relations of the participants occupying the positions” (Scott, 2003, p. 20). Rules specify appropriate behavior for the work place, govern relationships between functional activities, and ensure that each decision is made in a consistent fashion each time it is made in a “detached, impersonal manner” (Tompkins, 2005, p. 51). Formalization allows individuals to move in and out of positions within an organization with minimal disruption to overall functioning. High levels of formalization help to simplify the decisions for participants; rules and standardization are “mechanisms both for restricting the range of decisions each participant makes and for assisting the participant in making appropriate decisions within that range” (Scott, 2003, p. 52). Informal communication networks tend to be

ignored in a highly bureaucratic organization, as they are perceived to undermine the authority and accountability.

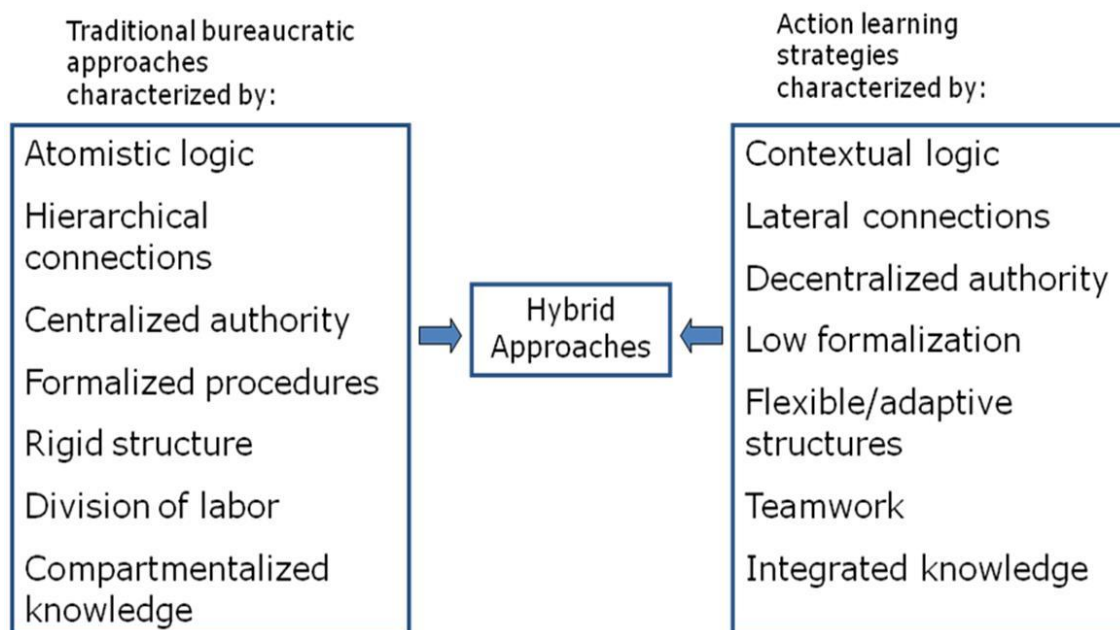
Finally, in a bureaucratic organization, decision-making authority can be defined as *highly concentrated or centralized*. This concentration has two elements; first, non-routine decisions are referred up the hierarchy for action, and second, decision making is concentrated into relatively few specified authority roles. Jennergren (1981) describes this duality as differentiation or integration. Decision-making is differentiated or decentralized when there is a “delegation of decision-making from higher levels to lower ones as a differentiating device.” Decentralization can also sometimes be used to mean integration, or “participation, as opposed to concentration, in decision making without reference to hierarchical levels.” In a bureaucratic organization, decentralization occurs to the extent decisions are based on formal rules and standardized procedures, so bureaucratic organizations can be highly decentralized. In circumstances where problems are beyond the scope of formal procedures, however, decision-making is referred upward in the hierarchy (concentrated = centralized). In the bureaucratic structure, participatory or interactive methods of decision-making – wherein multiple stakeholders are involved and consensus is sought – are rare (concentrated = opposite of participatory). Table 3 summarizes the characteristics of bureaucratic organizations that will be used in this research.

<b>Table 3. Characteristics of a Bureaucratic Organization</b>
Segmentation of duties by fixed job descriptions
Functional specialization
Hierarchy of authority
Highly formalized
Highly concentrated/centralized decision-making

These characteristics provide a functional match to most large public organizations. These organizations are large –requiring segmentation and formalization – and deal with complex problems, thus a high level of expertise is required. A high level of accountability is required to satisfy higher headquarters, Congress, the state, and/or the public. The missions do not undergo serious challenges or changes, thus most activities are routine. Position-specific roles and responsibilities are defined and not regularly changed. A high degree of turn-over in certain public organizations requires fixed job descriptions to ensure minimal disruptions in work flow. Contingency theory explains that bureaucratic characteristics are a good match to the mission and context of large public organizations.

It must be noted that there are no pure organizational forms; most organizations have a mixture of attributes. There is no purely bureaucratic organization or a purely participatory organizations. Typically, there is some hybrid between the traditional bureaucratic forms and more integrated, participatory forms such as Burns and Stalker’s “organic” form; Heckscher’s (1994) interactive form; or what Carley and Christie call “Action Networks.” In order to implement the new environmental planning and policy approaches Carley and Christie (2000) call for dramatically new approaches. The duality of operational types summarized by Carley and Christie (p. 170) forms the basis of Figure 3. As previously described, it is expected that the organizations studied in this research will exhibit both characteristics as they implement sustainability, so an in-between condition to Carley and Christie’s duality is expected (and added as a 'hybrid approaches' box in the Figure). The literature indicates that the extent to which highly bureaucratic organizations are successful at implementing sustainability will actually depend on how well they can incorporate more organic organizational characteristics in their

predominantly bureaucratic environments. Again, contingency theory best explains that bureaucratic characteristics are the best fit for the case study organizations.



**Figure 3. Comparison of Organizational Strategies (Carley & Christie, 2000)**

The interview protocol included several questions designed to evaluate the extent to which the organizations are bureaucratic based on the characteristics listed in Table 3. Statements about the workplace were provided and participants were asked to agree or disagree with the statements. They were also encouraged to provide comments on the reason for their response. These data are necessary to confirm the case study organizations are bureaucratic, as expected, and also document examples of where other forms of interaction and structure are evident, lessening the effect of the bureaucracy and enhancing the ability to innovate.

### 3.3 Large Public Organizations

Defining what can be considered a large and public organization is important, since this research assumes that large organizations will have more barriers to implementing sustainability than smaller public or private organizations. This research, however, assumes no sharp distinctions between public and private, similar to what is advocated in the public management and organizational literature (summarized by Rainey, 2003).<sup>8</sup> This research focuses on large public organizations for the following reasons: public organizations have a particular role to play in implementing sustainability as a matter of public policy and accountability, their size and influence in the economy, as well as enhancing successful outcomes for all related entities engaged in implementing sustainability goals. Large public organizations that occupy campus-like facilities also have significant environmental impacts -- regulatory or otherwise. They therefore employ environmental planners to manage their environmental concerns. Facility and/or mission requirements also require consumption of natural resources (energy, water, land) and produce hazardous and non-hazardous waste. Research on the relationship of governance to implementing sustainable development points to the critical role government will play (e.g. Evans, et al, 2006; Lafferty, 2004). This dissertation does not compare large to small, or public to private. It seeks to explore the challenges faced by large public organizations and will generalize to these types of organizations only. Later studies can use the results from this research to conduct comparisons by looking at smaller, private organizations that are working on sustainability goals. This section outlines the logic employed to select the case study organizations.

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<sup>8</sup> "Theory, research and the realities of the contemporary political economy show the inadequacy of simple notions about the difference between public and private organizations. For management theory and research, this realization poses the challenge of determining what role a distinction between public and private can play. For practical management and public policy, it means that we must avoid oversimplifying the issue and jumping to conclusions about sharp distinctions between public and private." (Rainey, 2003, p. 61)

This research focused on large organizations based on consistent findings from the organizational theory literature that organizations tend to become more bureaucratic due to size, *not* due to their ‘public-ness’ or ‘private-ness’ (Rainey, 2003, p. 58). Therefore, the organizations selected for the study will be large compared to other organizations in their respective categories (peers) based on comparisons of overall annual budget, employees and size of the public served.

The concept of a public organization is one debated in the organizational theory literature. And, due to the many characteristics that are shared between public and private organizations, making a clear distinction is difficult. The distinction is therefore typically portrayed as points on a continuum based on two major elements: ownership and funding (summarized in Rainey, 2003, p.68). Case studies were chosen from organizations that rely in part or in full on public funding (taxes) and are publicly owned. This study is not seeking to compare public to private; rather it will select cases from organizations that are clearly public to establish external validity. That is, this research seeks to draw conclusions about work environments for this type of organization only.

There are also issues associated with younger organizations that are seeking to become established and are still developing a solid and clearly defined mission. Young organizations, regardless of size as measured by total number of employees vs. total revenues, tend to fail at greater rates than large (Tolbert & Hall, 2009) and face different challenges. The organizations selected as case studies are well-established, with long histories and clearly defined, stable missions.

Finally, each of the selected organizations operate in a campus-like setting for which the maintenance of land and facilities is the responsibility of the organization and is critical to

support its mission. In order to support these campuses, each organization must: procure energy to ensure a stable supply of heat and power; ensure there is enough water to support its employees and customers for potable and mission purposes (i.e. cooling or wash racks); manage wastewater generated and waste materials (solid, gas or liquid); and maintain a land base in support of its mission, such as for military training, ecological or agricultural research, physical buffers, or recreation purposes. Finally, the selected organizations maintain the facilities: design and construction of new facilities, operation and maintenance of existing facilities, demolition and deconstruction of outdated facilities. All of these support activities provide a greater context of environmental issues and common challenges across the cases, regardless of the core mission.

### **3.4 Sustainability Implementation Challenges as Innovation Challenges**

Organizations that are large public and bureaucratic are not typically capable of innovation, especially sustained innovation. Critiques of bureaucracy and research on failed change efforts are common (i.e. Durant, 2007; Johnston, 1993; Warwick, 1975; or for summaries see Light, 1998; Osborne & Brown, 2005; Rainey, 2003). Yet it can be done (e.g. Mazmanian & Nienaber, 1979, on the Army Corps of Engineers). Change typically happens incrementally over a long time period, however, and the literature supports that this will not be sufficient to meet environmental challenges.

Paul Light (1998) summarizes literature that considers government as a “hostile context in which to innovate” because these organizations face little direct competition, there is no profit-driven incentive, and there are high costs for failure (p. 7). Other barriers include “dense organizational structures, scarce resources, reluctance to delegate authority, and high levels of internal scrutiny – none of which has been characterized as beneficial to innovation” (ibid). Light also points out that the focus is typically on a single act of innovation – not on creating



organizational environments that innovate naturally or enable continuous innovation and improvement. Specific to this dissertation, Light notes that large size can work both for and against innovation. Large organizations typically have more internal resources to apply to experiments and innovative projects. Large size can also “insulate that organization from political opposition and allow somewhat greater control of the environment” (p. 224). On the other hand, large organizations have greater distance between top and bottom, and other internal barriers that “work against collaboration,” and create more rules and procedures which “reduce risk-taking by frontline employees” (p. 225). Light also noted that age is an important influence – older organizations have “greater bureaucratic boundaries, less connectedness to the community, more need for formal systems to provoke ideas, and more need for shocks to jump-start the organization’s interest in innovativeness” (p. 234). Another interesting fact is that, although Paul Light attempted to research a wide spectrum of innovating nonprofit and government organizations in the state of Minnesota, he found that even though “single acts of innovation occur in large government agencies every day, it is difficult to find many such agencies that could be remotely described as innovating organizations.” At least in Minnesota, “the search for organizations that were large, governmental, and innovating *produced an empty set*” (p. 212, emphasis added).

Bob Doppelt (2003) describes the bureaucratic model as a governing system that reacts to the symptoms of problems and is unable to adopt more sustainable practices. “The mechanical, hierarchical organizational designs employed by a majority of public and private entities today lead to a patriarchal view of governance. The patriarchal model views the organization as a collection of disconnected, directionless parts that must be controlled from the top while the bottom carries out the orders” (p. 18). According to Doppelt, this type of governance, even

though it ensures “consistency, control and predictability,” blocks the flow of information, undermines personal responsibility and accountability, and disempowers people (ibid).

Doppelt documents several other sustainability “blunders” revealed through his research which stem from bureaucratic organizational design factors. These include the “siloed approach” to environmental and socio-economic issues which works against the holistic and systems-based view needed for sustainability. The strict partitioning of responsibilities, environment, labor, and human health, for instance, “makes it difficult to identify the cause and effect of systemic problems,” and thus makes it difficult to find and involve the right stakeholders in finding solutions (p. 32). According to Doppelt, government agencies do not reward experimentation and rarely learn from mistakes, therefore are not supportive of continual learning and innovation (p. 36).

Leith Sharp focuses on the compartmentalization of large universities as a major barrier to sustainability because it discourages the systems-based thinking that is necessary. “The separation of different disciplines, arenas of responsibility, and tiers of management generally prevent people from understanding the boarder context or the overall systems that operate across the institution” (Sharp, 2009, p.3) Without this appreciation, only minimal progress can be made – in the form of projects and media-based programs – and efforts in one area can have unintended consequences in another. The culture that results in this type of organization leads to feelings of disengagement and exclusion for the people who work there, which causes a “systemic lowering of expectations and a withdrawal of creative energies and self-initiative from the workplace” (ibid, p. 6). Sharp argues that the belief that organizations operate rationally must be replaced with awareness that much of what drives organizations is irrational.

This literature on innovation challenges in large public organizations articulates the many barriers for implementing the new approaches to managing environmental problems; approaches that are integrated, holistic, collaborative, pluralistic, strategic, interactive, place-based, future-oriented and adaptive. Large public organizations must overcome the barriers that result from their bureaucratic structures, cultures and processes in order to meet the demands called for by sustainability. This previous research on innovation and change in public organizations, literature on implementing sustainability, and organizational theory are combined to provide a conceptual framework for data collection and analysis. As previously explained, process measures were developed and used to determine if attributes and activities that enable innovation are present within the case study organizations.

Based on the literature, the expectation is that positive outcomes will be found in those cases where both bureaucratic and innovative organizational attributes and activities are in place. In other words, the case studies will exhibit organic or learning organizational attributes in otherwise bureaucratic workplaces. *If sustainability goals and objectives are equated with organizational success, then there is a need for both innovation and change management.* The case study organizations will have adapted and implemented organizational structure and cultural changes to enable successful implementation of their sustainability programs. These are described next.

### **3.5 Expected Attributes and Activities**

In order to determine what organizational activities and attributes should be present to promote implementation of sustainability, literature on success factors for organizational change and innovation was reviewed. This literature outlines characteristics required of organizations that enable successful innovation and implementation of sustainability. Not surprisingly, there is

considerable overlap. Theories of what it takes to innovate successfully and continuously in government contexts are provided by Levin & Sanger (1994), Light (1998), Borins (2001), and Osborne & Brown (2005). Theories of what it takes to implement sustainability in organizations are provided by Starik & Rands (1995), Nattrass & Altomare (1999), Doppelt (2003), Stead & Stead (2004), and Stubbs & Cocklin (2008). The contributions from this literature are summarized in this next section as a conceptual framework for data collection and analysis. None of these sources specifically address large public organizations that are bureaucratic in nature, and this gap in the literature is what this study seeks to address.

Important variables for success were grouped into four main activity categories including: 1) orientation to the external environment; 2) supportive leadership and culture; 3) effective internal management systems; and, 4) supportive internal structure (based on Light, 1998). All of the literature stresses the importance of alignment between these areas for success, since if one or more of these areas are not in alignment, the contradictions will undermine the change effort. “Alignment means that all of the key factors that influence the organization’s performance – leadership, vision, goals, structures, tactics, communications, learning, rewards, compensation, hiring, promotion, accounting, decision-making, information and employee involvement mechanisms – *send the same message* (Doppelt, 2003, p. 211, emphasis added). Also important is that the expected activities and attributes are not necessarily just those expected in either a bureaucratic or innovative organization - these are keys to success regardless of the organization's predominant structural or cultural characteristics (Appendix B summarizes the excerpts from the literature on which this framework is based).

### *Orientation to the External Environment*

The effect of the external environment is an important factor in successful innovation, as well as important to the interconnectedness of sustainable organizations to other organizations. Active engagement with external stakeholders also sets the expectation for the change effort; it enhances the organization's reputation in the area and reinforces the message to the internal stakeholders. The case studies are expected to use a common set of activities when interacting with their external environmental (listed in Table 4). These statements were read to the interview subjects and they were asked to agree or disagree and then to comment on their answers.

**Table 4. Indicators for Orientation to the External Environment**

- |  |
|--|
| <ol style="list-style-type: none"><li>1. Organization has outward focus that results in interaction with the external environment</li><li>2. Organization sustainability effort is motivated by external drivers/context</li><li>3. Organization seeks outside partners for support of sustainability effort, to include financial support</li><li>4. Organization lobbies for supportive external regulations, policies, guidance, etc., including from higher headquarters (parent organization)</li><li>5. Organization seeks to influence suppliers and customers toward sustainable practices</li></ol> |
|--|

### *Supportive Leadership and Culture*

The innovation and change literature, as well as the sustainability literature, share a common emphasis on the importance of leadership. Dynamic leadership to promote the sustainability change initiative is necessary, but also necessary are supportive leaders – leaders that know how to create “conditions for others to succeed” (Light, 1998, p. 20). These leaders manage the entire organization so that innovation continues even after they leave. Cultural

aspects of change are hard to characterize because they represent the intangible aspects of an organization, but it is important that cultural aspects are in alignment with the change effort. An organization's culture is "a fairly stable set of taken-for-granted assumptions, shared meanings, and values that form a kind of backdrop for action" (Smircich, 1985, p. 58). How deeply these cultural aspects are changed reflects the depth of the change effort. Sustainability authors consistently argue for "transformations" in how organizations conduct their activities which would require "them to closely examine and change the underlying values and assumptions that define their essence" (Stead & Stead, 2004, p. 14). There are multiple indicators of a supportive leadership and culture that the case studies are expected to possess (Table 5). These statements were used in the interviews.

**Table 5. Indicators for Supportive Leadership and Culture**

1. Organization has leaders that are knowledgeable about sustainability and aggressively support the incorporation of the concept into the entire organization's operations
2. Organization has leaders that support a culture of innovation
3. Organization has a culture that supports and rewards innovation
4. Organization has a clearly articulated vision of sustainability which it tirelessly communicates

### *Effective Internal Management Systems*

Internal management systems to track progress toward the goals and objectives established by the sustainability program are also consistently included in the literature. These metrics are critical for measuring progress and therefore justifying the expenditure being made in sustainability. It also allows for the success, or lack of, to be communicated to stakeholders. There are several indicators of effective internal management systems that are that the case

studies are expected to possess (Table 6). These statements were read to the interview subjects and they were asked to agree or disagree and then to comment on their answers.

<b>Table 6. Indicators for Effective Internal Management Systems</b>
<ol style="list-style-type: none"> <li>1. Organization has measurement and accounting procedures that reflect sustainability metrics and provide constant feedback about the change efforts to all levels of the organization</li> <li>2. Organization designs and implements employee performance appraisal systems that incorporate sustainability criteria and rewards sustainability contributions</li> </ol>

### *Supportive Internal Structure*

Internal structure indicators were the final area examined here. This is the area where the organizations most directly reconcile the demands of bureaucracy with the need to support innovation. A common aspect of bureaucracies is functional segmentation, which inhibits interaction across functions. These structures locate individuals with the same specialties and career backgrounds together, reducing the sharing of new ideas. Innovative organizations encourage teamwork, collaboration, and participation using flat organizational structures. How the organizations reconcile these structural demands is one of the key questions of the research and one that is not clearly answered by the literature. Expected activities by the case studies organizations include cross-functional teams (Table 7). These statements were included in the interviews.

<b>Table 7. Indicators for Supportive Internal Structure</b>
<ol style="list-style-type: none"> <li>1. Organization has addressed the need to enhance interaction and integration amongst its functional units</li> <li>2. Organization has devoted resources to sustainability implementation consistently over time</li> </ol>

The literature on organizational change, innovation, and sustainability calls for common activities and attributes for organizations focused on maintaining or enhancing innovation. There is much overlap in this literature, as sustainability requires innovations along with sustained organizational change. Maintaining significant organizational change and innovation efforts are not strengths of large public organizations -- so the data collection framework was designed to capture the extent to which these activities would be present as an indication that the case studies were adjusting to the demands of sustainability. These common areas were summarized in statements that were then used in the interviews for data collection. Additional details on the research methods are presented next.



## CHAPTER 4

### RESEARCH DESIGN AND METHODS

The objective of this research is to describe and analyze the effect bureaucratic work environments have on implementing sustainability goals and objectives in large public organizations. Qualitative methods are necessary for this research for several reasons. The nature of the phenomena of interest is complex and context-sensitive. Previous work on organizational change, innovation and the implementation of corporate sustainability efforts has not defined a clear theory of factors that influence success in all types of organizations. On the contrary, the research is full of conflicting and confusing results that make generalizations difficult (Light, 1998; Osborne & Brown, 2005). There has been little, if any, previous work on implementing sustainability in public organizations, especially large state and federal organizations. The focus to date has been on private corporations (i.e. Doppelt, 2003; Natrass & Altomare, 1999; Willard, 2002), so there is a lack of applicable theory to draw from. The focus of this study is to assemble in-depth descriptions and conduct analysis over a small sample of critical case studies. The purpose is not to sample from a wide range of cases and attempt broad generalizations to all organizations, or to highlight differences between organizations based on ownership, size or mission.

The literature predicts that organizations successfully implementing sustainability programs must simultaneously be both innovative and bureaucratic. The research is therefore guided by a primary question: *How have large public organizations implemented sustainability programs?* The conceptual framework predicts expected attributes and activities for bureaucratic

organizations with successful sustainability programs. This question was addressed through a case study approach using three primary research questions:

1. Are bureaucratic organizational characteristics present?
2. Are attributes and activities that enable innovation present?
3. Has the sustainability program been successful?

In order to answer these questions, other, more detailed questions were developed to guide the data collection and analysis. Descriptive questions answered the how question, and evaluative questions looked for relationships and interactions and identified a possible basis for theory-building for sustainability in large public organizations.

#### *Descriptive*

- How was the sustainability program initiated? What functional area is responsible for this program?
- How have the case study organizations implemented their sustainability goals/programs?
- Who implements sustainability?
- What are the organizational characteristics of the case study organizations? Are they bureaucratic (as expected)?
- What areas of (environmental) sustainability seem to have better success than others?

#### *Evaluative*

- Is there evidence of organic or learning organization structure overlain on the bureaucratic structure?
- What are common implementation activities to each of the cases? What are common challenges?
- How do functional areas differ within each case?
- How do the cases differ by overall characteristics and by implementation activities?
- What do these cases contribute to our knowledge about the implementation of sustainability in public organizations? Do they support recommendations from the literature?

## **4.1 Research Design**

The research design consists of an multiple-case replication study (Yin, 1994). The use of case study method is applicable for several reasons. The research questions involve understanding on-going phenomena over which the researcher has no control. The research seeks to explain how these organizations have implemented their sustainability programs and then use this to build theory applicable to sustainability. It is naturalistic inquiry, which is “research takes place in real-world settings and the researchers does not attempt to manipulate the phenomena of interest” (Patton, 2002, p. 39). The purpose of the research is to understand how sustainability is interpreted and implemented within the specific context of a large public organization. The results will help build knowledge and contribute to theories of how to implement the principles of sustainability, and thus the concept of sustainability itself. Results will be only generalizable to other large public organizations.

Multiple cases were used for replication purposes – each organization represents a case. The unit of analysis is the organization; qualitative data was collected from multiple sources to build the case for each organization as a whole. Conducting multiple cases allows for literal replication – that is repeating the same data collection techniques for each organization with the expectation that results will be similar for the large public organizations studied.

A critical step in designing this research was to develop a theoretical framework which consisted of a series of propositions. These propositions were developed from the existing theories of change and innovation in organizations, as well as theories of sustainability in organizations (outlined in the prior chapters). The propositions state what is expected to be found in the cases, as the cases were purposefully selected for their successful sustainability

programs. This theoretical propositions were then used to ensure replication procedures in data collection and provided the basis for within-case and cross-case comparison.

**Proposition 1.** Bureaucratic organizations will be successful in implementing sustainability if the organization has a strong orientation toward the external environment.

**Proposition 2.** Bureaucratic organizations will be successful in implementing sustainability if the organization has leadership that is supportive of and knowledgeable about sustainability.

**Proposition 3.** Bureaucratic organizations will be successful in implementing sustainability if the organization has leadership and culture that supports innovation.

**Proposition 4.** Bureaucratic organizations will be successful in implementing sustainability if the organization has effective internal management systems focused on sustainability.

**Proposition 5.** Bureaucratic organizations will be successful in implementing sustainability if the organization has structures that encourage cross-functional interaction.

**Proposition 6.** Bureaucratic organizations will be successful in implementing sustainability if the organization provides stable funding to the program over time.

**Proposition 7.** In the absence of conditions identified in Propositions 1-6, bureaucratic structures and cultures will inhibit implementation of sustainability initiatives.

## **4.2 Case Selection**

The cases were selected purposefully because the intent of this research is to yield in-depth understanding and insights and theoretical generalization, not empirical generalizations. In order to answer the research questions regarding the effect bureaucratic structure, processes and culture have on the implementation of sustainability, cases were sought that met the following organizational criteria:

- They have set sustainability goals, have established a sustainability program, and promote their efforts widely such that they are considered leaders in sustainability amongst their peers.
- They are large, personnel in the thousands and budgets over one hundred million dollars.
- The operating revenue, or a portion of this revenue, is from public sources such as taxes.
- They are publicly owned.
- They are embedded in a larger public organization, at federal and state level, which affects local policy and decision-making.
- They operate and maintain a campus-like grouping of buildings, facilities, land, and infrastructure in support of their mission.

In order to answer the research questions regarding outcomes related to sustainability, cases were sought that have multiple environmental effects across a wide range of issue areas. Organizations that conduct operations in a campus-like setting and manage real property in support of their specific mission provide this rich context of environmental issue areas over those that simply occupy office buildings. The cases are presented in Table 8, below.

<b>Table 8. Case Studies (references follow table)</b>					
<b>Case</b>	<b>Age</b>	<b>Mission</b>	<b>Annual Funding/ Budget</b>	<b>Employees; other support</b>	<b>Total Facility Square Footage, Acres</b>
U. S. Army Fort Bragg Fayetteville, North Carolina  Part of the U.S. Army and the U.S. Department of Defense	Established 1918	"Our mission is to maintain the XVII Airborne Corps as a strategic crisis response force, manned and trained to deploy rapidly by air, sea and land anywhere in the world, prepared to fight and upon arrival and win."	Annual Garrison operating budget ~\$400 million (does not include salaries)	Civilians ~ 8,000 Military ~ 43,000	160,700 acres ~ 32 million square feet of building space
Oak Ridge National Laboratory Oak Ridge, Tennessee  Part of the Department of Energy	Established 1943	Public Science and Energy laboratory. Focus Areas: Neutron Science, Energy, High-performance Computing, Systems Biology, Materials Science at the Nanoscale, National Security	\$1.65 billion	Personnel ~ 6,000 Annually hosts ~ 3,000 guest researchers	Main campus - 4,470 acres Overall reservation - 34,000 acres Facilities: 4,256,064 square feet
University of New Hampshire, Durham Campus, Durham, New Hampshire	Established 1866	"UNH is the state's public research university, providing comprehensive, high-quality undergraduate programs and graduate programs of	\$539.4 million annual operating budget (approximately	Faculty ~ 1,100 Staff ~ 2,300 Student population ~ 14,600	Main campus - 1,100 acres; Outlying land - 1,350 acres 180 buildings for

<b>Table 8. Case Studies (references follow table)</b>					
<b>Case</b>	<b>Age</b>	<b>Mission</b>	<b>Annual Funding/ Budget</b>	<b>Employees; other support</b>	<b>Total Facility Square Footage, Acres</b>
Part of the University System of New Hampshire		distinction. Its primary purpose is learning: students collaborating with faculty in teaching, research, creative expression, and service."	16 % state and federal government sources)		5,673,000 gross square feet

Sources:

ORNL Fact Sheet, <http://www.ornl.gov/ornlhome/docs/fact.pdf>; *Oak Ridge National Laboratory DOE Site Sustainability Plan for FY10*; *Oak Ridge National Laboratory Annual Sustainability Report*; Fort Bragg, GlobalSecurity.org summary <http://www.globalsecurity.org/military/facility/fort-bragg.htm>; About UNH, <http://unh.edu/unhedutop/about-unh>; *University of New Hampshire Campus Master Plan, 2004*; *University of New Hampshire Campus Master Plan Update, 2012*

### 4.3 Data Collection

To ensure reliability, the same data were collected from each case study site using the same techniques. Several data collection methods were used to ensure construct validity. As noted by Yin (1994) multiple sources of data help corroborate observations through triangulation, providing multiple sources of evidence for the same phenomenon. A case study database was created using NVivo software developed by QSR International<sup>9</sup> so that the evidence is available for other investigators to review and validate.

The cases were purposefully selected based on their initial success and as leaders in sustainability, their size, their source of funding and the campus-like context within which they operate. Data were collected in two major phases: 1) a literature review prior to a site visit; and 2) site visits. Literature provided by the case study primary point of contact (POC) and readily available from their sustainability websites or other online sources, such as conference presentations, was accessed and reviewed prior to the site visits.

Interview subjects were identified through the POC at each location. The primary POC was asked to: 1) provide contact information for individuals responsible for sustainability implementation in the areas of energy, water, waste and acquisition; 2) provide an introduction to

<sup>9</sup> Additional information on NVivo and QSR International is available at: <http://www.qsrinternational.com/default.aspx>

these individuals; and, 3) help coordinate the site visit. All interviews were conducted by the same researcher following the same interview protocol (Appendix C). A consent form was developed and approved by the Georgia Institute of Technology Institutional Review Board for the Protection of Human Subjects (Appendix C). The consent form provides a background for the research and informs the subjects of their rights. It was reviewed with each study participant prior to the interview and they acknowledged this with their signature. Each study participant was ensured anonymity by removing of case-study identifying information from the raw data. Interviews were digitally recorded using a Sony IC recorder. The interviewer also recorded notes during the interviews as back-up and support to the digital recordings. The digital audio interview files were then transcribed into text for insertion into the NVivo database.

The data collection framework was designed to capture as much variation as possible between the organizations and within the organizations based on the expected relationship between organizational attributes and activities and expected outcomes. The implementation of sustainability goals should affect a range of divisions, or functional areas, within each organization, so the data collection attempted to include interviews from as many functional areas as possible as the source of variation within the research design. As it turned out, the number of individuals involved in sustainability implementation was not very large and they tended to be within the facilities support functional area. This is discussed in detail in the results presented in Chapters 5 and 6.

#### *Phase 1: Document and Literature Review*

Various documents were obtained from the organization POC, as well as publically available sources. The documents were reviewed to further describe the cases and background for the adoption of sustainability goals, including description of their sustainability efforts to

date. The documents obtained and reviewed prior to the site visit and interviews. The documents included:

- Strategic plans, master plans
- Newsletters, award notices, web sites, conference presentations, books or other publications
- Organizational charts
- Annual sustainability reports

### *Phase 2: Site Visit*

*Direct Observation* – The researcher spent time at each case study location with the intent to observe how sustainability planners interact with co-workers, supervisors, and functional area experts they seek to influence. One week was spent traveling to and interviewing at each organizational site. Site visits were conducted the week of April 18-22, 2011, at Fort Bragg; August 1-5, 2011, at ORNL; and January 23-27, 2012, at the UNH. The researcher was able to observe team meetings at two of the case study sites, ORNL and the UNH.

*Open-Ended Interviews* – Interviews with practitioners were conducted and the same questions asked of each. This is called standardized open-ended interviewing and requires carefully and fully wording each question before hand so that each subject will be asked the same questions in the same order. This allowed for the data collection instrument to be examined beforehand by the Institutional Review Board, supervisors within the organizations, or other reviewers; allowed the interviews to be highly focused; and enabled later analysis by making responses easy to find and compare (Patton, 2002, p. 346). The interviews were audio recorded and transcribed for use with NVivo software. Interview questions are presented in the Interview Protocol (Appendix C). These were pre-tested by interviewing a principle POC at Headquarters Department of the Army, a key case study organization. The interviews were also conducted with the principle sustainability POC at each organization so that they could express



concerns to the interviewer. There were no objections to the interview questions by any of the participants. The interviews consisted of structured statements for which the participants could agree or disagree, then the participants were asked to elaborate on their answers using examples or other comments from their experiences.

Interview subjects were identified based on the process outlined in the previous section; through the specific sustainability goals their functional areas play a part in implementing. The principle POC was asked to identify interview subjects and then snowball techniques were used to identify other relevant subjects. That is, during the interview process, the researcher asked if there were others that should be interviewed. Prior to the site visit, interview subjects were contacted via email to explain the purpose of the research and inform them of their rights. This information was repeated prior to the interview and a consent form was signed by each participant to acknowledge that their participation is voluntary, they can stop at any time, and that their identity will not be linked to the data – keeping their comments anonymous.

#### **4.4 Analysis**

The analytical methods include preparation of cases study reports, analysis of interview responses using database queries, within-case comparisons of interview data between functional areas, and cross-case comparison of interview information. Identifying common themes in the unstructured responses was also a critical component of the analysis.

##### *Case Study Reports*

A case study report was prepared for each organization and contains specific background data. The case study reports include a timeline of significant events, description of important events, and description of the sustainability programs. The results summarize the major activities related to sustainability for each case study organization such as, when the efforts were

initiated and significant events in the timeline, the strategic goals related to sustainability, who has responsibility for sustainability implementation, how programs are funded, and the major activities that have been undertaken to date.

#### *Within Case Comparisons*

Responses were first grouped by functional area to allow for comparisons within the cases. This analysis determined if the success, or lack of success, for goals related to energy, water, waste and procurement is related to other attributes of the respondents. Overall, the perceptions are similar with few differences *within* the cases based on functional areas of the respondents. As a result, most of the comparisons were then completed across the cases.

#### *Cross-Case Comparisons*

Most of the analysis examined similarities and differences *between* the cases. There are more similarities than differences. This supports that the overall findings are potentially generalizable to other large public organizations. Focused analysis was conducted on those aspects that were noticeably different between the organizations. Differences provide evidence that other variables are influencing sustainability implementation outside of those covered by the propositions guiding this research.

Matrices were created to capture key interview observations based on the theoretical framework and other themes that emerge through comparisons of interview responses across the cases. Miles & Huberman (1994) refer to these as “conceptually ordered displays” which “deliberately drop case identification of data” to observe main trends across the cases (p. 184). Conclusions about the effect of bureaucracy on the implementation of sustainability were prepared based on the results, as well as implications for future implementation of sustainability and the concept of sustainability itself.

#### **4.5 Methodological Limitations**

There are limitations to the precision of pattern-matching. The types of comparisons drawn are not precise – they do not involve quantitative or statistical criteria (Yin, 1994). They are based on qualitative and descriptive data which is subject to my own interpretive discretion. For observations that do not fall neatly into the existing framework, I made decisions about which category to place them or created new themes and categories. Although this was naturalistic inquiry in that I was not manipulating the phenomena of interest, my presence in the organizational setting influences the outcome simply by my focus on these specific programs and by being there --which is implicitly a manipulation of the phenomena of interest. As the research questions asked about activities and attributes that are expected in successful cases, it was easy for the subjects to agree that these were present, even if they had not considered the importance of these activities and attributes before the interview. The power of suggestion could have positively skewed the responses.

There are also methodological limitations due to the nature of observation techniques. During site visits, I was only able to observe two meetings among sustainability team members. A few individuals were not available for interviewing during the on-site data collection. Follow-up phone calls were made, but these were not effective in soliciting responses from the remaining interview subjects. There are limitations due to inherent variability in data collection.

There are limitations due to researcher bias. As I was the sole data collection instrument, and I have definite opinions about this area due to my work experience, it was very important to create a database of all responses such that a second researcher could review and analyze the data and make similar conclusions. I sought to be conscious of my bias such that I did not miss other

important factors that affect the ability of sustainability goals to be implemented that have nothing to do with bureaucratic organizational attributes or my propositions.

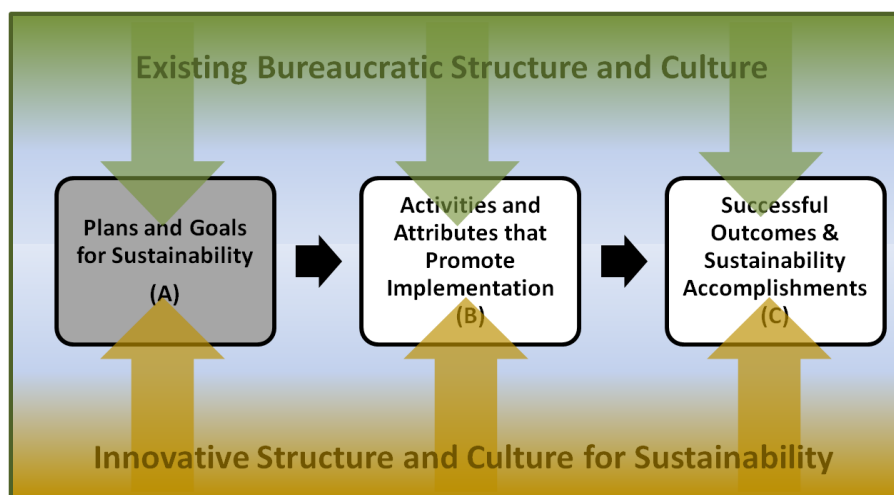
Although the unit of study was the organization, the interviews were conducted with individuals. In organizations the size of those studied, few individuals understand how the entire organization operates. Therefore, some of the answers relate to what the interview subject considered the organization but are really just perspectives about his/her immediate Directorate or Branch. Additional sources of information helped to correct this error, but it is related to the data collection method and affects the validity of the results.

## **CHAPTER 5**

### **CASE STUDY CHARACTERISTICS**

This chapter presents results from the research that confirm desired case study characteristics; each case study has an active sustainability program and is bureaucratic in structure and culture. The first set of research questions also examine other case study characteristics including: how the sustainability program was initiated; what functional area is responsible for this program; how have the case study organizations implement their sustainability programs; and who implements sustainability.

In the proposed causal chain diagram (Figure 4), the case studies begin with setting plans and goals for sustainability (A), which then requires changes in organizational activities and attributes (B) in order to ensure successful achievement of these goals (C). According to contingency theory, how the organization is structured will have an effect on the achievement of sustainability goals. The bureaucratic nature of these organizations is therefore shown as having an influence (Figure 4), as well as the expected attributes associated with organic or learning organizations to encourage innovation. As described earlier, the bureaucratic characteristics are expected to be beneficial for managing small, incremental changes over time, while the organic or learning organizational characteristics are needed to encourage innovation, cross-functional interaction, and a holistic view of the organization. This is the duality expected -- in order to implement sustainability programs, organizations have to be good at managing change over time, but also good at producing innovation.



**Figure 4. Plans and Goals for Sustainability**

This Chapter reviews results for plans and goals for sustainability (Box A in Figure 4). This is accomplished by presenting the case study reports. Information to build the case study reports was assembled from online literature sources (e.g. articles, websites, newsletters), resources provided by the POCs at the case study sites (e.g. strategic plans, annual reports), and comments made by the interview subjects relative to what motivated/initiated the efforts. This chapter also presents data collected to confirm the case study organizations are bureaucratic, as expected. The next chapter presents evidence of the expected activities and attributes (B), and Chapter 7 presents results related to outcomes (C).

## **5.1 Fort Bragg**

Fort Bragg is a large military installation located in North Carolina. It is considered a power projection platform because of its critical role in training, preparing and deploying armed forces, in particular the XVIII Airborne Corps, which "maintains a strategic response force capability to deploy on short notice to anywhere in the world by land, air, or sea, to conduct full-spectrum operations as an Army, joint or combined headquarters."<sup>10</sup> The military reservation

<sup>10</sup> <http://www.bragg.army.mil/18abc/Pages/default.aspx?vm=r>

covers over 160,000 acres with over 32 million square feet of building space. There are multiple training ranges, unit headquarters, vehicle maintenance shops, ammunition storage facilities, and three airports/airfields. A typical day on the installation may support a population of 180,000 (Soldiers, civilians, contractors, retirees, and family members). The installation contains a hospital, 14 medical clinics, 6 dental clinics, 10 schools, 11 churches, 7 child care centers, 28 restaurants, 11 shopping centers, and a library. There are over 5,000 units of family housing and 200+ recreation facilities.<sup>11</sup>

Army Garrison organizational structure is centrally standardized through Headquarters guidance and the Installation Management Command, though variation is typical at installations. The Garrison provides support services to all tenants and organizations on the installation. The culture of the installation is heavily influenced by the military culture it supports. Common Levels of Support are established to guide staffing, funding and responsibilities of the mission support functions. The Standard Garrison Organization depicts functional divides; the primary functional divide is between the military units and military chain of command (and other military organizations and tenants) and the support functions and their chain of command. The installation's Commanding General is the highest ranking military member on the installation and the most senior leader, the Commanding General is responsible for the military units on post. The organizational division is very clear most of the time, as the military staff wear a uniform to work and the civilians (support functions) do not. The support functions reporting chain is through Branch Chiefs, Division Chiefs, and Directorate Heads and ends with the Garrison Commander (a military commander at the Colonel rank, which is one grade lower than the first General Officer rank of Brigadier General) and the Garrison Commander's Deputy (a civilian

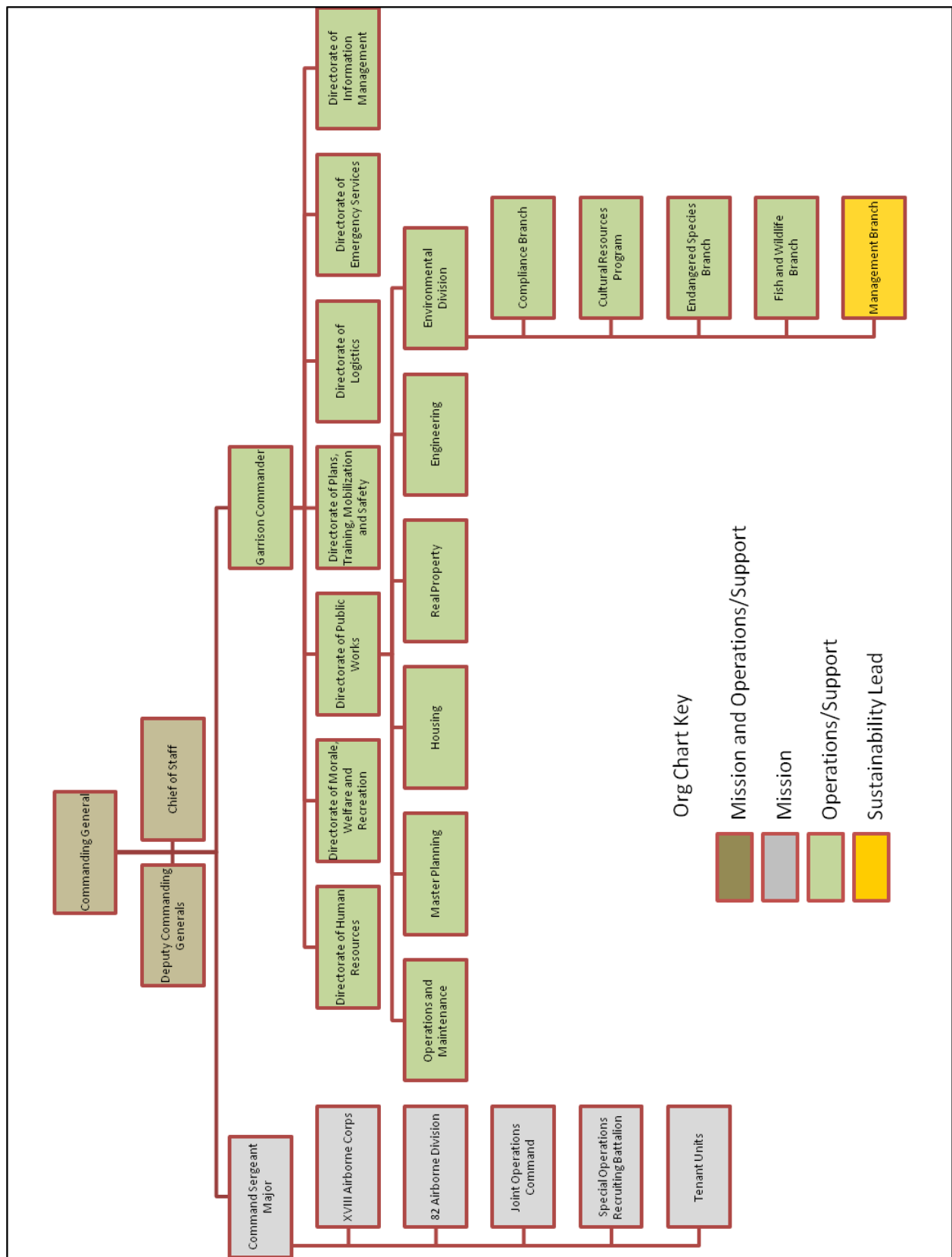
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<sup>11</sup> Installation statistics vary depending on source, these were found at:  
<http://www.bragg.army.mil/directorates/DES/I2MC/Pages/I2MCOverview.aspx>

and typically retired military). A simplified representation of Fort Bragg's organizational structure (Figure 5) demonstrates several points: 1) a functional split between mission (Commanding General) and operational/support functions (Garrison Commander); 2) functional divides by Directorates; 3) functional divides within the Directorate of Public Works; and, 4) the location of the office with primary responsibility for sustainability program implementation.

Fort Bragg's sustainability program was formally initiated with a strategic sustainability planning workshop, conducted at the installation in 2001. This workshop -- called the Army Executive Sustainability Conference -- was motivated by two primary factors: 1) environmental issues at the installation, and 2) leadership direction and support. At that time the command responsible for Fort Bragg was the U.S. Army Forces Command (FORSCOM). The leadership (Garrison Commander) at the installation was particularly receptive to the idea of sustainability due to several recent environmental crises which affected the ability to support its training mission. In particular, the installation was under constraints due to endangered species issues. It was also encountering water supply issues as a result of several drought years in the region. The installation relies upon surface water sources for most of its potable water. Also relevant were external encroachment pressures caused by incompatible land use development along the fence line, closing an important training area.





**Figure 5. Fort Bragg Organizational Chart**

FORSCOM, at that time, had responsibility for managing several installations of which Fort Bragg was one. Installation management issues, such as environmental compliance, were centrally supported at FORSCOM headquarters, located at Fort McPherson, Georgia. The environmental planners and pollution prevention professionals at FORSCOM had been exploring the concept of sustainability and were able to express this idea as a strategic planning process that would allow these professionals to more effectively address environmental challenges. FORSCOM leadership supported this approach with a memo from the Deputy Commanding General requesting that each installation actively engage military operating units, installation personnel, regulators, and the local community to create and achieve long-term sustainability goals. This memo and FORSCOM staff support, combined with the Garrison Commander's support, enabled Fort Bragg to be the first installation to complete the sustainability planning process. The first step of the planning process is a goal-setting workshop.

The workshop engaged stakeholders from across all the installation functions (including major military units), as well as brought external stakeholders from the surrounding communities and state regulatory agencies. It was a unique and successful effort, inspiring the establishment of the "Sustainable Fort Bragg" program. Aggressive 25-year goals were set in the areas of: air, water, waste, energy, transportation, green procurement, training lands and transportation. These were documented in a *Fort Bragg Strategic Sustainability Plan*. This process was later repeated at over 20 Army installations. During the same time period, engineering professionals within the U.S. Army Corps of Engineers were developing new design and construction guidelines to create more sustainable buildings. The Corps of Engineers provides facility design services to Army installations using common standards of service and design.

After the initial support from FORSCOM, resources for the Sustainable Fort Bragg program came from the Public Works Directorate's Environmental Division which still oversees the sustainability program. A key component of the sustainability program is its sustainability planners. These individuals serve as advisors to the goal teams and are physically located with the Directorate that owns the goals. The planners were "functionally integrated into the Garrison directorates as the primary change agents for translating sustainability concepts into practical applications."<sup>12</sup> The vision of the environmental leadership was that the other Directorates would recognize the value of sustainability and provide funding to support the sustainability planners themselves. However, the Public Works Directorate continues to be the sole funder of these positions. The sustainability planners are all contracted (non-government) individuals through a multi-year contract vehicle that is regularly renewed. The Environmental Management Branch Chief, under the Environmental Division Chief, manages the contract and provides the day-to-day oversight of the sustainability program. The first sustainability planners were pollution prevention individuals whose duties slowly evolved to reflect the areas of needed assistance based on the sustainability goals: such as energy, materials, and transportation. The number of sustainability planners was up to ten at one time, but has since decreased to six. Additional support for specific sustainability projects must come from other funding sources, depending on the proposed activity. Army civilian personnel time for involvement in the goal teams and other activities is allowed as part of the ongoing roles and responsibilities of those individuals. Only the sustainability planners are specifically dedicated full-time to Sustainable Fort Bragg, for all others this work is an additional duty. Status on sustainability activities are presented quarterly to the Sustainability Management Council, which includes the Garrison

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<sup>12</sup> Fort Bragg Environmental Branch (2011) *Ten Years of Sustainability, Fort Bragg, North Carolina, The Right Way...The Green Way...All the Way*, page 6

Commander, but not the Commanding General, that represents the operations and support functional nature of sustainability.

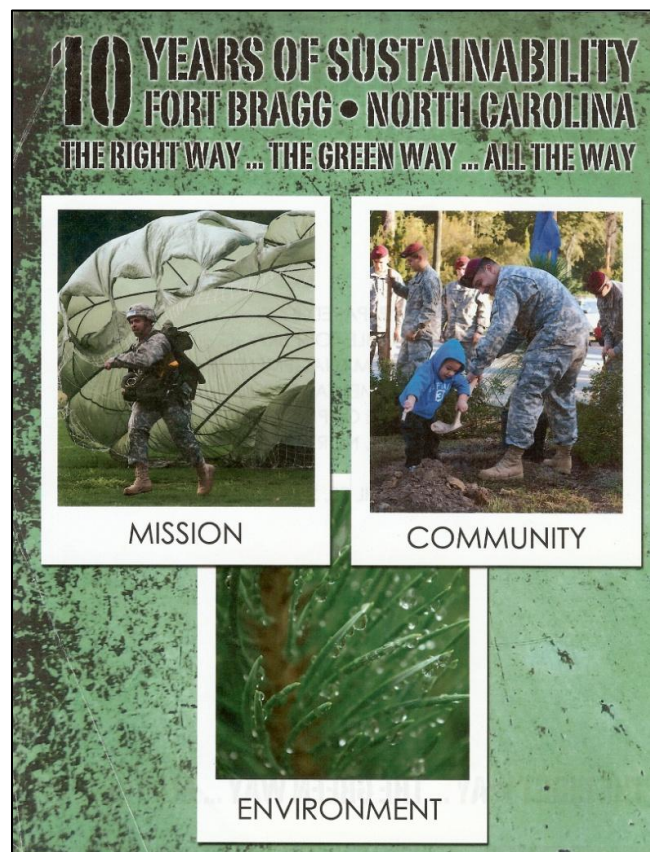
In 2003, the installation worked with the (then acting) Secretary of the North Carolina Department of Natural Resources to form a local non-profit organization dedicated to implementing sustainability initiatives in the region surrounding the installation. Fort Bragg provided support to the organization through its sustainability planners and other professional staff until 2010, with the intent that the organization would become stable enough to secure funding and support its own professional personnel. The non-profit, called Sustainable Sandhills, is still active in the region. In 2004, the installation integrated sustainability into its Environmental Management System, re-naming it a Sustainability Management System. Environmental Management Systems, in accordance with the International Organization for Standardization 14001 standard, are required at Army installations, so the using the Environmental Management System for managing the sustainability efforts was a logical step. Fort Bragg's environmental policy became: "The Right Way...Obey environmental laws through awareness of federal, state and installation regulations. The Green Way...Practice pollution prevention by choosing actions to safeguard health, the environment, financial and natural resources. All The Way...Continue to improve through awareness of the comprehensive impacts of individual actions on the Fort Bragg mission, community and environment."<sup>13</sup>

In 2005, the sustainability planners and environmental leadership worked to revise the strategic planning process and integrate sustainability into the Garrison Strategic Plan as Garrison Strategic Goal #1: Sustainable Community. The objectives of this Garrison strategic goal provide the current framework for the sustainability program (Table 9). Cross-functional

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<sup>13</sup> Fort Bragg Environmental Branch (2011) *Ten Years of Sustainability, Fort Bragg, North Carolina, The Right Way...The Green Way...All the Way*, page 2

teams support each of the goals and membership of the teams is from within the various Garrison support directorates. This team structure has been maintained throughout the installation's program. Sustainability is primarily a Garrison support activity. It does not include the majority of the population: the military units that train on and prepare to deploy from the installation. Others that are not directly involved include the family members that live on the installation and/or use the installation's facilities. Retired military and other tenant organizations are also not formally active in the sustainability program. Contractors are involved only in as much as the construction designs they are using or contracts they are under dictate certain outcomes or behaviors.



**Figure 6. Communicating Fort Bragg Sustainability**

<b>Table 9. Fort Bragg Sustainability Goals</b>		
<b>Goal Area</b>	<b>Proponent</b>	<b>Goal</b>
Land Use	Directorate of Plans, Training and Mobilization	Create and enhance sustainable training and urban areas to ensure military readiness and promote compatible growth of the surrounding communities.
Facilities	Directorate of Public Works	Become the model sustainable military community for the world by using sustainable principles throughout the lifecycle of all facilities and supporting infrastructure.
Materials	Directorate of Family and Morale, Welfare and Recreation	Achieve zero waste through acquisition and management of materials and commodities which, throughout their life cycle, create no additional waste nor require resources for disposal.
Utilities (Energy and Water)	Directorate of Public Works	Supply reliable utility services and infrastructure with no negative impacts while aggressively reducing overall demand.
Transportation	Directorate of Logistics	Build a sustainable, world-class, ground transportation network providing a seamless transition between multiple modes of travel while reducing harmful emissions by 2030.
Culture	All	Create a culture which fosters a sustainable lifestyle to enhance the quality of life of the Fort Bragg community. This encompasses the social, mental, physical, and spiritual well-being of its members.

The individuals implementing sustainability at Fort Bragg cover a wide range of topical areas, tended to have been at the installation for less than 10 years (half of them have been there less than five), have a bachelors degree or masters degree, work under the Directorate of Public Works, and have engineering, environmental or other career backgrounds (Table 10).

<b>TABLE 10. Characteristics of Sustainability Professionals at Fort Bragg<sup>14</sup></b>					
Topical Area	Count	Number of Years at Organization	Count	Educational Level	Count
Facilities	2	0 to 5	5	Other	1
Administration	2	6 to 10	2	Bachelor	6
Natural Resources	1	11 to 15	1	Masters	3
Energy	1	21 to 25	1		
Transportation	1	26 +	1		
Water	1				
Other	1				
Planning	1				
Career Field	Count	Organizational Location		Count	
Engineering	4	Directorate of Public Works		7	
Environmental	2	Directorate of Plans, Training and Mobilization		1	
Other	2	Morale, Welfare and Recreation		1	
Natural Resources	1	Directorate of Logistics		1	
Management and Business	1				

## 5.2 Oak Ridge National Laboratory

Oak Ridge National Laboratory (ORNL) is the Department of Energy's largest science and energy laboratory and is located in Oak Ridge, Tennessee. ORNL research areas include energy, advanced materials, security and physics. The campus houses approximately 6,000 researchers and support individuals along with 3,000 visiting scientists annually. The campus contains many research and laboratory facilities on 4,470 acre campus, including a Spallation Neutron Source and High Flux Isotope Reactor, in over four million square feet of building space. The overall ORNL reservation is 34,000 acres.

<sup>14</sup> "Count" refers to the number of interview subjects in each category.

Similar to Fort Bragg, ORNL is organized by function, with a similar split between the research functions and the operations and support functions, with research functions further organized by topical area. All functions of the organization are aligned with Directorates and all report at the highest level to the Laboratory Director. Associate Laboratory Directors lead research-oriented Directorates, such as Computing and Computational Sciences; Energy and Environmental Sciences; Global Security; and Neutron Sciences. The support functions are covered by several other Directorates, headed by Directors. A simplified representation of the organizational structure at ORNL (Figure 7) demonstrates several points: 1) the functional divide between mission and operational/support functions; 2) functional divides by Directorates and Divisions; 3) functional divides within the Facilities and Operations Directorate; and, 4) location of the offices with primary responsibility for sustainability program implementation.

Most of the individuals with sustainability responsibility are within the Facilities and Operations Directorate, which is organized by functions in Divisions: Fabrication, Hoisting and Rigging; Facilities Development; Facilities Management; Facilities Strategic Planning; Integrated Operations Support; Laboratory Protection; Logistical Services; and Utilities. Unlike Fort Bragg, sustainability responsibility is also found within the core mission side of the organization through the Energy and Environmental Sciences Directorate, in the Energy and Transportation Science Division, demonstrating a link to the core mission function of the laboratory. An Associate Laboratory Director (mission) *and* a Facilities and Operations Program Director (support) jointly fund the Sustainable Campus Initiative, reflecting interest from the energy research and development mission of the lab. There are research opportunities within the operations of the laboratory itself, which is recognized by the joint sponsorship.

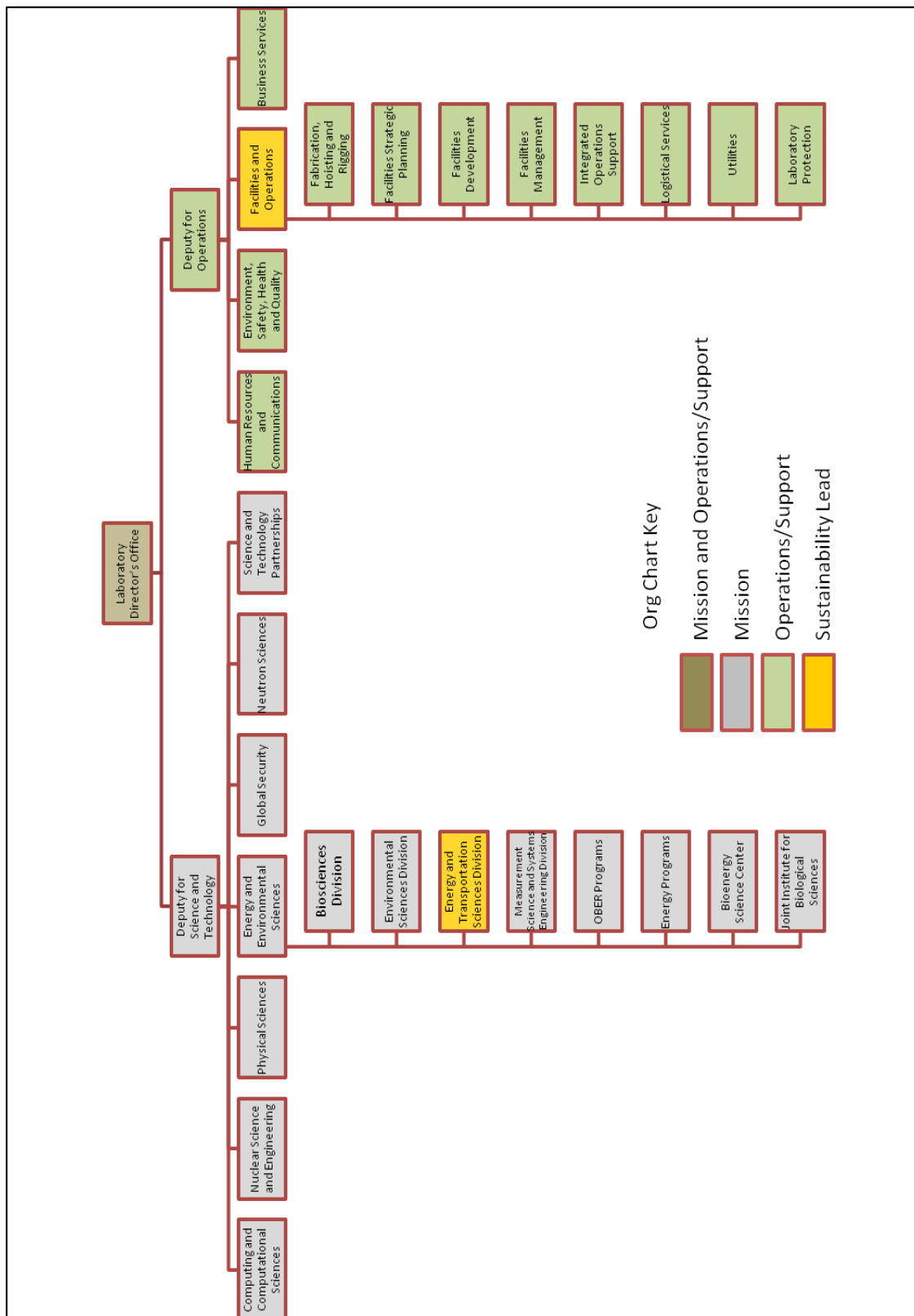


The onsite manual labor workforce (the non-professional personnel, referred to as craft employees) is under a separate management structure and is unionized. This element of the workforce is easily identified as they wear a distinctive uniform. Although these personnel are integral to operations, they did not seem to be actively engaged in sustainability efforts. It was not clear how extensive the laboratory researchers were involved in sustainability efforts. Support of the sustainability program appeared to be mostly within the facilities and operations' divisions professional personnel.

The Sustainable Campus Initiative (SCI) at ORNL has its origins in a major management change and modernization effort at the laboratory that began in 2000. ORNL underwent a major change in facility operations when the University of Tennessee and Battelle Memorial Institute joined to win the operations contract for the laboratory. Battelle Memorial Institute operates several national laboratories for the Department of Energy, and University of Tennessee had a history of research partnerships with ORNL. A private not-for-profit company called UT-Battelle, LLC, was established in 2000 for "the sole purpose of managing and operating ORNL...Formed as a 50-50 limited liability partnership between the University of Tennessee and Battelle Memorial Institute, UT-Battelle is the legal entity responsible delivering the Department of Energy's research mission at ORNL."<sup>15</sup> The management change coincided with a large investment by the Department of Energy to upgrade and modernize the laboratory.

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<sup>15</sup> <http://ut-battelle.org/about.shtml>



**Figure 7. Oak Ridge National Laboratory Organizational Chart**

The new management team developed a master plan that focused heavily on building an energy efficient modern campus. The plan involved new construction of LEED certified buildings. One building is net zero for energy. As noted in the interviews: "We didn't use the word sustainability; it wasn't in the vocabulary at that time. But we wanted to really walk the talk for an energy laboratory, and so that envisioned sustainable landscaping and the buildings are really important parts of the overall process." Another large piece of the laboratory renewal is a \$89 million Energy Savings Performance Contract the lab awarded to Johnson Controls, Inc., in 2008. Energy Savings Performance Contracts are designed to pay for themselves in energy savings. The contractor guarantees a certain reduction in energy costs which pay for the capital investments. These contract vehicles make it easier to fund conservation improvements as the costs are spread over time and are predictable. The Energy Savings Performance Contract includes several energy efficiency solutions such as advanced electric metering, energy efficient lighting, water conservation measures, compressed air cooling, and heating, ventilation and air conditioning (HVAC) improvements. The bulk of the contract, however, was for a new biomass gasifier energy plant, a super boiler that uses organic material and is highly efficient. The new power plant opened in July 2012.

The SCI came together as a formal program in 2008 in order to bring together the multiple separate initiatives and add new ones -- to be an umbrella for all sustainability-related activities. The program has an overarching goal to "achieve benchmark sustainability in campus operation and in research, development, and deployment of key technologies."<sup>16</sup> The SCI seeks to integrate energy research interests with the facility operations (support) side of the laboratory. This is reflected in the co-sponsorship of the initiative by two directorates. The Facilities and Operations Directorate is one of the sponsors, representing the operations and support side.

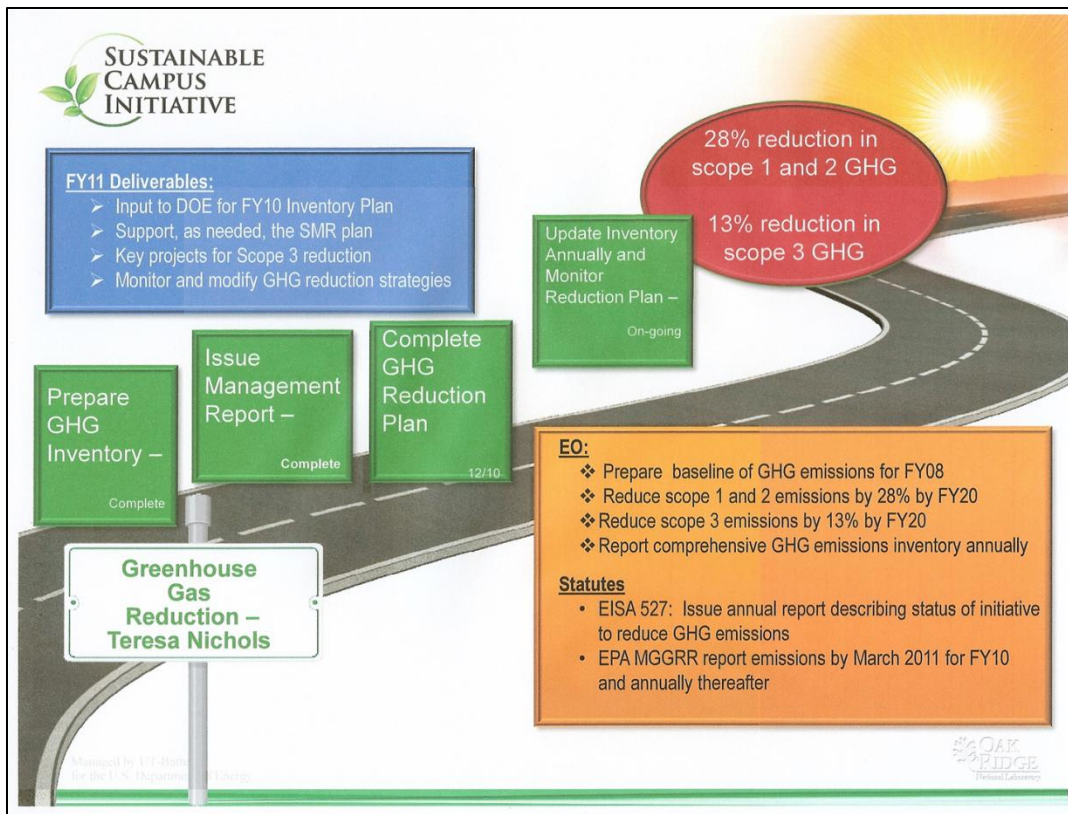
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<sup>16</sup> ORNL Site Sustainability Plan for FY 2010, page 59

Energy and Environmental Sciences Directorate is the other sponsor, representing the research side. The sponsors provide resources to pay for the additional personnel time or project-specific needs. At the time of this research, the SCI has a relatively stable budget programmed for several out years. Day-to-day supervision of the program is conducted by a Group Leader within the Energy and Transportation Sciences Division, part of the Energy and Environmental Sciences Directorate.

A timeline of 10 years was established, along with roadmaps. Roadmaps (Figure 8) are the structure by which long-term goals are set along with interim, short term objectives. Roadmaps provide the foundation of the teams that have responsibility for executing the roadmap, and are developed by that team. There are currently more than 20 roadmaps (Table 11). The Director of Facilities and Operations has made success of these roadmaps a part of the department's personnel performance plan. The funding provided is used for SCI leadership (personnel time) and for seed money for various roadmap projects. Project funding is provided based on proposals brought forward by the roadmap owners. Each roadmap has specific fiscal year deliverables. Regularly scheduled meetings are held between individual roadmap owners and the leadership of the SCI. All roadmaps are also briefed to the SCI sponsors (the Director of Facilities and Operations Directorate and the Associate Laboratory Director for the Energy and Environmental Sciences Directorate) quarterly to assess the merit of projects and provide guidance.

<b>Table 11. ORNL Sustainability Roadmaps</b>	
<b>SCI Elements</b>	
Facilities and Land	<ul style="list-style-type: none"> <li>- Greenhouse Gas Reduction (28% reduction in scope 1 and 2 GHG; 13% reduction in scope 3 GHG)</li> <li>- High Performance Sustainable Buildings (HPSB), New Construction and Major Renovation (all new construction meets LEED and HPSB criteria)</li> <li>- HPSB, Existing Facilities, LEED-EB</li> <li>- Energy Audits for Existing Facilities</li> <li>- Sustainable Landscaping and Land Use</li> <li>- Energy Savings Performance Contract</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>- Solar-Assisted EV Charging (state-wide EV charging project; 125 solar-assisted charging stations regionally by March 2012)</li> <li>- Sustainability in the ORNL Vehicle Fleet (zero net carbon emissions by FY25)</li> <li>- Sustainability in Employee Transportation (zero carbon emissions; pursuing a work-from-home pilot program)</li> </ul>
Utility Infrastructure	<ul style="list-style-type: none"> <li>- Small Modular Reactor constructed and Power Purchase Agreement for power supply by 2020</li> <li>- Grid Efficiency, Smart Grid (advanced meters installed and feeding data management system)</li> <li>- Energy Storage and Peak Power Management (fully functional Central Energy Data Center; active energy storage systems by 2015)</li> <li>- Renewable Energy Sources (7.5% renewable power by 2013; meet DOE and EO Goals)</li> <li>- Wireless Energy Data “Energy Wall” (complete by 2013)</li> <li>- Water Management (reduce water consumption by 26% by 2020)</li> <li>- 30% More Energy Efficient Facilities</li> <li>- New energy audit process for defining Energy Conservation Measures</li> </ul>
Employees and Systems	<ul style="list-style-type: none"> <li>- Employee, Family, and Community Engagement</li> <li>- External Application of SCI (wide community impact)</li> <li>- Employee Wellness (benchmark-able wellness program)</li> <li>- Information Technology (Green Information Technology - desktop computer energy usage)</li> <li>- Green Procurement (benchmark sustainable acquisition process)</li> <li>- Annual Sustainability Report (complete and repeat annually)</li> <li>- Sharing Successes (successes shared; recognition and awards)</li> </ul>
Waste	<ul style="list-style-type: none"> <li>- Recycle and Reuse, Routine Waste (zero office waste to landfill)</li> <li>- Recycle and Reuse, Construction Waste (zero construction waste to landfill)</li> </ul>



**Figure 8. Example ORNL Sustainable Campus Initiative Road Map**

ORNL's sustainability efforts have also been affected by the Department of Energy headquarters. There are many federal laws and Executive Orders related to aspects of sustainability. In particular, Executive Order 13514 (issued in 2009) requires each federal agency to designate a Senior Sustainability Officer and prepare a *Strategic Sustainability Performance Plan*. The Executive Order also sets very specific targets for reduction in energy and water use, waste diversion, and greenhouse gas reduction. Based on this driver, the Department of Energy articulated specific goals for all its sites, and this has affected ORNL's SCI. Goals and metrics for the SCI efforts needed to incorporate those set by the Department of Energy, to include preparation of a *Site Sustainability Plan* (published in 2010) and the establishment of the Sustainability Transformation Teams -- a term created by the Department of

Energy. According to the ORNL's *Site Sustainability Plan*, the existing program (SCI) was merged with the concept of Department of Energy's requirement for Sustainability Transformation Teams and to formerly describe the roadmapping process. The resulting permanent adoption of the ORNL Sustainable Campus Initiative Roadmap Process (very rationally) is as follows: 1) define the current condition; 2) define the desired future state; 3) determine the route (roadmap) to get from one to the other; and, 4) determine how progress will be measured. The overall process for setting goals is somewhat voluntary and "ad hoc," however, as noted in the interviews:

"Yeah, if you look at the way the sustainable campus is set up, it's extremely ad hoc; we each have formal rows within the organization, and the sustainable campus is strictly voluntary, we meet on a regular basis to prepare notes to look at ways that we can work more closely with the other roadmaps. One of the cornerstones of the Sustainable Campus Initiative is actually to sort of blur the lines between the operation side of the house and the research side of the house. And so having greater participation with our peers from the research community is one of the things that we're working really hard to expand on, and that shows up in several of the projects that we've chosen and how we've done the implementation on them."

The individuals implementing sustainability at ORNL cover a wide range of topical areas with most associated with facilities, administration and energy. Most of the individuals implementing sustainability have been at ORNL for 16 years or more and have a bachelor's degree or master's degree (just over half had masters degrees). Half of them work under the Facilities and Operations Directorate and several under the Energy and Environmental Sciences Directorate, and they have engineering or management and business career backgrounds (Table 12).

<b>Table 12. Characteristics of Sustainability Professionals at ORNL<sup>17</sup></b>					
Topical Area	Count	Number of Years at Organization	Count	Educational Level	Count
Facilities	3	0 to 5	3	Other	2
Administration	3	6 to 10	1	Bachelors	4
Energy	2	11 to 15	1	Masters	8
Natural Resources	1	16 to 20	2	PhD	1
Transportation	1	21 to 25	3		
Water	1	26 +	5		
Other	1				
Planning	1				
Waste	1				
Acquisition	1				
Career Field	Count	Organizational Location		Count	
Engineering	6	Facilities and Operations Directorate		7	
Management & Business	4	Energy and Environmental Sciences Directorate		4	
Environmental	2	Environmental, Safety and Quality Directorate		1	
Planning and Architecture	1	Business Services Directorate		1	
Natural Resources	1	Department of Energy, Oak Ridge Operations Office		1	
Other	1	Outside Consultant		1	

### 5.3 University of New Hampshire

The University of New Hampshire (UNH) in Durham, New Hampshire, is part of the University System of New Hampshire, the State's higher education system. The UNH offers graduate and undergraduate degrees in 100 different majors, with most activity occurring on its Durham Campus of 1,100 acres, with 180 buildings and over 5.7 million square feet of building space. The campus provides housing, classroom and research space, along with recreational and commercial facilities. There are 3,400 faculty and staff (including all non-academic researchers and other functions) supporting 14,600 students. The UNH also supports outlying land of over 1,300 acres for research and recreational purposes.

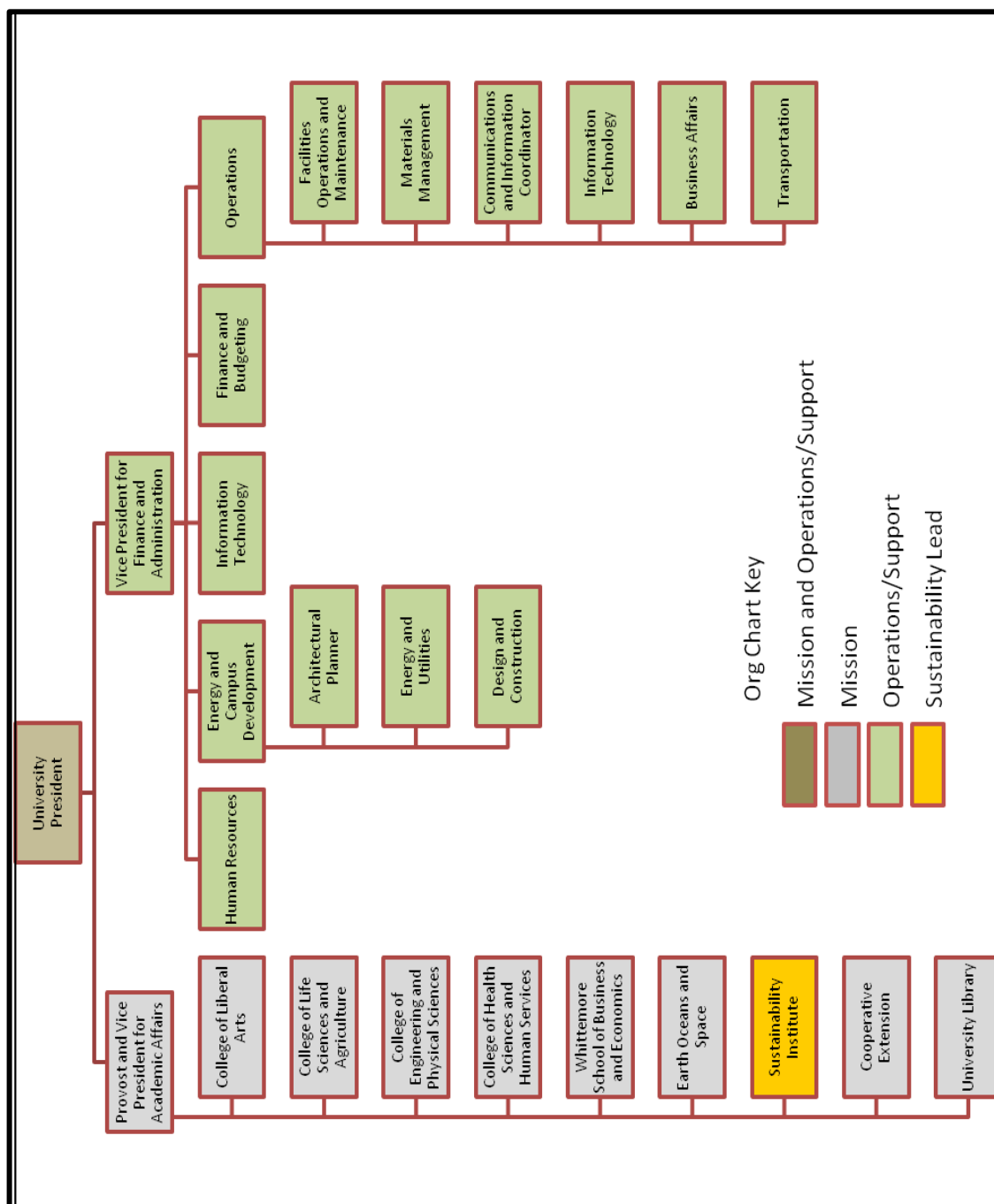
<sup>17</sup> "Count" refers to the number of interview subjects in each category.



The UNH is organized around Responsibility Center Units which have responsibility for their own financial decisions. Each of these units develops a strategic plan, consistent with the overall UNH plan, plans its budget and manages its personnel accordingly. There are also Business Service Centers that support the Responsibility Center Units to help with finance and human resource transactions, developing and monitoring budgets, and adherence to University System of New Hampshire and UNH policies and procedures. Responsibility Center Units are based on function but do not necessarily follow organizational reporting chains. The academic functions are grouped by topical areas and called colleges, schools or institutes, with research grouped together by topic (programs, centers and institutes). These core mission functions, including the library and portions of information technology, each have a reporting structure to a Dean or a Director that reports to the Provost. The other functions are grouped around specific support services. A simplified representation of the organizational structure at the UNH (Figure 9) demonstrates: 1) the functional divide between mission and operational/support functions; 2) functional divides within academic schools and support divisions; 3) functional divides within operations; and, 4) location of the office with primary responsibility for sustainability program implementation.

Most of these support functions are organized within the Office of Finance and Administration with a reporting structure that includes the Assistant Vice Presidents for Human Resources, Energy and Campus Development, Information Technology, and Operations. These offices and Assistant Vice Presidents report to the Vice President for Finance and Administration and then to the President of the University. The UNH's Sustainability Institute reports directly to the Provost, giving it an academic (core mission) focus. But, most of the individuals with responsibility for implementing sustainability activities are located within the Finance and

Administration Office. This creates a unique combination of support and core mission personnel guided by the Sustainability Institute. The organizational divide between core mission and support at the UNH is reflected in titles: Deans and Directors equal core mission functions; Vice Presidents and Assistant Vice Presidents equal support functions.



**Figure 9. University of New Hampshire Organizational Chart**

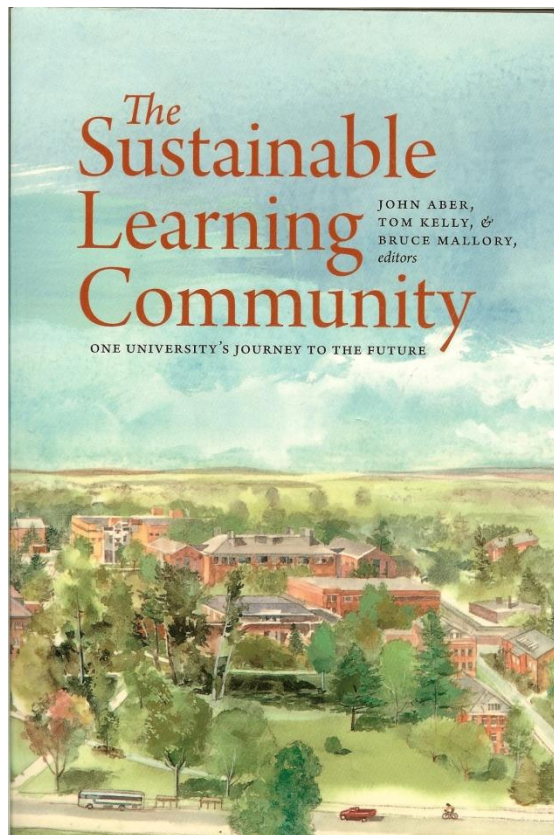
The UNH has had academic focus areas in the natural sciences, agriculture, ecology, and engineering from its origins and especially as a land-, sea- and space-grant institution. Academic focus, in both instruction and research, had incorporated the concept of sustainability since the 1970s, well before the institution focused efforts on becoming a sustainable campus. There were two main drivers that enabled the Sustainability Institute to emerge in its current form. The first was the generous endowment by an anonymous donor of \$10 million to be dedicated to campus sustainability efforts. The second was the high price of energy in New England. These drivers, along with a pre-existing interest in global environmental issues and a desire to be viewed as a leader amongst its peers, enabled UNH's campus operational initiatives to come together with academic interests into a single program.

The endowment was received in 1997 and was quickly followed by the creation of the Office of Sustainability Programs in 1998. The endowment allowed the University to expand on an area that was already of interest to its faculty and students and to further establish the University as a leader in the area of sustainability. Being a leader in this area allows the University to recruit faculty and students and further grow this area of expertise. The University seeks to integrate sustainability as a guiding principle for higher education. How this is envisioned by the UNH is described in a book published in 2009, titled: *The Sustainable Learning Community: One University's Journey to the Future*.<sup>18</sup> In the book (Figure 10), key concepts that underlie the university's sustainability efforts are articulated demonstrating how the principles of sustainability provide a basis for learning (course examples are presented), campus operations (shown in planning and projects), research (case studies describe research projects), and engagement (demonstrated through programs that involve the outside community).

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<sup>18</sup> Editors are: John Aber, Tom Kelly, and Bruce Mallory

"We begin by recognizing that our overarching effort is a variation on a much older and abiding cultural concern: clarifying what it means to be educated. Our approach to this concern weaves together ancient insights and modern necessities in a set of perspectives that we believe are responsive to the extraordinary challenges and opportunities of sustainability and that aim to empower and inspire students in all fields to advance sustainability in their civic and professional lives. The sustainable learning community model focuses on four key systems that underpin the ability of a community or society to pursue quality of life: biodiversity and ecosystems, climate and energy, food and society, and culture and sustainability. These are integrated as educational initiatives focused on institutional practices across what we refer to as the core functions of the university: curriculum, operations, research, and engagement (CORE)." (page 2)



**Figure 10. UNH's Sustainability Publication**

Parallel to the establishment of the Office of Sustainable Programs was the emergence of the Climate Education Initiative and the Energy Task Force at the UNH. The Climate Education

Initiative had been actively engaged in global climate change and greenhouse gas (GHG) issues, conducting a GHG inventory for the University as early as 2001. The Energy Task Force was established in 2005 primarily to identify ways of reducing energy consumption in response to growing energy costs. The task force's mission grew quickly, however, as the issue of climate change became more concrete and interest in GHG reduction on campus moved onto the University President's agenda. In 2007, the issue became far more visible as UNH was the first land grant university in New England to sign the American College and University Presidents' Climate Commitment. Signatories to this agreement pledge to take immediate action to reduce GHG emissions and move toward carbon neutrality. Unlike the focus of the Office of Sustainability Programs (with its academic focus), the efforts of the Energy Task Force were centered on campus operations. The Energy Task Force published *WildCAP: The University of New Hampshire's Climate Action Plan* in 2009 which set targets for GHG reduction and proposed various actions to achieve these reductions. A major project to convert existing on-campus power generation to a renewable resource was a critical component of the energy efforts. Called the EcoLine™, the project involved construction of a landfill gas pipeline to fuel the on-campus cogeneration heat and power plant. This major project came on line in 2009, significantly changing the GHG emission profile of the campus.

The high visibility of the energy efforts, the EcoLine project in particular, and continued activities of the Office of Sustainability Programs led to planning and reorganization efforts in 2006. At this time the Office of Sustainability Programs was re-named University Office of Sustainability and became a direct report line to the Office of the Provost. Workshops with faculty and staff across the campus were conducted about the various sustainability programs, and as a result the name changed again to the Sustainability Academy in 2008. Also at this time,

a cross-campus Collaborative Council was established as a governance structure for the Sustainability Academy. The Academy personnel, its graduate and undergraduate fellows, and faculty fellows that have sustainability-related research projects participate in the Collaborative Council to help integrate various sustainability efforts and provide strategic direction to the Academy. In 2012, the name changed to the Sustainability Institute, which is the most current program title.

Goals and objectives sustainability are established and monitored through a task force structure with subcommittees and groups under each major task force (Table 13). Task forces can set their own goals, but also serve to "complement and integrate the work of related UNH groups."<sup>19</sup> Specific University-wide goals for GHG reduction are the most formalized of the goals for UNH sustainability. The rest are embedded within the committees and have not been adopted in any formal way. Some task force and committee annual reports have been published, although the format and timing is organic in nature -- reporting is done how and when the committee and/or task force decide to do it.

<b>Table 13. UNH Sustainability Goals</b>		
<b>Task Force</b>	<b>Committees and Related Groups</b>	<b>Responsibilities and Goals</b>
Energy Task Force	Energy & Campus Development Energy & Utilities Transportation Policy Committee Climate Education Initiative Energy Club Ecological Advocates Sustainability Stewards Student Energy Challenge Climate Action Plan	- Developing timelines, targets and action items under a UNH Climate Action Plan (called "WildCAP") to help move UNH towards carbon neutrality. - Developing immediate and future actions to reduce energy costs, lower greenhouse gas emissions and improve energy conservation through technological improvements, increases in efficiency, reductions in waste and selection of fuels. - Inventorying and promoting curricular, research and engagement programs intended to increase awareness of and behaviors around energy use, efficiency, greenhouse gas emissions and climate change.

<sup>19</sup> Excerpt from the UNH Sustainability Institute web site: <http://www.sustainableunh.unh.edu/ecotf>

<b>Table 13. UNH Sustainability Goals</b>		
<b>Task Force</b>	<b>Committees and Related Groups</b>	<b>Responsibilities and Goals</b>
Ecosystem Task Force	Committee on Real Property Acquisition and Disposal Woodlands Advisory Committee UNH Stormwater Center UNH Campus Planning UNH Water Resources Center Office of Woodlands & Natural Areas Campus Recreation	<ul style="list-style-type: none"> <li>- Developing a long-term plan for sustainable management of biodiversity and ecological integrity of UNH lands including the core Durham campus.</li> <li>- Developing tools for assessing, evaluating and managing ecosystem function and services within the Oyster River and Lamprey River Watersheds including approaches to landscape design and management in support of the Campus Landscape Master Plan and in accord with knowledge and best practices of sustainable ecosystem management.</li> <li>- Identifying mechanisms that support professional development opportunities for UNH faculty/staff to contribute to the goals of the EcoTF including related curriculum, research, operations and engagement activities.</li> </ul>
Sustainable Food System Task Force	UNH Conventional and Organic Dairies UNH Farms and Greenhouses UNH Organic Garden Club UNH Dining UNH Slow Food Healthy UNH Cooperative Extension	<ul style="list-style-type: none"> <li>- The overarching goal of the Task Force is to illustrate the strength and contribution of UNH to sustainable food systems worldwide, from farm to fork to health outcomes. The Task Force includes in its focus local, state, regional, national and international activities with the goal of providing resources and models for the practical development of sustainable food systems.</li> <li>- On campus, the Task Force makes recommendations to the administration, faculty, and others to further UNH's position as an effective leader in food systems education and research, and as a model for university operations and community engagement.</li> </ul>

Sustainability is featured in the *Campus Master Plan* and the University's *Strategic Plan*. One of the goals in the recently issued *Campus Master Plan* is to: "Reaffirm and Strengthen the UNH's Long Standing Commitment to Sustainability." This goal is addressed through several areas including incorporation of sustainability concepts and principles into the *University's Planning, Design and Construction Guidelines* and the *Landscape Master Plan*. A commitment to a walkable campus and enhancement of alternative forms of transportation are also featured in the *Campus Master Plan*. Sustainability challenges appear in the *Strategic Plan* as background issues that will drive higher education in the future. The Sustainability Institute is featured in the strategic goals to develop interdisciplinary schools and academies and actively engage outside communities.

The Sustainability Institute has a Chief Sustainability Officer/Institute Director, an Associate Director, three Program Coordinators, a Program Support Assistant, an Administrative



Assistant, and graduate research assistants and interns. There are also faculty fellows associated with the Food and Society Initiative; Biodiversity Education Initiative; Culture and Sustainability Initiative; Climate Education Initiative. The Institute supports itself through the earnings of its endowment. The Institute provides funds to support internal proposals for academic projects or other sustainability projects. The UNH is also initiating another funding source based on the savings from energy efficiency projects through a new Energy Efficiency Fund. The intent of the fund is to capture energy cost savings associated with energy efficiency retrofits to provide funding for further retrofit projects, as these are difficult to fund with constrained operational budgets.

The individuals implementing sustainability at the UNH cover a wide range of topical areas with most in facilities and administration, but fairly equal representation across the topical areas (especially energy, water and waste). Similarly, the time these individuals had been working in this organization was fairly evenly distributed across all categories, with most having been at UNH for 6-10 years, with an equal number having been there longer than 21 years. Most have bachelors or masters degrees and nearly all work under the Finance and Administration directorate. This Finance and Administration branch of UNH is responsible for facilities operations and maintenance, business affairs, energy and campus development, and facilities design and construction. The career background of the UNH sustainability professionals also had a wide range -- fairly equally representing environmental, engineering and business backgrounds. Refer to Table 14.

A comparison of key aspects of the case studies is provided in Table 15.

**Table 14. Characteristics of Sustainability Professionals at UNH<sup>20</sup>**

Topical Area	Count	Number of Years at Organization	Count	Educational Level	Count
Facilities	3	0 to 5	1	Other	3
Administration	3	6 to 10	6	Bachelors	7
Energy	2	11 to 15	2	Masters	5
Waste	2	16 to 20	2	PhD	2
Water	2	21 to 25	3		
Transportation	1	26 +	3		
Other	1				
Planning	1				
Natural Resources	1				
Acquisition	1				
Career Field	Count	Organizational Location		Count	
Environmental	4	Finance and Administration		11	
Engineering	3	Office of the Provost		3	
Management & Business	3	University System Purchasing and Contract Services		1	
Other	3	College of Life Sciences and Agriculture		1	
Planning and Architecture	2	College of Engineering and Physical Sciences		1	
Natural Resources	2				

**Table 15. Case Study Comparison**

Aspect	Fort Bragg	ORNL	UNH
<b>Motivation/drivers to start</b>	Environmental issues; Encroachment issues; Command support	Modernization program; Energy	Energy; Climate Action Plan; Academic endowment
<b>Key enablers</b>	Environmental Management System requirement; Executive Orders; Installation-level champions and leadership support; Headquarters support	Laboratory leadership sponsor and champion; Headquarters support (Strategic Sustainability Performance Plan)	Academic interest Initial endowment University leadership support
<b>Start date</b>	2001	2008	1998
<b>Locus of leadership</b>	Support	Mission + Support	Mission
<b>Organizational home</b>	Directorate of Public Works, Environmental Division	Energy and Environmental Services Directorate, Energy and Transportation Science Division	Office of the Provost
<b>Goal setting process/document</b>	Goal setting workshop; Garrison Strategic Plan; Goal teams; External goals through Executive Order and Army policy	SCI roadmaps; Site Sustainability Plan; External goals through Executive Order	Task forces with subcommittees; Climate Action Plan

<sup>20</sup> "Count" refers to the number of interview subjects in each category.

<b>Table 15. Case Study Comparison</b>			
<b>Aspect</b>	<b>Fort Bragg</b>	<b>ORNL</b>	<b>UNH</b>
<b>Effect of higher headquarters on sustainability efforts</b>	Moderate to low	Moderate to strong	Minor to none
<b>Integrated with design guide/master plans?</b>	Yes	Yes	Yes
<b>External community engagement?</b>	Yes	Limited	No
<b>Dedicated funding source</b>	Yes, for personnel; Expectation to apply and obtain other funding sources (grants, technology projects, etc.)	Yes, for personnel, seed money for programs and projects	Yes, for personnel, seed money for programs and projects; Revolving fund for energy projects, federal funds
<b>Reporting</b>	10 year status report published 2011; Sustainability Tracking and Audit Reporting System (STARS) for implementation of sustainability in operations and maintenance of existing buildings; Reporting to headquarters Army	Developing an annual report; Reporting to headquarters Department of Energy	STARS - Sustainability Tracking and Rating System developed by the Association for the Advancement of Sustainability in Higher Education (AASHE)
<b>Outreach</b>	Website; Sustainable public service announcement (Facebook); Conference briefings; Participation with regional non-profit	Website; Newsletters; On-campus seminars; Conference briefings; Presentations to sister labs; Site tours	Website; Published book: "The Sustainable Learning Community"; Local news story on EcoLine project; Site tours
<b>Individuals on the teams who implement sustainability</b>	Strictly voluntary with exception of Sustainability Planners (organization supports 'work time' dedicated to this effort)	Strictly voluntary with exception of SCI dedicated staff (organization supports 'work time' dedicated to this effort)	Strictly voluntary with exception of Sustainability Institute personnel (organization supports 'work time' dedicated to this effort)

## 5.4 Bureaucratic Organizational Characteristics

There were two main methods for gathering evidence that the case study organizations are bureaucratic in their structure and culture. The first was a review of organization charts (presented in the previous section), and the second was through specific questions in the interview process. Other sources of this information were comments made by the interview subjects and other literature sources on the organization. This section presents the interview results and combines these with the other sources to evaluate the evidence to support that the case study sites were bureaucratic, as expected. It also shows the influence of sustainability on

these bureaucratic elements, as expected. The needs of sustainability implementation are particularly relevant to the interview subjects, as they were selected for their responsibility in implementing sustainability.

A portion of the Interview Protocol was developed to measure the study participants perspective of bureaucratic characteristics of their organization (as described in Chapter 3 and shown again in Table 16). This was done to answer the question: *Are bureaucratic organizational characteristics present?* A Likert scale<sup>21</sup> was developed for capturing qualitative responses in a quantitative format, and each subject was given a code sheet (Table 17) to guide their responses as they were read statements (Table 18) about their organization for which they could agree or disagree. They were then encouraged to give additional details and comments regarding their numerical score. The scale ranged from "Strongly Disagree" to "Strongly Agree." As is predicted by the contingency theory, these organizations should have characteristics of both bureaucratic and organic/learning organizations, which predicts some mixed results for these questions. Summaries of responses are given in this section. Many participants struggled to explain how their organization works as it is a mixture of balancing these extremes, and these direct observations are also presented in this section.

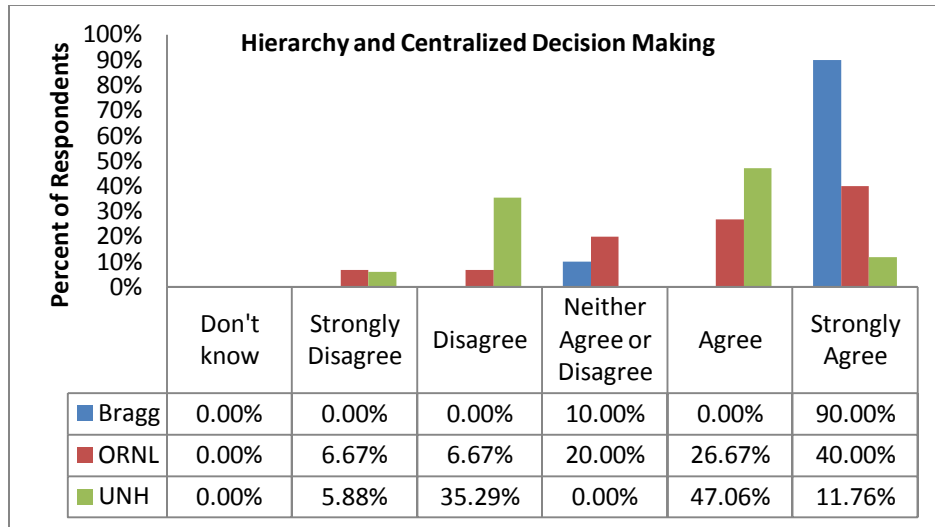
<b>Table 16. Characteristics of a Bureaucratic Organization</b>
Hierarchy of authority Highly concentrated/centralized decision-making Segmentation of duties by fixed job descriptions Functional specialization Highly formalized

<sup>21</sup> Likert scales are commonly used in questionnaires measuring attitude, knowledge, personality traits, abilities and educational attainment. Likert scales allow respondents to specify intensity of feelings for a specific item by indicating their level of agreement or disagreement on a symmetric agree-disagree scale. Data is then measureable on a interval basis.

<b>Table 17. Code Sheet for Organizational Characteristics</b>					
<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
I don't know	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree

<b>Table 18. Statements for Collecting Responses for Organizational Characteristics</b>
This organization has a strictly defined hierarchy for decision-making with major decisions made by senior staff.
My position has a several specific responsibilities, under which I have a high level of autonomy for getting the work done.
I typically interact only with people within my discipline or functional area.
I often work across disciplines or functions to get tasks accomplished.
There are strictly defined roles and responsibilities governing my workplace.

As described in Chapter 3, one of the characteristics of a bureaucratic organization is a hierarchy of authority with concentrated decision making (major decisions made by a small number of individuals). Decision-making at lower levels is limited to routine and well-defined activities only. The extent to which participants in each case study agreed that there was a strictly defined hierarchy at their organizations with major decisions made by senior personnel varied across the cases (Figure 11). Respondents from Fort Bragg strongly agreed (average of 4.80) with the statement, while respondents from ORNL agreed (average of 3.87) and those from UNH were fairly evenly split with almost equal number agreeing and disagreeing (average of 3.24).



**Figure 11. Hierarchy and Centralized Decision Making**

Comments from participants of all three organizations were very similar and reinforced that major decisions are made higher in the organizations, but not in isolation from the input of lower level personnel. This is the first of many data points that demonstrates the tension between bureaucratic characteristics and organic/learning characteristics as expected within these organizations -- *especially* within the office that has specific responsibility for sustainability implementation.

Yeah, you know ultimately funding comes from senior staff and so they're engaged in the process, but I do feel like they do a very good job of utilizing our feedback in order to make those decisions, so I don't feel like they're making them completely isolated from us.

The decision may be signed off on by a senior manager, but the decision-making ability is a result of the input that's received from the staff.

We try to push the decision making down to the lower levels. You know there are always some decisions that need to be made at the highest level, but not most.

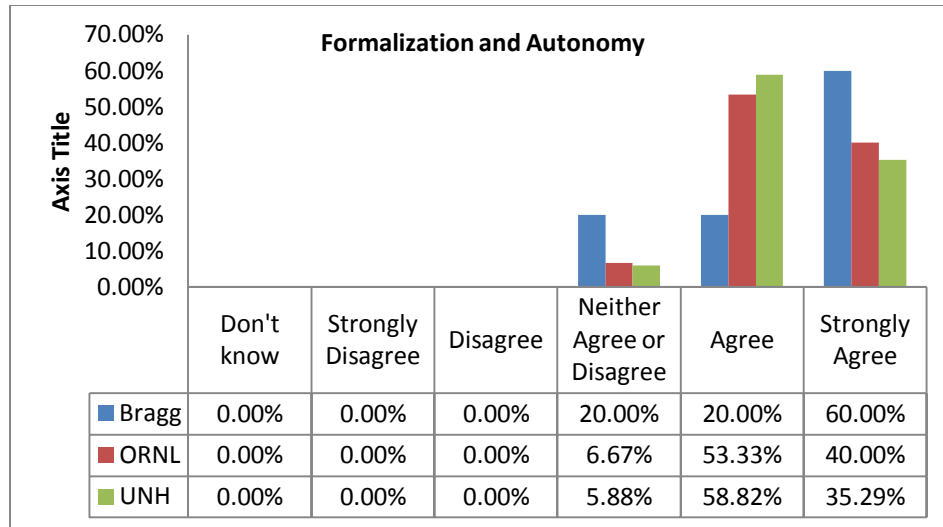
I agree and disagree, because in some situations there is a strict hierarchy, some situations there isn't.

No, I mean the decisions by senior staff aren't made in a stove pipe, I mean they get input from everybody from the janitors to... I mean from the subject matter

experts they get the input; it's not like they do it behind closed doors. They're very engaging, they have open forums for staff. ...you can send [leadership] questions and he personally responds, but we are structurally organized where big decisions are made at the top.

Respondents that commented generally feel empowered to make decisions within their area of responsibility and that their input is valued and taken into consideration. Another commented: "Getting the work done doesn't necessarily mean making decisions." This comment shows again, how many day-to-day, routine activities are the responsibility of the staff and they do not need to consult with higher-ups to make these types of decisions. The UNH structure is more decentralized than the others, as described in the previous chapter -- there is significant autonomy granted to the various colleges and institutes. This helps explain the neutral overall response on hierarchy and centralized decision making as major decisions are done at the college- and institute-level.

In order to further explore the decision making and formalization characteristics, interview subjects were asked to agree or disagree with a statement that indicated their position has several specific responsibilities under which they have a high level of autonomy to get things done. Agreement shows how decision making within certain parameters is allowed, but also that the position is well-defined and formalized. Overall, respondents all agreed or strongly agreed with this statement, as consistent with formalization and decentralized decision making in bureaucratic organizations (Figure 12).



**Figure 12. Formalization and Autonomy**

Interview subjects that commented on autonomy feel empowered to make certain decisions, but they must balance this with an accountability to their leadership. They feel the overall direction of the organization is established by leadership and accountability up the chain is a very real aspect of what they do. As noted by one participant: "I think it's more of because any decision I make impacts others that I have to get either approval or buy-in from either a lateral or higher, or that I fear for my life, so I better ask." The interview subjects also feel specifically that their *roles in sustainability* were part of the reason they are empowered.

Well, it's just I have autonomy to kind of in my... I'm sort of almost unique in the [sustainability] planners that I don't have a lot of oversight on me. Now, can I get, can I accomplish a lot without having to go get – probably not. So I am the master of my destiny; however, I'm still not allowed to do anything. I still work in a bureaucracy.

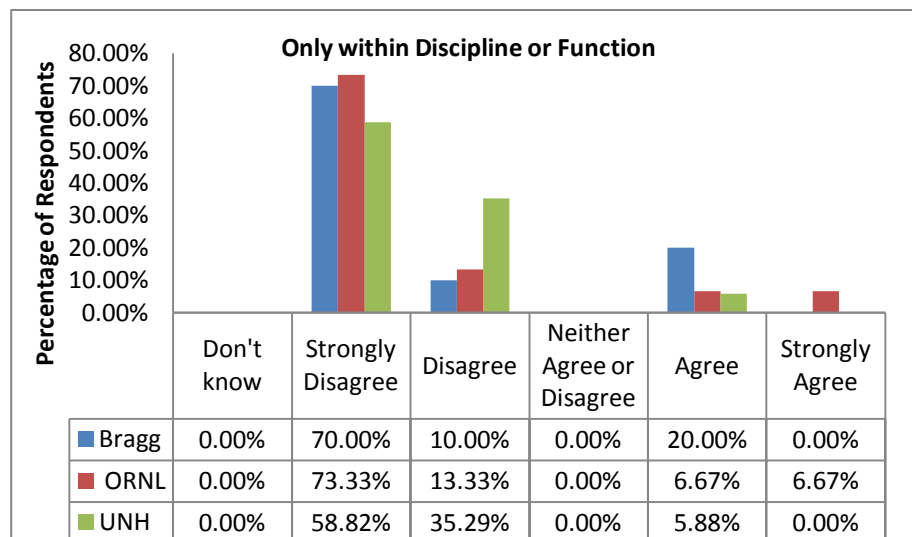
Everybody's accountable to somebody, so it's hard, but I would agree, but they need... There are big goals; there are big initiatives. There is a direction that we're headed in, and within that I think I have a lot of autonomy.

So, it's the fiscal side which is where the upper management has the most influence on that, but again they've been great as far as if I want to pursue third

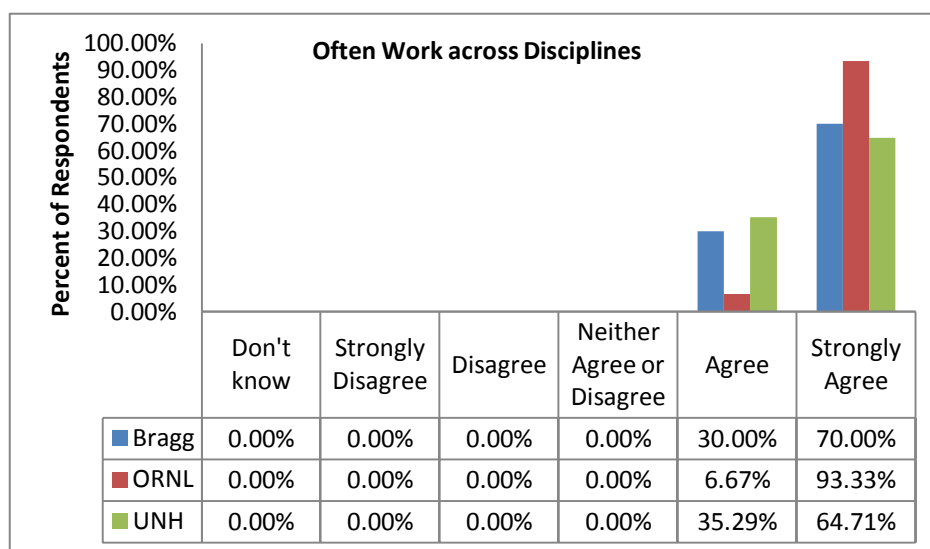


party financing or leasing or those kinds of things I'm always free to bring back additional options for them to consider.

Another significant characteristic of bureaucratic organizations is functional specialization and segmentation of duties by job description. These areas were evaluated with two statements that had opposite wording. The first stated that individuals only work with people *within* their discipline or functional area, and the second indicated that individuals often work *across* disciplines or functions to get tasks accomplished. The level of agreement and disagreement for these statements was very consistent across the case studies -- nearly all participants feel they regularly work across functional areas and disciplines to get their jobs done. Figures 13 and 14 show the responses to these statements.



**Figure 13. Only within Discipline or Function**



**Figure 14. Often Work Across Disciplines**

At first these responses appear to be inconsistent with the expected bureaucratic characteristics of functional specialization and segmentation. But, this can be explained if one views this at the level of the entire organization. The organizational charts confirm all three case studies are divided by function and that individuals within functional areas are specialized in these areas. Based on their comments, it appears that interview subjects interpreted this statement in the context of their particular directorate and their roles in sustainability implementation, and not according to the overall organization. Within their functional areas (Directorate of Public Works, Facilities and Operations Directorate, or the Finance and Administration branch), they do interact with others to accomplish their tasks. As one participant noted: "I mean I interface with a lot of people because of the nature of my job. Just the nature of my job is understanding the research as well as the infrastructure. I've just got to talk with everybody." But, few commented specifically on crossing the divide between core mission and support functions. Comments indicate that working across functions is mostly due to the nature of their work as project managers, facility operators and environmental planners.

I mean the example there is that energy use covers everything, so I'll be interacting with people from students up to faculty, and then on the operational side people from, like you said before, housekeepers up to, you know, VPs of operations and things like that, so... Which I like; I like the ability that I kind of get to get into everybody's business, but so that's why that is.

There is also a sense that they were pushing boundaries with their interactions: "...it's just that you can't do anything in a vacuum here, and you know I don't operate that way anyway, so the heck with everybody." Another commented: "Pretty much everybody's empowered to jump into any other things. So if they stay in their lane, it's only because they feel comfort in staying in their lane. But there's plenty of opportunity to cross-pollinate." These comments show how a certain amount of personal initiative is needed to go against the predominant culture. There are not constraints in the organization per se, but there is a culture of staying in your lane.

Another interesting aspect of these interview questions on cross-functional interaction is the clear influence of sustainability. Participants often commented that it is because of the nature of sustainability that they work across disciplines and functions -- specifically in their roles as change agents and on cross-functional teams, agreeing that it was unique to sustainability.

We're change agents. So for change agents, we interact with our functional area. But for us to effect change, we have to be out interacting with people that are not in our functional areas.

I mean with the teams that I work with, my teams that I work with are really cross-sectional of the organization so some of these people have no idea what sustainability was when they started. Then in my working groups, they're very specific. My working groups deal with plumbing, HVAC and electric, so these people, they're very specific on what they want to do. They're not looking at sustainability necessarily, but they know what they want efficiency. They know the efficiency that they want so, yeah, it's a very cross-functional group that I work with.

And that was one of the fun things about sustainable campus is that I got to interact with people that I didn't even know existed, and you know when you've worked at a place for 18 years you think you kind of know the environmental

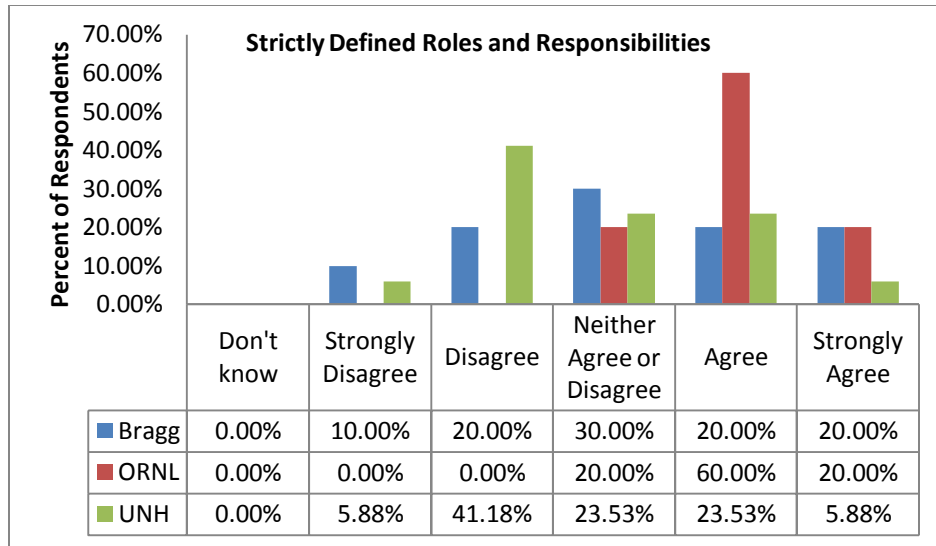
universe, and then you get to be a participant in a group like this and you find out that there's way more people out there that are doing fun stuff. So, it's a treat to be in sustainable campus.

Yeah, basically my job description is the opposite of that; I mean I'm supposed to try to interact with as wide of variety of different people as I possibly can to, you know, push the sustainability goals.

Again, we're very cross-pollinated here...and I think that's part of what the sustainability effort has brought us. These taskforces and sustainability groups you will be in a room with people from all disciplines across campus, and I think that's really a strength of what we do here...

Based on these comments expressed through these two questions on interaction, it is clear that sustainability programs have enhanced cross-functional interaction at these organizations, but that a certain level of interaction also occurs as part of normal operations for these particular individuals.

The last organizational characteristic to be evaluated was based on the bureaucratic characteristic of formalization with workplace rules, roles and responsibilities strictly defined. Participants were asked to agree or disagree specifically that there were strictly defined roles and responsibilities governing their workplace. There are a range of responses here, with most of the respondents at ORNL agreeing (average score of 4.00) that they have a strictly defined (formalized) workplace; while participants at Fort Bragg and UNH varied such that, on average they didn't agree or disagree (Fort Bragg average of 3.20 and UNH average of 2.82). Figure 15 depicts the variation in study participants perspective of formalization.



**Figure 15. Strictly Defined Roles and Responsibilities**

Participant's difficulty in agreeing or disagreeing with this statement is reflected in some of their comments, which show that formality has a place and a purpose, but they are able to work around it, if needed. Many of these responses are indicative of bureaucratic culture, as well as the structure. There are not so many rules that individuals are restricted in work activities, but it does take a certain amount of individual motivation (and a certain type of individual) to take advantage of opportunities in a culture that tends to use the rules to stay in lanes and reduce risk. "It – I mean, that's kind of true, but it kind – but there's just ways around it too. So I'll put it this way. If you wanted that to be true, it could be." Respondents feel there is a need for rules, but that they have the ability to question these or work around them if needed. Generally, they feel this not just for themselves, but the organization as a whole -- when it comes to strictly defined roles and responsibilities a subject commented: "Yeah, I'm afraid if there are, nobody pays attention to them." Interview comments related to roles and responsibilities demonstrate the tension sustainability practitioners experience as they strive to be change agents in a culture resistant to change.

They're not strict. There's things I need to do like objectives or pushing that folder in one direction. But they're not strict. Going back to that flexibility – the goal may change. And we have to be able to react.

I have some rules and definitions, but also the ability to do my own thing.

Yes, there's a definite hierarchy on how things are done, but if I can state my point on what I want to do, I think everybody is receptive of that and if they, even if it's a little bit of the outside, they may say, you know what? Why don't you try that? So I think that leeway is there.

I agree that there are defined roles and responsibilities, but I wouldn't say that they're... Again, we have... I feel like we have a lot of room to try to, you know, to make decisions and manage our roles and responsibilities; it's not, you know, so cut and dry that we are in a box, if that makes sense. Yeah, I don't know if I rated that right, but... And I think it's important there are roles and responsibilities... It's not a box.

I'd say agree, they're certainly strictly defined, although they're squishy around the edges when it's important for the organization to be able to, you know, sometimes just bring one back and it's neither black nor white; it's some shade of grey. So, you certainly don't want to crawl out on that limb by yourself; you want to make sure that you've had that discussion with the right folks.

There are systems, you know, but then you have the real versus ideal, you know, and so of course they're in place, how much they influence anyone day-to-day is another matter, but yeah systems are in place, but not for every aspect of the...or maybe they are I just don't know. I'd say that would be an agree; I agree there's some assistance, but that doesn't mean it's universal and it doesn't mean that the system dictates actual behavior.


I have quite a bit of freedom to operate as I need to, but certainly there are boundaries and guidelines to follow

...we're pretty informal. I think people in general would know that there are certain human resources and other policies you follow, but at the same time we're very decentralized, and as a result each office or department sometimes has its own set of guidelines, rules that they follow that other departments don't, and it makes it sometimes a little confusing.

The overall results from the organizational characteristics questions and the other data sources provide evidence that a bureaucratic work environment exists at each of the case studies (Table 19). These results are based both on the interview responses and other literature reviewed

(such as organizational charts). Responses indicate that ORNL had the strongest evidence of a bureaucratic characteristics, followed by Fort Bragg, with UNH showing the least evidence. Comments from the participants show that, even though their organization is bureaucratic -- in particular with reporting chains, segmentation by job function, and strictly defined roles and responsibilities -- they have ways of working within and around some of these attributes to get their jobs done, they feel empowered to affect decision-making, and they understand the unique requirements of sustainability. In particular, they feel they commonly worked across functional divides to get their jobs done -- especially to implement sustainability.

**Table 19. Evidence to Support Presence of Bureaucratic Organizational Characteristics**

Bureaucratic Characteristic			
	ORNL	Fort Bragg	UNH
Hierarchy of authority	++	++	+
Highly concentrated/centralized decision-making	+	+	+
Segmentation of duties by fixed job descriptions	+	+	+
Functional specialization	++	++	++
Highly formalized	++	+	+

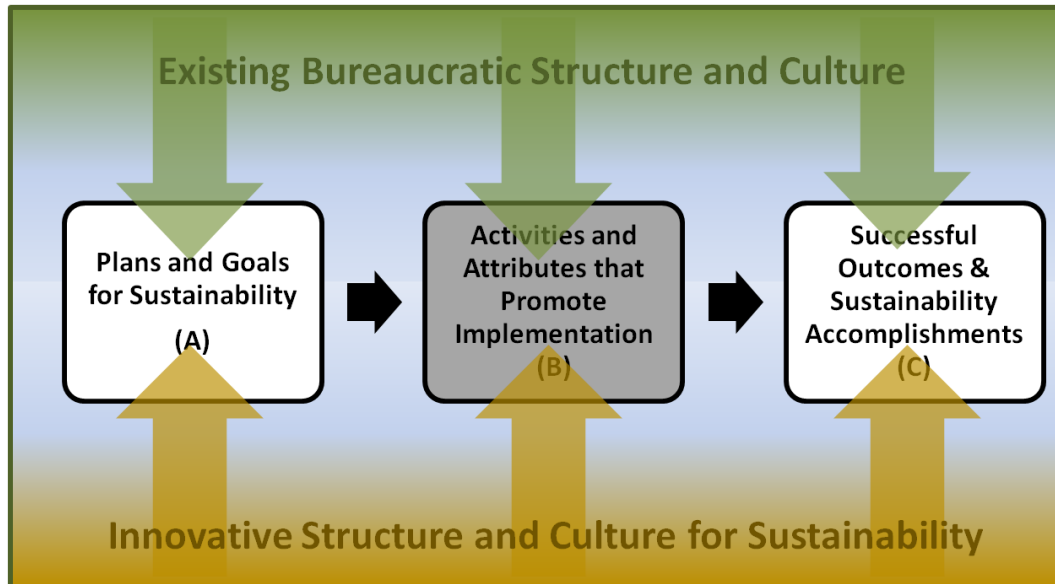
\* key: **O** = Little to no support  
 + = Some support  
 ++ = Strong support

## **CHAPTER 6**

### **ACTIVITIES AND ATTRIBUTES**

This chapter presents the significant results and findings associated with the research question: *Are attributes and activities that enable innovation present?* As predicted by contingency theory, the case study organizations will begin with setting plans and goals for sustainability (A), which then require changes in organizational activities and attributes (B) in order to ensure successful achievement of these goals (C). Chapter 3 outlined the attributes and activities that should be present in an organization that successfully implements a sustainability program, based on the literature. In this research, it is expected that sustainability requires large public organizations to adopt characteristics that are at odds with their fundamentally bureaucratic nature. The previous chapter outlined how each case study established sustainability goals for itself and presented results that confirm the bureaucratic characteristics of each of the case studies. It also showed sustainability practitioners feel a certain level of empowerment to try new things and to work across functional divides, indicating the presence of less bureaucratic characteristics. This chapter reviews results associated with the other expected activities and attributes that should be overlain on the bureaucratic (Box B in Figure 16). Data collected should reveal similar tensions between the two modes of organizing, as was evident in the results presented in the previous chapter.





**Figure 16. Activities and Attributes that Promote Implementation**

## 6.1 Orientation to the External Environment

The presence of expected attributes and activities that contribute to sustainability success was primarily determined by questions in the interview protocol and comments made by interview subjects. It was substantiated with case study information on the teams, task forces, and other aspects of the sustainability programs, described in the previous chapter. The interview subjects were given a series of statements to agree or disagree with that explored the extent to which certain expected attributes and activities existed at their organizations. These statements were focused on activities and attributes associated with sustainability. Thus the answers may or may not represent the organization as a whole. The Code Sheet used for Activities and Attributes is given in Table 20. As described in Chapter 3, the statements dealt with four major areas: *Orientation to the External Environment*, *Supportive Leadership* and

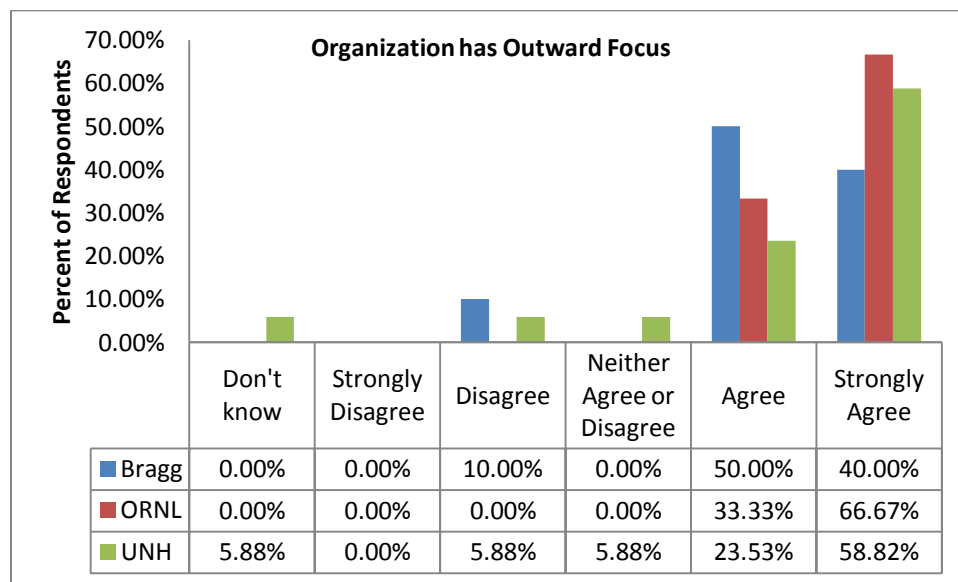
*Culture, Effective Internal Management Systems, and Supportive Internal Structure.* Results from *Orientation to the External Environment* are summarized first, and the statements used in the Interview Protocol for this area are shown in Table 21.

<b>Table 20. Code Sheet for Sustainability Activities and Attributes</b>					
<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
I don't know	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree

<b>Table 21. Statements for Orientation to the External Environment</b>
This organization has outward focus
Our sustainability effort is motivated by external drivers/context
This organization seeks outside partners for support of sustainability effort, to include financial support
This organization seeks support for its sustainability efforts through external regulations, policies, guidance, etc., including from higher headquarters (parent organization)
This organization seeks to influence suppliers and customers toward sustainable practices

The extent to which organizations are oriented to the external environment has several components. The first is its outward focus. An outward focus is evident if the organization participates in external events, engages with professional societies focused on sustainability, and publicizes their sustainability metrics. Responses across all case studies consistently agreed that their organizations have an outward focus on their sustainability efforts (Figure 17). As shown in Chapter 5, most of the individuals that implement sustainability have advanced degrees and are engineers or environmental planners. As a result, interview comments frequently mentioned participation in professional organizations and societies -- both related to their area of expertise and also specifically focused on sustainability. Each case study has a website for their program

and they frequently share results of their efforts with the external public through these and by participation in conferences. ORNL has newsletters each month posted to their website. Other comments indicated that visitors and researchers interested in sustainability were welcome and common at the sites. Fort Bragg's efforts with an external nonprofit demonstrate its efforts to actively engage with the surrounding community, and ORNL interview subjects also stressed how this is important. The UNH is involved with several external organizations focused on climate change and sustainability, and annually submits information on its sustainability efforts to the Advancement of Sustainability in Higher Education.



**Figure 17. Organization has Outward Focus**

The second statement explored how much the interview subjects agree that their sustainability effort is motivated by external drivers or the external context. These responses (Figure 18) also reveal something about the extent to which these organizations are responding to external drivers, as would be consistent with contingency theory and boundary spanning. Overall, respondents had a wide range of responses. On average, these responses come out

neutral, neither agreeing nor disagreeing, with Fort Bragg's average of 3.20, ORNL at 3.13, and the UNH average score is 2.71. The comments support this neutral stance, as many participants feel the sustainability efforts are motivated by a combination of internal and external drivers, with internal often being expressed as more significant. Generally, the external drivers are related to mandates from higher headquarters or legal drivers, and the internal drivers are related to reputation, long-term mission success and doing the right thing. Fort Bragg and ORNL, as part of the federal government, are affected by Executive Orders and other regulations, which are translated through their higher headquarters to the sites with specific requirements. But, both Fort Bragg and ORNL feel their sustainability efforts pre-dated these drivers and they now use these to help keep their programs viable.

Well, sustainability and what we're doing is basically mandated from Congress and the President, or Army Chief of Staff, or Department of Defense, or whoever, we're a function of the federal government so it's external - we react. I will say that there has been some independent - in the Army lingo I guess you would say movement from the "boots on the ground" - otherwise grass roots development here at Fort Bragg that has been pushing up as opposed to it normally being pushed down.

...I mean I don't know what all external drivers that make regulations, or prices, or whatever, some other... Yeah, I mean we're more driven by DOE executive orders. So, part of it is just the will to want because we know it's the right thing, and then yeah there's now... And we initially started heavy focus on the sustainability efforts in early 2000, so it was prior to the executive orders, and now executive orders come through to help us kind of set goals, so they set the goals for us, so those little stuff will, and now mandates.

Initially we had a sustainability program that was I'd say leading the industry, and then when the Obama administration came in they put in a whole bunch of executive orders which mirrored what we were doing, which was good because it, I mean we had much of it done, but with tight budgets we prioritize so that we meet those executive orders rather than, and it's changed our priority structure, so OK. So, I preferred it the way before when we were doing it because it was the right thing to do, and being in the lead.

It started with internal drivers, but with the Executive Order and the other stuff, and there are other kinds of guidance, and rules, and orders that we have to

follow, so that fed into the initiative, but the initial Sustainable Campus Initiative was an internal ground-up thing, now there is some responsiveness - has to be- to external directives like the executive order, so it's both, and it's not neither; it's both.

These organizations are motivated to be leaders amongst their peers, support their mission, and do the right thing. This is consistent with observations in the literature that large public organizations with stable missions do not tend to be as responsive to external influences. They are shielded, somewhat, from external effects. But, these organizations are also sensitive to market prices and reputation (in comparison to their peers) -- specifically in relationship to sustainability. Their adoption of sustainability due to external drivers is consistent with this sensitivity and with contingency theory. For these organizations, it appears sustainability must have both internal and external drivers to have continued traction -- additional evidence of the duality and tension between the organizational types, as expected.

I mean, that -- we always -- well, I mean, we are that; and we internally motivate ourselves. We have our own Garrison Goal #1 is really kind of our own personal driver for our sustainability team, which is the -- I would say almost -- we -- well, I mean, and there's a mix, and probably an equal mix of internal and external. We always look for a legal driver.

I guess there's some external factors such as cost of goods and security of goods. It could drive those. It's about conserving resources. It's about conserving training lands and preserving those, supporting and implementing sustainable practices that will ensure that the mission can go on at any point and remain responsive. I would say that's more of an internal. And there's also external factors like laws that guide our program.

We obviously have external drivers that are doing that but I think that as an organization in total, I think that we know that it is the right thing to do and the smart way to go. I think that is what motivates us.

You know, certainly yeah, I mean we have external drivers that we're trying to meet. Do I think that's our primary motivation? No.

I think we want to do the right thing. Now, are we smart enough to capitalize on the fact that we're doing the right thing? Yes, we want DOE to know that we are trying to be the best possible contractor facility that we possibly can, so if we do

something right yes we're going to tell people that we do it, but I think the motivation is because we genuinely want to do the right thing.

I think it's more us... I think it's motivated by wanting to do the right thing. I'm sure that is probably 75% of it, but you know, well it probably wouldn't be that strong, but I've always felt that we try to do the right thing here.

No, I mean we are trying to maintain ORNL as a leader in sustainability, so our number one is ourselves; it's looking inside and how can we... We've already set ourselves up we think as a leader across other DOE labs and in the region, you know we have the largest LEED certified campus in the state of Tennessee. We want to maintain that leadership role for us, and so the other external drivers aren't the primary focus for us. They are drivers but not primary.

The UNH does not have the external influences of a higher headquarters that Fort Bragg and ORNL have, nor is this institution affected by federal sustainability orders and regulations targeting federal agencies. This organization is more driven by the interests and desires of its faculty and students, and the desire to lead amongst its peers. Accordingly, it had the lowest score for influence of external drivers. This also corresponds to the academic origins of the Sustainability Institute and its closer ties to the core mission of the organization. That said, the high cost of energy was mentioned as an important external driver and sensitivity to its peer institutions also shows an external focus. This organization shows a mixture of influences as similar to the other organizations.

Well, I think you have personalities within our institution that do a lot on their own, you know, and I think that it's really driven by a lot of factors, you know, it's not just external or somebody saying we want to be this way; there's a lot of reasons why.

We use our sustainability record to proclaim ourselves to the outside world, so you know that's not the primary driver; the primary driver is internal, but we do communicate to the world and use it to recruit students and recruit faculty and staff.

No, it's internally motivated. Well, I don't know, I would say it's internally driven. Yeah, the external driver would be a lot of our energy efficiency came from economic imperative, because our electric rates are amongst the highest in

the country, and that set the stage for a lot of the other stuff, but I think we're mostly internally driven.

I think it's very much internal to the sustainability leadership and I don't think it's as much driven by the outside. I think we like that piece of it, but I think it's definitely they want to be successful on the inside.

I think it's internal, it's again that's our mission. We had viewed that as part of our core educational mission and as an internal driver. In fact, I think some of the externals are sometimes attention pushing against it, especially in this economic and political climate.

I think if there wasn't a sustainability movement externally, I think we'd still be doing it. I think the people that ran this organization 50 years ago were looking at it. They didn't call it sustainability, they didn't know it as sustainability, but they knew it as stewardship. You have limited resources, how do you make them last? Yankee frugality, I've heard that word a couple of times.

Some of the UNH respondents also describe the nature of the sustainability drivers as reflective of where the individual's sit in the organization as to what their primary drivers are generally. Thus, their motivation for sustainability tends to support drivers that are more relevant to their position/function.

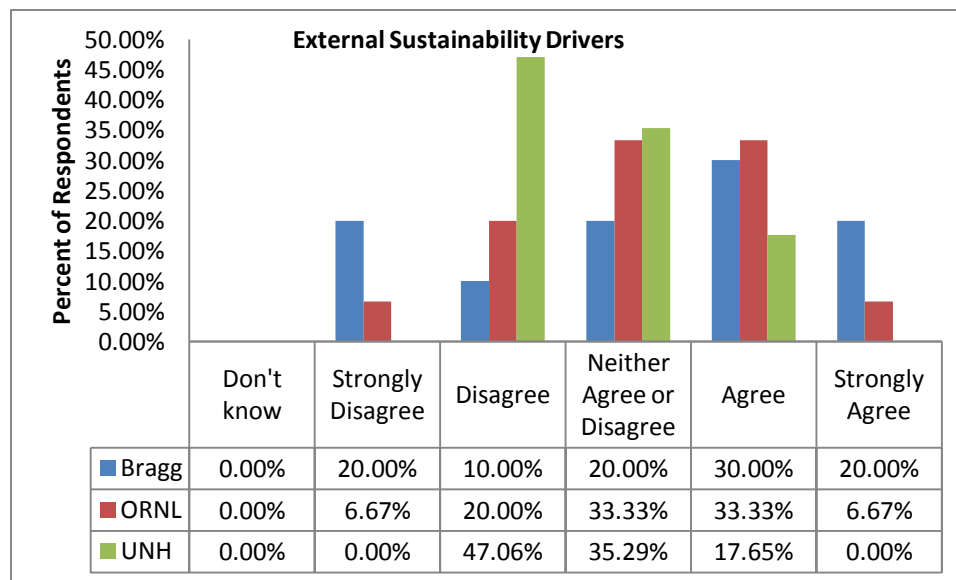
Again, I think that gets down into the structure of the organization, so I think that maybe my opinion is that, you know, again groups like the Sustainability Office might be more driven by, you know, how they compare to peers and all these types of ratings that they need to do. I'd say that our office of utilities and energy, you know, maybe were more driven by what we think we can achieve, and you know the greater goal of overall energy production and things like that. I mean that's an external factor to some extent, but I think that it's not like we're doing it for...

Yeah, I'd say it's not that we're doing it because we're being required to do or adhere to meet some threshold of some metric that says that you need to reduce this by this amount. I would say there's a combination. I think there are some that are entirely motivated externally, and I think there are some that are entirely motivated altruistically, which I could call internally. So, there are some that are reacting. I think at the facilities level there's a lot that's a reaction, but it's... But I think there is a recognition of both the sustainability benefits, but as well as the business side to sustainability.

I mean for the most part it's about recruiting students and doing research. I mean I think the only caveats I would say are in the facilities operation world they're

very focused on sort of cost savings and just maintaining the integrity of their organization. So, I think that one area out of the academics planning... Yeah, planning, but there's such a difference in even talking about operations there's such a difference between planning, design, and construction, and operations, so...

Also, it is clear in all cases that the proponents for sustainability will use whatever drivers they can to help support the program and its efforts. For example, if there is an external driver, such as an Executive Order, that helps support their initiative, then they will call attention to that.



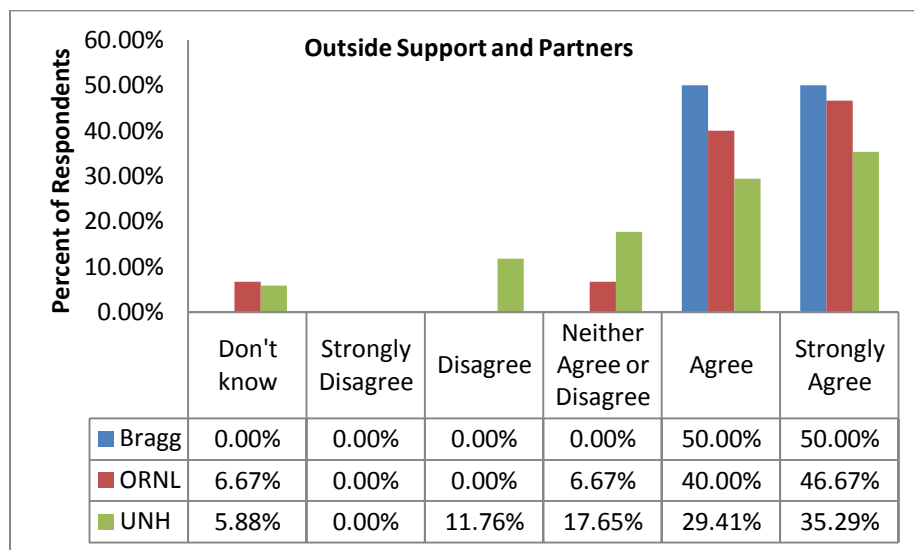
**Figure 18. External Sustainability Drivers**

Interview subjects were asked to agree or disagree that their organization seeks outside partners for support of their sustainability efforts, to include financial support, as further evidence of an orientation to the external environment. Responses across all three cases show interview subjects agreed or strongly agreed with this statement (Figure 19). A common method of funding large energy projects is with long-term energy agreements, such as an Energy Savings Performance Contract. These contracts are designed to shift the burden of financing large



projects to private entities, which then get a portion of the energy savings over time.

Cooperative arrangements such as this were described by study participants as critical for getting large-scale energy efforts funded. A variety of other sources, such as grants, were also noted.



**Figure 19. Outside Support and Partners**

A statement was prepared to help understand the extent to which the case study organizations reach out to change policies, regulations, or guidance that may be negatively affecting their efforts. Interview subjects were asked to agree or disagree with the statement: This organization lobbies for supportive external regulations, policies, guidance, etc., including from higher headquarters (Figure 20). Each of the case study organizations are influenced by a higher headquarters to a certain extent. Fort Bragg, as part of the U.S. Army; ORNL as part of the Department of Energy; and UNH as part of the University System of New Hampshire. Overall, the answers reflect the extent to which the 'parent' organization has influence on the organization's activities. For the military, much of what happens on an Army installation in the form of building construction, procurement, and management is dictated by standard regulations

applicable to all Army installations. As a result, the responses from Fort Bragg participants indicate they had to reach out to change and influence these standards on many occasions, some fairly significant and having repercussions throughout the Army. The average score for the interview subjects from Fort Bragg was 4.22, agreeing that they seek to influence outside policy that affects their sustainability program. A particular example was described by an interview subject:

We're the – we were the burr under the saddle. We were the ones that, when the Army first put out the MILCON Transformation Guidelines....We jumped right in and go, "Whoa, whoa, that's all well and good. But you're walking all over these other things that we're trying to do in terms of sustainability." So we got an audience, if you will, with Mr. MILCON Sustainability, which was the senior colonel in ACSIM, or the Assistant Chief of Staff of the Army for Installation Management up in Washington. There was a group of about four of us that went up there to see him and his staff. We said, "Sir, this is just" – we actually called him out on it. They changed it. Over the next year or so – 18 months – they actually changed MILCON transformation guidance...So we were able to beat, beat, beat, squawk, raise hell, provide proof, show them it wasn't more expensive, etc., etc. They finally backed off, and they created a thing called Chapter Six of the MILCON Transformation Guidelines...We were able to declare the sustainability things that were important to us. That was a major victory.

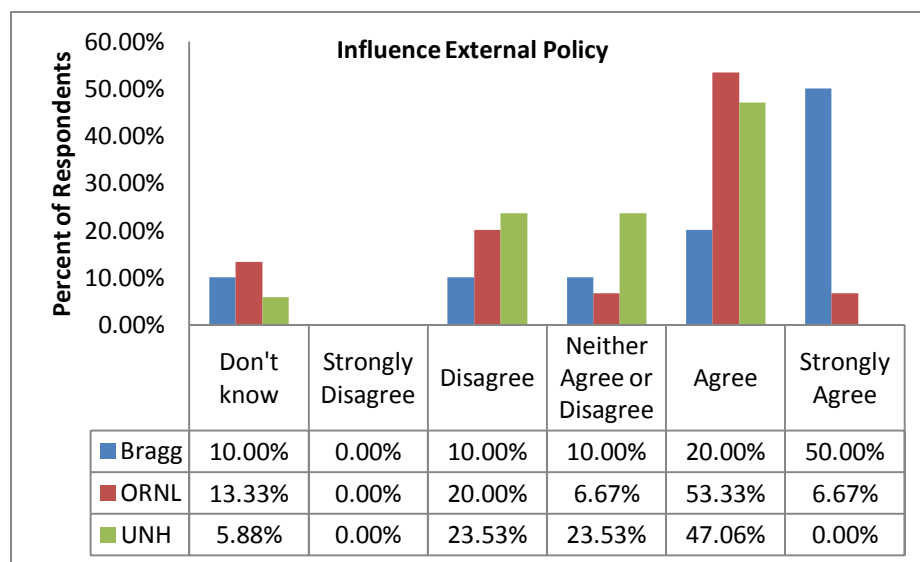
For ORNL, the DOE dictates some of their operating parameters, but impact on sustainability is mostly at a higher level -- such as the Executive Orders and Sustainability Performance Plans -- so the average response that these respondents gave was 3.54, not quite to agree, but on the positive side of neutral. ORNL subjects feel they seek to influence external policies, to a certain extent. Comments from ORNL indicate that support can be gained through partnerships, and that they do not have direct issues in conflict with their program.

...What we seek support in is not necessarily a new mandate or something like that, or a new policy, but more like more it would seek support in how we partner with, how we implement the policies and that sort of thing; more grassroots level than political level. How we're going to interpret the policies, so...not that we're trying to make, you know, trying to get political support to make change, to make

it easier for us or something like that, but maybe just in providing guidance to us to help us meet our goals.

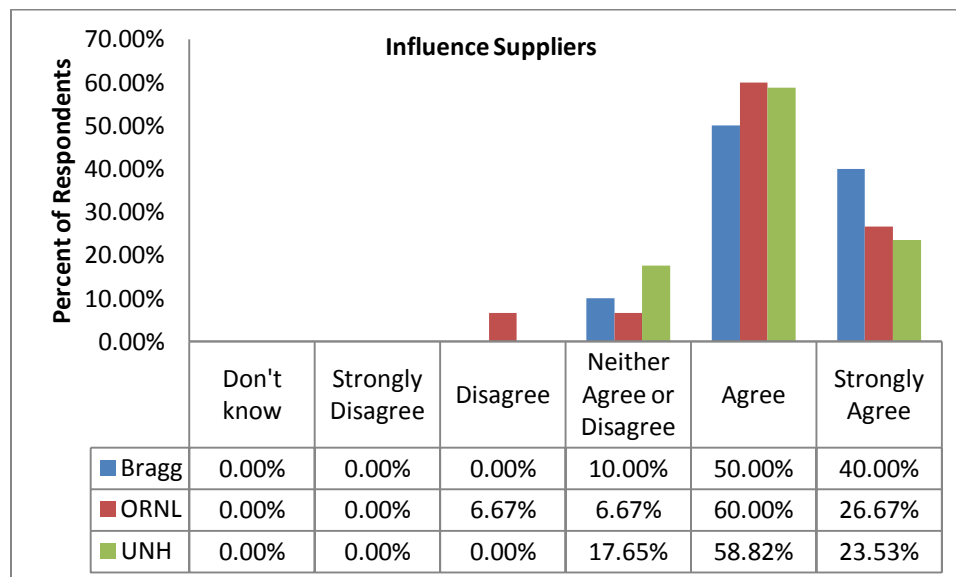
Based on the UNH average score, 3.25, and the comments given, this organization has the least external regulations and mandates impacting its sustainability efforts. They occasionally run into roadblocks, but tend to work within or around them, rather than aggressively attempt to change them. This can be seen in the following comment:

Sometimes it's, you know, it's something that we have to figure out, like when we were trying to figure out how to sell renewable energy credits from the landfill gas project we had to work with a lot of legislatures to figure out exactly how we could do that, and what was legal and not. When we were setting up the revolving loan fund, what we had really hoped to initially do was to borrow against our endowment and return to the endowment...The endowment was very excited about that, because we were sort of guaranteeing them a 10% return on investment, which is better than they are getting on the stock market, but that was not allowed under the University's charter or the State Constitution, so we have to kind of restructure how we were doing that.



**Figure 20. Influence External Policy**

The final statement evaluating *Orientation to the External Environment* focused on the extent to which these organizations seek to influence suppliers and customers toward sustainable practices. Responses are very consistent across the organizations with nearly all interview subjects agreeing or strongly agreeing with this statement (Figure 21). Although interview subjects agreed that they were attempting to influence suppliers, they often felt more could be done or that there were limits on what they could do. Their comments often reflect challenges they face significantly affecting suppliers. One area that seemed to be most positive is the affect sustainability has had on building design and construction -- with many comments focused on how architecture and engineering and construction companies have had to learn rapidly in order to meet the demands for more sustainable buildings by the case studies.



**Figure 21. Influence Suppliers**

The interview results (Table 22) clearly show that activities related to engaging with external stakeholders, professional organizations, peer institutions, parent organizations and suppliers is very common across the case study organizations. The organizations are equally

driven by external and internal influences. Overall, the results show evidence that these activities and attributes are important for sustainability implementation at these large public organizations.

<b>Table 22. Evidence to Support Organization's Orientation to the External Environment</b>			
<b>Orientation to External Environment</b>	<b>Evidence to support?*</b>		
	<b>Fort Bragg</b>	<b>ORNL</b>	<b>UNH</b>
Outward Focus	++	++	++
Motivated by External Drivers	+	+	+
Outside Partners and Support	++	++	++
External Policy and Guidance	++	+	<b>O</b>
Influence Suppliers and Customers	++	++	++

\* key: **O** = Little to no support  
 + = Some support  
 ++ = Strong support

## 6.2 Boundary Spanning

Proposition 1 guiding this research deals with orientation to the external environment. Activities conducted by organizations that focus on managing the external environmental are referred to as boundary spanning in organizational theory. Although this research did not focus on these activities from a boundary spanning perspective, the results from the interview questions related to orientation to the external environment provide interesting implications for how sustainability programs can be viewed as a boundary spanning activity. The interview subjects indicated agreement with most of the statements regarding orientation to the external environment. This can be explained as activities and attributes that support innovation but also as boundary spanning, as boundary spanning is defined as those activities that occur between

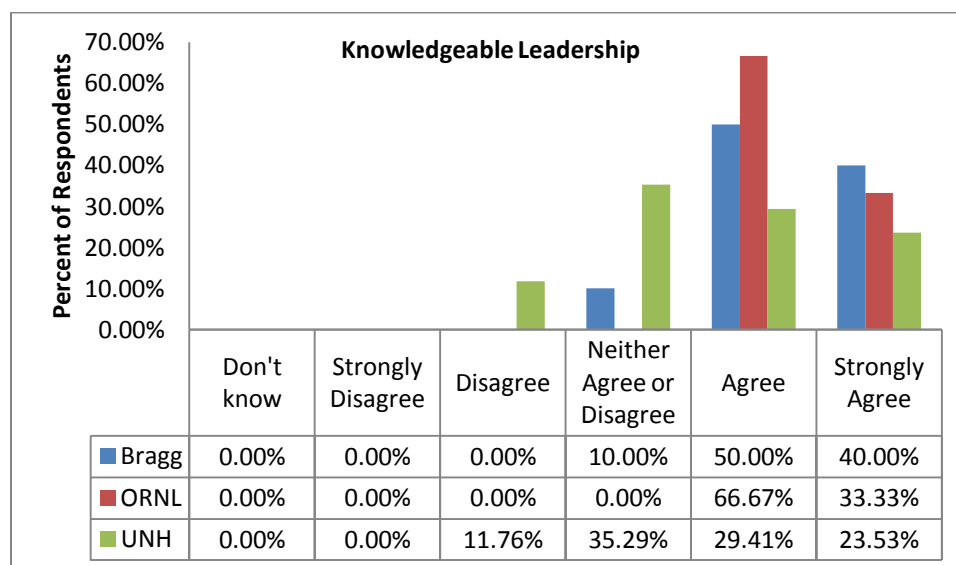
organizational member and members of the organization's external environment (Mezner & Nigh, 1995). The interview statements confirm the case study organizations undertake these activities and they appear to be doing so to increase the success of the sustainability program. The sustainability practitioners engage with external organizations and communicate with the general public about their efforts. They seek to influence external policy related to sustainability and influence suppliers to provide more sustainable products. The organizations are influenced by external drivers and the sustainability programs are a way to mitigate the effects of these drivers, such as the cost of energy, requirements of Executive Orders or mandates from higher headquarters. The extent to which these activities and attributes support theoretical propositions about organization's engagement in boundary spanning is an area in need of future theory development.

### **6.3 Supportive Leadership and Culture**

The second set of questions in the interview protocol focused on *Supportive Leadership and Culture* as an expected attribute that contributes to sustainability success. The interview subjects were given a series of statements to agree or disagree with that explored the extent to which certain expected attributes and activities existed at their organizations. The Code Sheet used for these Activities and Attributes is given in Table 20 (page 106). The statements used in the Interview Protocol for this area are shown in Table 23. These data are combined with other information from the case study reports (such as literature reviewed) to evaluate the extent to which these attributes are present. As before, the focus is on sustainability, and not the other areas of leadership within the organization.

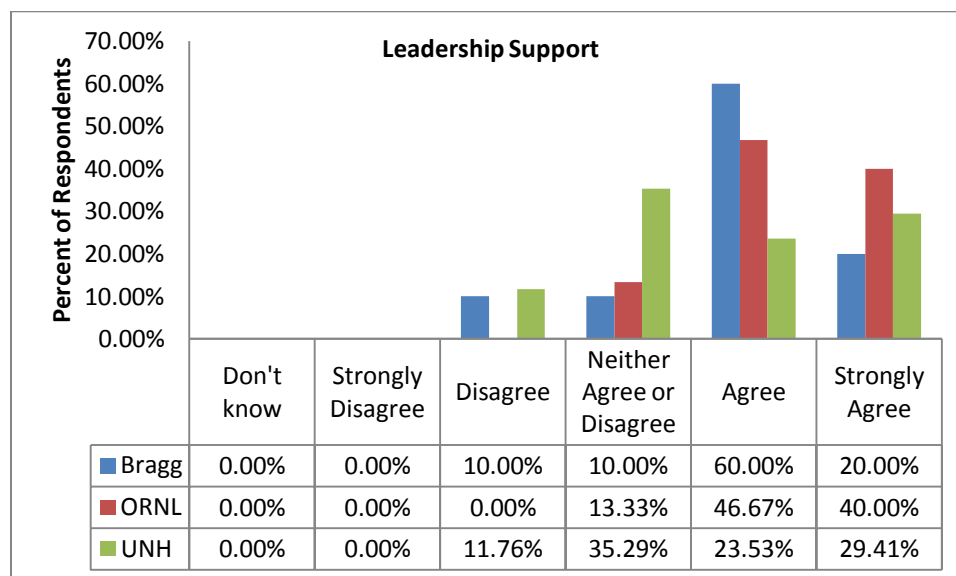
<b>Table 23. Statements for Supportive Leadership and Culture</b>
This organization has leaders that are knowledgeable about sustainability
Our leaders aggressively support the incorporation of the concept into the entire organization's operations
This organization has leaders that support a culture of innovation
This organization has a culture that supports and rewards innovation
This organization has a clearly articulated vision of sustainability which it tirelessly communicates

The first three questions relate specifically to leadership and the perceived support sustainability efforts have from leadership, including the level to which innovation is encouraged. When asked about the extent to which their leaders are knowledgeable about sustainability (Figure 22), Fort Bragg and ORNL agree that their leaders are knowledgeable (both averaging at 4.3). The UNH respondents are less convinced, with a more neutral score (average 3.65). A common observation across all the case studies is that not all levels of leadership are equally engaged or knowledgeable, but that enough leaders in critical places are.



**Figure 22. Knowledgeable Leadership**

Interview subjects were then asked to agree or disagree that their leadership has embraced sustainability through aggressively supporting the incorporation of the concept into the entire organization's operations. Overall, respondents from all three organizations agree with this statement (Figure 23), indicating the presence of positive support from their leadership, with ORNL's responses most positive (average 4.27) and UNH least (average 3.7). The interview comments reflect uneven leadership support, however, for some aspects of the organization, there is no engagement by leadership. All comments are consistent about leadership support from the facilities management (operations and support) part of the organization. This makes sense, as this is the division or directorate where most of the individuals with sustainability implementation roles are located in the organizational structure so they are more tuned into their direct line of leadership and less sure about the other leaders. UNH has the most dispersed leadership amongst its many academic units; the college dean is often the most relevant leader. This helps to explain the lower level of agreement from this organization.



**Figure 23. Leadership Support**

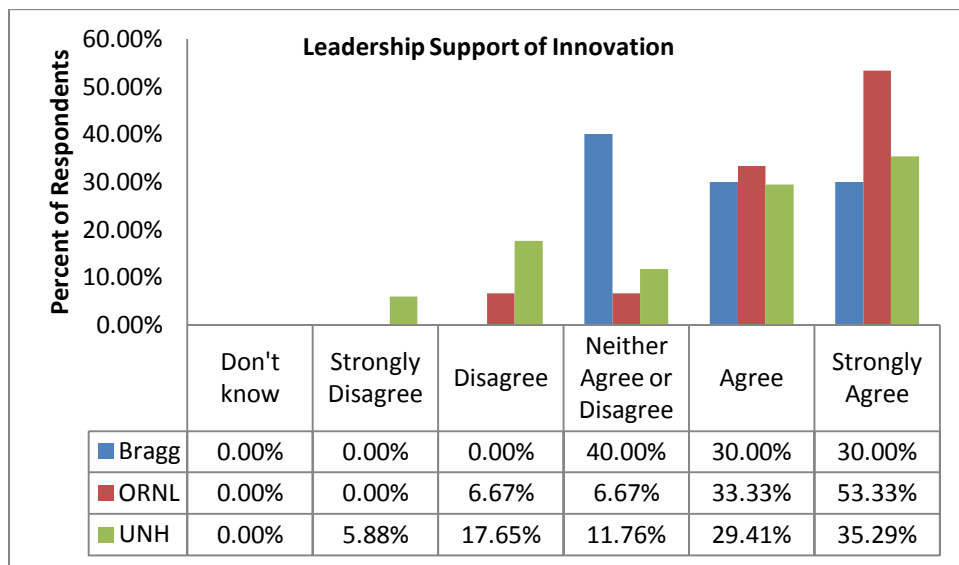


A statement was included to evaluate the extent to which leadership supports a culture of innovation through instituting reward and recognition programs, sharing power, sharing credit, or considering new ideas. Participants agree that a culture of innovation is supported by their leadership (Figure 24), with strongest level of agreement from ORNL (average 4.3) and lowest from UNH (average 3.7). As consistent with the other responses related to leadership, there are concerns about the uniformity of the leadership support across the organization. These comments also reveal much about the cautious nature of these organizations and the resistance to change that is predicted by the literature on large public organizations. This is evident from the following comment from Fort Bragg.

I think the innovation is important. But there's always a resistance to change. So I'd say a three on that one. I wouldn't rate it as high. The ear is open on those innovative ideas. But sustaining innovation is challenging especially when today's innovation may not be relevant tomorrow. So I think we're slower in approaching innovation until it's a proven practice. I think there is some innovative practice. But I wouldn't say that would be the thing that we would go for. Maybe in some cases, yes, but depending on what the innovation is, what other risks are associated with that. And the chain of liability with the government, it's cradle-to-grave. So there's a little bit more apprehension with, I would say, going full guns with innovation. I'll just say that we're not.

Even though an innovative culture is critical to the core mission of the ORNL as an organization (research in energy and materials), the facilities and operations side doesn't appear to have the same cultural support for innovation -- making it even more difficult to move forward with sustainability projects. The dichotomy between core function and support functions is even more evident here, as shown in the following comment. Yet this comment also highlights how important the bureaucratic characteristics can be, as well. As this interview subject states so clearly -- even with the downsides to bureaucracy, it does enable changes to be implemented that could not in more open work environments. A criticism is also a praise.

There are two different sides of the house; you've got the support side and you've got the R&D [research and development] side, and I can't speak for the R&D side, but for the support side I would tend to disagree; I would give it a two for the same reason – they tend to dictate how things are going to be. The decisions are made at a high level and you're kind of told how it's going to be. There isn't a lot of opportunity for new ideas, but at the same time they've got a good plan, they've done some great things, much more than anybody's previously done. So, again it's pluses and minuses. They've got a great plan; they've done things I wouldn't believe could be done, so before we had that more open environment they didn't accomplish near as much. That's right. So, things that are based on a criticism sometimes can actually be, you know, there's a benefit to it.



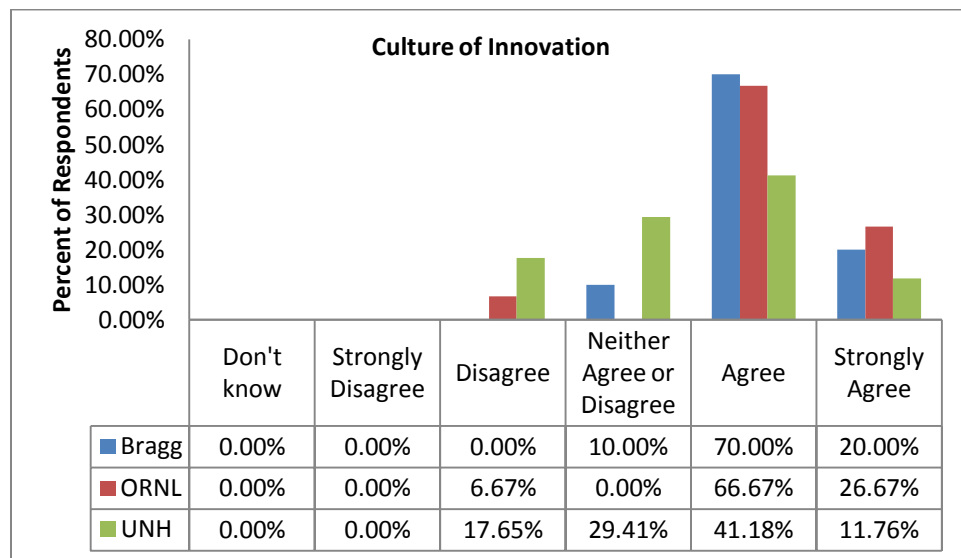
**Figure 24. Leadership Support of Innovation**

This duality between openness to ideas and ability to implement ideas is also evident from the UNH comments. UNH is the least bureaucratic of the three case studies, and seems to have the hardest time sustaining change efforts, as expected. What this interview subject describes is the flip side of the ORNL comment. At UNH all great ideas are welcome, but not all great ideas get implemented.

...They do; they do solicit ideas. They had a lot of public input when the whole university went through a strategic plan a couple years ago, lots of people's ideas evolved. What I'm not sure that they do is always implement them. But they're

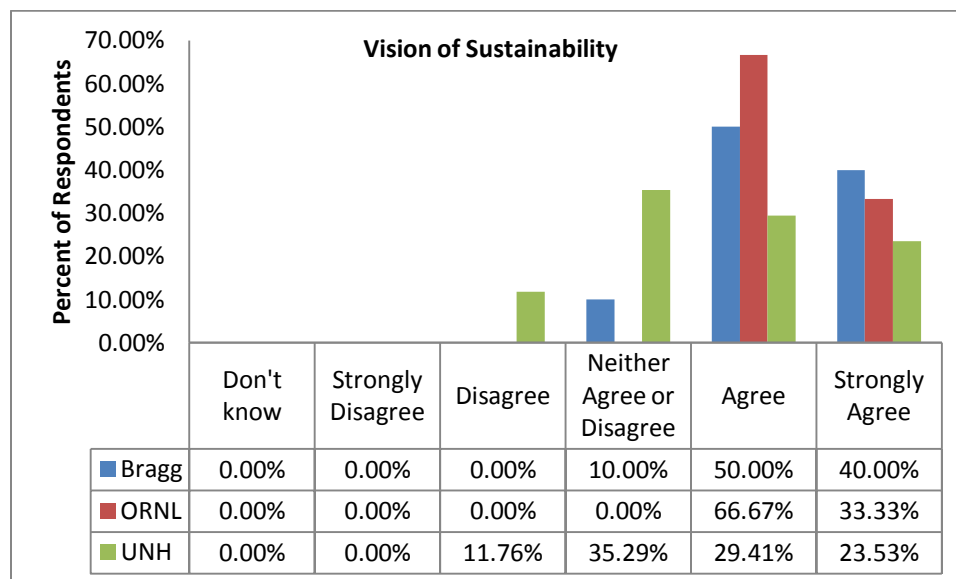
very open to hearing stuff. It's difficult when you have a large organization to get them, the whole organization, to embrace change; that's a challenge.

The remaining questions in the *Supportive Leadership and Culture* portion of the interview protocol focused on the overall culture and the sustainability vision of the organization. Interview subjects were asked to agree or disagree with a statement that the organization *as a whole* has a culture supportive of innovation. Respondents across all three organizations agree that they work in an organization that supports innovation (Figure 24), but they also had a difficult time expressing what that means. As with any question regarding culture, it is hard to articulate what this is, but comments about reward programs and training were noted, as was the need for improvement. Fort Bragg and ORNL had similar average response that corresponded with "agree" (4.1) whereas UNH average was closer to the neutral position of neither agreeing nor disagreeing (3.47).



**Figure 25. Culture of Innovation**

The last question in the section on *Supportive Leadership and Culture* was on vision. Interview subjects were asked to agree or disagree with a statement that indicated their organization has a strong vision of sustainability which it tirelessly communicates. As with the other statements in this area, most respondents agree with the statement (Figure 26). Also similar, Fort Bragg and ORNL respondents have a stronger level of agreement, on average (both at 4.3) than those from the UNH. These respondents agree overall, but are closer to a neutral position on this statement, as well (average of 3.65).



**Figure 26. Vision of Sustainability**

Overall, the interview results provide evidence that these organizations have supportive leadership and culture, with Fort Bragg and ORNL showing more evidence than the UNH (Table 24). This makes sense in that strongly bureaucratic organizations also have strong leadership direction. From the sustainability side, this leadership is critical, whether the organizations is bureaucratic or not. The sustainability practitioners also feel their leadership and culture support

innovation -- which is inconsistent with bureaucracy, but needed for sustainability. Another example of the interesting tension between the two modes of organizing and how this affects sustainability practitioners.

UNH shows the least evidence for bureaucratic organizational characteristics when compared to the other two cases (refer back to Table 19, page 103), which seems to predict that this organization would also have the most innovative culture, as these are considered opposites. Contingency theory predicts that the more bureaucratic organizations are least likely to innovate. However, for these three cases, the UNH responses consistently indicate less evidence that their leadership supports sustainability and innovation than Fort Bragg and ORNL. The cases with the stronger bureaucratic characteristics (based on perception of employees) also have employees who feel strongly they have leadership and cultural support the need to be innovative for sustainability. This supports the importance of strong leadership direction, whether the organization is bureaucratic, innovative or a mixture of both.

<b>Table 24. Evidence to Support Organization's Supportive Leadership and Culture</b>			
<b>Supportive Leadership and Culture</b>	<b>Evidence to support?*</b>		
	<b>Fort Bragg</b>	<b>ORNL</b>	<b>UNH</b>
Leaders Knowledgeable about Sustainability	++	++	+
Leaders Aggressively Support Sustainability	++	++	+
Leaders Support Innovation	++	++	+
Culture Supports Innovation	++	++	+
Sustainability Vision	++	++	+

\* key: **O** = Little to no support  
 + = Some support  
 ++ = Strong support

## 6.4 Effective Internal Management Systems

The third set of questions in the interview protocol focused on expected attributes and activities dealt with *Effective Internal Management Systems* (as detailed in Chapter 3). The interview subjects were given a series of statements to agree or disagree with that explored the extent to which certain expected attributes and activities existed at their organizations. The Code Sheet used for Activities and Attributes is given in Table 20, page 106. Results from the *Effective Internal Management Systems* will be summarized in this section, and the statements used are shown in Table 25.

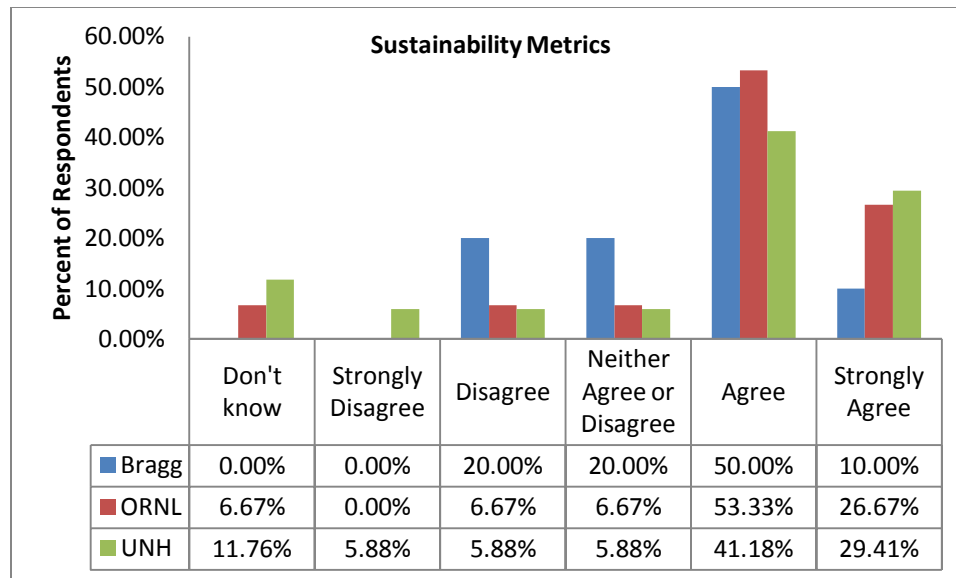
Effective management systems are critical to organizations, whether they are more bureaucratic or organic in nature, but the extent to which metrics are formalized, incorporated into job descriptions, tracked and reported, or formalized into rules and procedures, may be more evident within a more bureaucratic organization. A common critique of bureaucracy is that process metrics take on a life of their own and these become the focus instead of the overall performance of the organization. Yet, without metrics, it is not possible to know whether you are moving in the right direction; goals imply metrics. Therefore, this section of questions revealed much about the mechanics of sustainability programs for organizations.

<b>Table 25. Statements for Effective Internal Management Systems</b>
This organization has measurement and accounting procedures that reflect sustainability metrics
This organization uses sustainability metrics to provide constant feedback about the change efforts to all levels of the organization
This organization designs and implements employee performance appraisal systems that incorporate sustainability criteria and reward sustainability contributions

As discovered in the literature review, an essential element to successful change efforts and innovation is related to how well these efforts are supported by internal management systems. This is a reflection of how well the change effort has been institutionalized or made part of a structured and well-established system. The vision and goals communicated from the organization's leadership must be consistent with the metrics that are tracked by the organization when it evaluates its progress. If metrics are not collected and communicated, then these areas will not receive attention or subsequent focus. A common mantra is "what gets measured, matters." The first statement in this area asked interview subjects to agree or disagree that their organizations had measurement and accounting procedures that reflected sustainability metrics. Responses to this statement varied, but overall interview participants agree with the statement (Figure 27). ORNL and UNH participants agree with the statement based on the average response (4.1 and 3.9, respectively), whereas Fort Bragg respondents were more on the neutral side at 3.5, closer to neither agreeing nor disagreeing with the statement. Of interest here is that these questions were the first to cause respondents to choose the "I don't know" answer - revealing the complexity of tracking and reporting sustainability metrics.<sup>22</sup>

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<sup>22</sup> "Do Not Know" respondents were not included when overall average response values were calculated.



**Figure 27. Sustainability Metrics**

The comments provided for this statement are revealing, however. Many participants question the validity of the measurement efforts and the ability of these metrics to reveal if they are, in fact, making progress toward sustainability goals. Others noted that it is not clear metrics are comprehensively tracked throughout the organization; certain metrics matter more to different levels and different divisions. Interview subjects commented on difficult cause and effect relationships for which their metrics are not capable of explaining. They feel some of the metrics they collect are not very meaningful for understanding success. Just because a metric is easy to collect, that does not mean the metric tells you what you want to know about your sustainability program. Maybe something else has. Note how this is expressed by interview subjects:

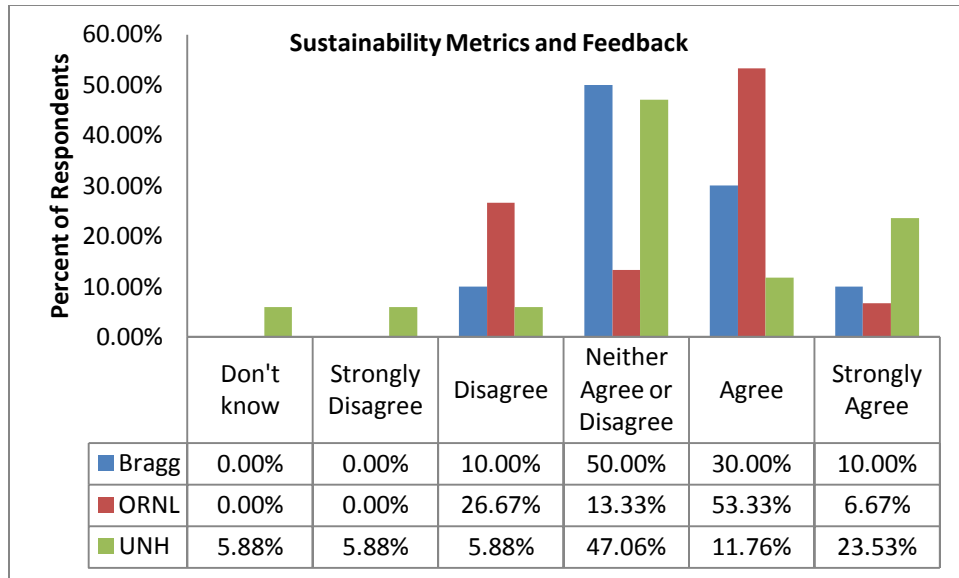
We do have metrics. How you quantify certain things. Some metrics are easier to collect that data than others. And with being a complex, large organization, a lot of our funding – those cost savings or cost avoidance is not realized out of that same pot of money at least at this level. It's hard to quantify certain things. You can't say oh, we have this cost savings because we started buying this. But the people that are disposing of it – there's no connection. So metrics are tough. Solid waste, we know how much we throw away. That's an easy one. How much we recycle, that's easy. But knowing what strategy actually impacted that change



is hard. And I think that's usually the most important part of that metric. Or those are good metrics to have. Procurement's hard to control. We know from our sources of supply, there's a green reporting tool that can be used to track green procurement purchases on Fort Bragg. But then people go off post. So are those metrics really reflective of what happens on the installation? Energy consumption is an easier one. We get an energy bill just like you do at home. So we know how many kilowatt-hours are being used. We get a water bill. So we know how many gallons of water are being used. Yes, we do have some of those metrics. But as far as being able to link those to behavior, that's tough – having the metric be reflective of the [sustainability] program.

It's hard to measure a lot of the things because there's not a lot of concrete [metrics] because a lot of the things with sustainability, in my mind, are a cultural change, so how do I document how much you've changed your opinion of whether to turn your light off? I can't easily quantify how many times you turned your light off and how many kilowatts that saved, but if I tell everybody in your organization to turn their lights off, and my power bill goes down, I must have done something right. It's difficult to measure exactly what it is, but by beating you into senseless submission that you need to turn your light off, we'll get the message across. I think that's the thing that's – it's tough to measure, but I think we're doing a lot of things, and trying to find that thing to measure.

The second statement in *Internal Management Systems* area took the issue a little further and asked how well the sustainability metrics are communicated throughout the organization. The lack of agreement with this statement -- "the organization uses sustainability metrics to provide constant feedback about the change efforts to all levels of the organization" -- reveals that this remains a challenging area for the case studies. And overall perception is the same across the cases about this issue. Many respondents did not agree or disagree. The overall scores for each the case studies were the same, all three averaged at 3.4 (Figure 28).



**Figure 28. Sustainability Metrics and Feedback**

The reasons for the ambivalence on this topic are numerous as expressed via the participant comments. There are still issues about which metrics are needed to tell the story: "...we have a hard time with our metrics, to be honest...We've gone round and round like what is our measure, what is leading, what's lagging, you know. They are still trying to figure it out in higher headquarters, too." There are issues in the data collection, some metrics are just not available for the entire operation - only pieces of it. All three organizations struggle with metering, for instance.

Every year, we just – we go, “Oh, you know, we just – metering is bad around here.” We just– that was the same thing. You could play the recording five years ago. Now, we're starting to put more meters in. Every time I renovate a building, I put in meters. Every new building I build, I'm putting in meters. But there are millions of square feet on this installation that do not have meters. I know that they're energy hogs. I mean, some of the crappiest buildings in terms of water use and energy use we don't have meters on. We know it. It's anecdotal. But good gracious, how much does it cost to go put a darn meter on the darn thing?

Another issue is communication. Even if the data can be placed on shared websites or in sustainability reports, the respondents feel that very few people within the organization access it or pay attention to it. And even the leadership is not tracking these metrics unless it has some direct relationship to the overall mission of the organization:

The comment I would make is that yeah the information is provided, it's not... I don't know to what degree people notice that it is being provided or bother going to the sustainability website and checking things out, but we have newsletters that go out and things. I'm provided way more information than I can digest, so...

...we do it well in some areas, but not well in others. So, when you talk to the people in energy and campus development, they're pretty good at letting others know how well we're doing in terms of saving energy and meeting our climate goals, but in other areas I don't think how well we're doing in sustainability, or where we need to improve, trickles down to other parts of the organization. I think if you asked in more of the academic side of the house and less operations, I'm not sure that they would even...

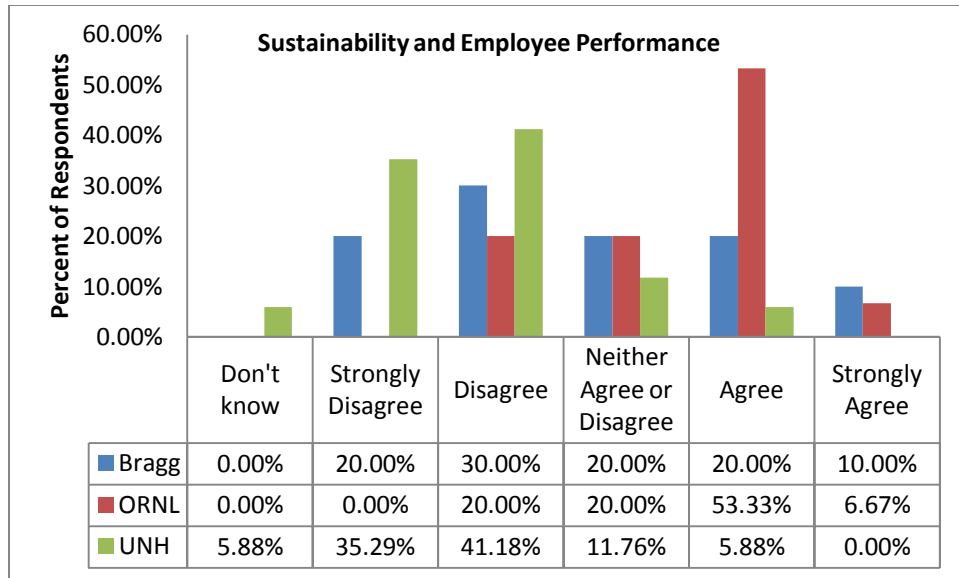
We're very good about getting information out to whoever wants it, but it's not actively being sought out by the higher-ups, necessarily. I think if it's tied to cost savings they're excited about it, but if it's, you know, just something that you think is an organizational mission, it's definitely not, you know, something that they're looking at.

Other respondents focused on issues associated with formalizing metrics. These comments reveal more about the divide between functional areas. What is important to the different functions are reflected in what they measure and track. This is also part of institutionalizing sustainability, moving beyond the isolated projects and efforts and developing metrics that are consistently measured and reported throughout the organization. Respondents from Fort Bragg and ORNL focused more on the mechanics of collecting data and interpreting the implications, whereas the UNH interview subjects struggled more with the formalization aspects. This is reflective of the level of bureaucratization. Fort Bragg and ORNL specify reporting chains for their sustainability efforts. Fort Bragg also employs a Sustainability

Management Council that meets every quarter and briefs the Garrison Commander. Similarly, at ORNL roadmap owners brief their leadership team regularly. The UNH does not have this accountability established, and therefore these interview subjects are more concerned with moving into a more structured accountability framework, as reflected in the following comment:

So, yeah, there's not a lot of formalization. There's not a lot of operationally, I mean our office sort of... The management within our office is much more interested in academia than operations, so the sort of sustainability management goals that you would see in like a more corporate organization that had sustainability as part of its mission or that had a more sort of hierarchy top-down management kind of thing, the sort of formalization of stuff, it's not really occurring, and it's not really I don't think being thought about very much.

The final statement in this area examined how well the sustainability metrics are linked to employee performance systems. Participants were asked about how well sustainability criteria are incorporated into employee performance appraisal systems. Many respondents disagree with this statement, but there are a wide range of responses (Figure 29). ORNL respondents generally agree with the statement, commenting that certain sustainability metrics are part of the employee evaluation criteria in Facilities and Operations, although they did not think this is the case in other parts of the organization. Fort Bragg respondents are spread widely through responses, with an average of 2.7, on the disagree side of neutral. Some feel positive steps are being made in this direction. UNH participants consistently disagree, feeling that this step had not yet been taken, consistent with the lack of formalization of the sustainability program within this organization.



**Figure 29. Sustainability and Employee Performance**

Overall, there is little evidence of effective internal management systems at these organizations for sustainability program implementation and monitoring (Table 26). Although there is evidence that metrics are in place and efforts are made to collect sustainability related data, there is little evidence that the information is communicated effectively in support of the program's goals or that individual employees have accountability for sustainability performance in their management systems. These issues correlate with actions required to institutionalize change efforts. They also correspond well with the challenges that were consistently identified across the case studies, reviewed in the next chapter.

<b>Table 26. Evidence to Support Organization's Effective Internal Management Systems</b>			
<b>Effective Internal Management Systems</b>	<b>Evidence to support?*</b>		
	<b>Fort Bragg</b>	<b>ORNL</b>	<b>UNH</b>
Measurement and Accounting Procedures	+	+	+
Sustainability Metrics and Feedback	<b>O</b>	<b>O</b>	<b>O</b>
Employee Performance includes Sustainability	<b>O</b>	+	<b>O</b>

\* key: **O** = Little to no support  
+ = Some support  
++ = Strong support

## 6.5 Supportive Internal Structure

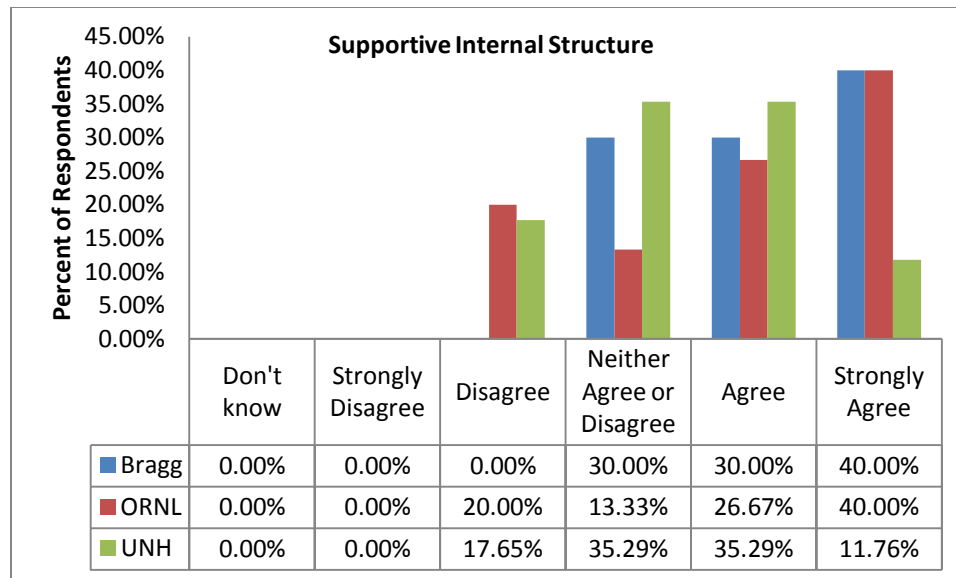
The final set of questions in the interview protocol focused on expected attributes and activities associated with *Supportive Internal Structure* (as detailed in Chapter 3). The interview subjects were given a series of statements to agree or disagree with that explored the extent to which certain expected attributes and activities existed at their organizations. The Code Sheet used for Activities and Attributes is given in Table 20 (page 106). Results from the *Supportive Internal Structure* are summarized in this section, and the statements used are shown in Table 27.

<b>Table 27. Statements for Supportive Internal Structure</b>
This organization has addressed the need to enhance interaction and integration amongst its functional units
This organization has devoted resources to sustainability implementation consistently over time

The first statement focused on the extent to which the organization had instituted new or additional organizational forms to enhance integration and interaction. In a bureaucratic organization, a common way to increase cross-functional interaction is with teams. As

consistent with contingency theory, the case study organization should have implemented structures to enable more cross-functional interaction in order to achieve their sustainability goals. The organic/learning organizational model is common to organizations that seek to maximize innovation. These organizations will have flat structures with more horizontal than vertical linkages. As the case studies are bureaucratic organizations, it is unlikely they will change their vertical reporting structures for sustainability, so this statement sought to see what other approaches, if any, had been implemented to enhance the integration needed for innovation and sustainability to succeed. The case study information presented previously shows how each organization has implemented team structures. Fort Bragg has teams for each sustainability goal area under the main strategic goal. ORNL has teams shaped by each roadmap and UNH has task forces based on overarching topical areas. These attempts to bridge functional divides at the case studies face many challenges and are not strong organizational structures compared to the existing functional divides and hierarchies. They are, however, important aspects of the sustainability programs in recognition of the need to engage across functional stovepipes to accomplish the overarching sustainability goals.

There was a mixture of responses to this statement, but overall participants tended to agree (Figure 30). Fort Bragg participants feel the most positive about these efforts, with an average score of 4.1. There is a similar level of agreement from ORNL at 3.9. UNH, on the other hand, average is more close to neutral, with a score of 3.4. Comments about the team structures, however, indicate these teams are not realizing the full potential that is needed.



**Figure 30. Supportive Internal Structure**

Fort Bragg interview subjects commented on the cross-functional nature of the sustainability goal teams and how critical this is for integrating sustainability into operations. But, the realities of the bureaucratic structures and the ability for personalities to make or break a team still severely affect the effectiveness of the teams. Furthermore, in a bureaucracy, big decisions are still made at the top and teams are often not able to change those.

...I think that the way that our sustainability team works, we have worked cross functionally relatively well, but it is still, especially on this very hierarchical environment, you have the stove pipes, but through the personalities on the team we have been able to kind of bridge that gap. So, it is kind of personality driven. Now sometimes it doesn't always work because you don't get the cooperation because you can't force them, but there is a fair amount of cross team, you know, across installation representation. Is it ideal? No.

There's been efforts of which I'm aware of and been involved in that definitely tried to have a relatively flat organizational structure. That being said, the realities are that the types of decisions that are being made and the drivers for sustainability are top driven and will generally be executed in large part only if it is a requirement and there's direct dollar support from – well, "on high." So, you can have input and a lot of ideas from a wide variety of individuals and a relatively open and flat team structure, but whether or not that gets implemented



or how that would be supported, whether the supervisors want to or not, is not really a decision of the group.

The comments from Fort Bragg further reveal the functional disconnect in its sustainability efforts as they involve mostly individuals in the support functions at the installation and there is limited engagement of others on the mission side. This is the true cross-functional divide they have not been able to effectively bridge.

We've got cross-functional teams, but it's primarily focused within the garrison activities, so that leaves the majority of the population out. When we first started, we went way outside, and we brought in representatives from the units, which was interesting because the Net Zero waste - ten years ago we were sitting in a room, and it was, like, well, let's get to a 70 percent reduction. And we had a sergeant that said if you don't get to zero, you're not trying. If you don't set your goal as zero - it's, like, my that's bold and audacious, big hairy audacious goal. But that was from a soldier that was not part of the garrison. I don't know what unit he was from, but - so I think we started that way. I think we've lost that momentum, but we have a pretty good cross-functional group across the garrison. And since the garrison's responsible for the day-to-day activities, that's the majority of our effort.

ORNL's comments reflect similar challenges. Even with the team structure, existing bureaucratic divides still overwhelm the interactions and potential improvement in outcomes. At ORNL, the management recognizes the need for interaction between the support side and the core mission functions, as the lab's research is focused on energy technology -- there is a sincere desire to walk the talk. But even with this, the ability to engage with lower levels of staff for implementation is limited, as they are not on the same teams (or on any team).

...when they talk about sustainability they'll come to me and they'll talk to me as it relates to contracts, or they'll go talk to somebody...on facility and operations and how it works on the maintenance guy out there. What they don't do is they don't pull me and the maintenance guy into the same room and say OK how does the work process work between you two guys, and then how can we make sure that have this product? You know, right now I'm telling you hey, you know we can't do it because those guys aren't specifying the right things. Well, maybe there's something I'm not doing that prevents them from buying the right things.

...I think we still got a lot of work that we can do on that; still a lot of silos, a lot of information that is not easily available to other people, and probably most importantly, we have some financial barriers that reward bad behavior. So, for example, if a maintenance engineer is being told don't go over your budget, he can choose not to repair a broken piece of equipment that can drive up energy costs. Right and the cost of that is in another part of the organization. That's one of the things that I'm working on is to try to make all of that first known to everybody and then have somebody be actionable. You can say the same thing about the energy consumption in a given small lab space; because we pay the bill at the top level of the organization it seems to be free, right. The obvious solutions don't get done, nobody does anything, nobody knows.

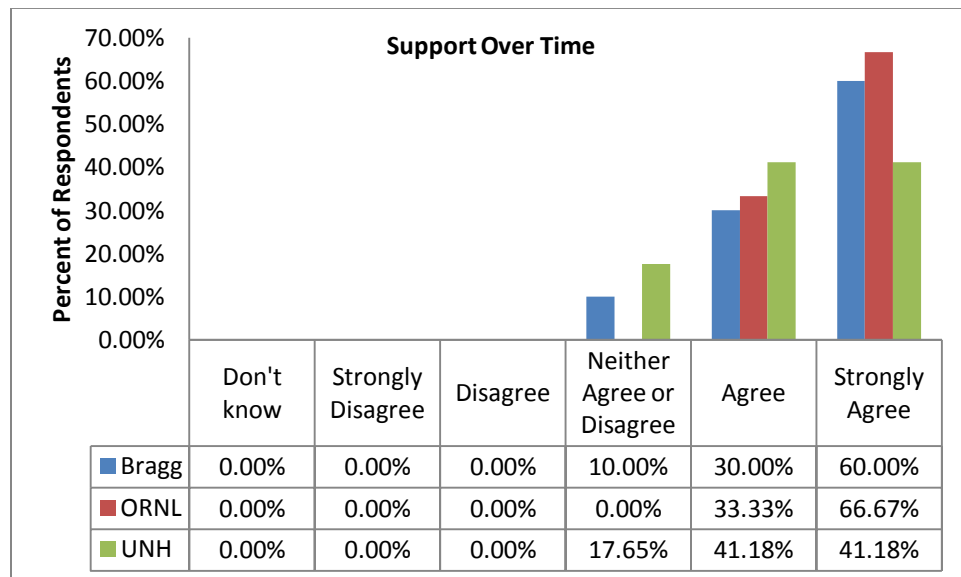
The challenges at the UNH are even more pronounced, as the functional divides between academic units inhibit integration on the core mission side. There is less formalization and less accountability. The UNH's program relies on volunteer interest and motivation even more so than the others. The relative autonomy between academic units creates competition and cross-discipline efforts are difficult to maintain, even though it is an expressed desire of the University through its strategic plan. Interaction within the support functions seems to be stronger, especially in the area of energy, but there was little evidence of cross-functional teams involving both the core mission and the support functions.

There's a lot of support and encouragement for that kind of thing, and I think there's been some successes, and others where it's less successful, but probably where the groundwork is in place and maybe change might come out of it at some point, but there's still a lot of ability of middle managers to sort of sabotage things that they, in their sort of individual areas if they don't like something that's happening, where they can. There's no requirement for them to participate in the horizontal organizations or the cross-functional groups, so if they are losing interest or they feel their interests are being challenged, they can just sort of stop the participation.

Well, I know within facilities we're definitely a cross-functional team expected to work together to achieve what is needed to meet the needs of the campus from a facilities standpoint. Again, I can't speak for the entire campus. Well, I can only speak for my little role, so...

I think there's a lot of effort to make that happen, but I think I'd have to disagree, I mean to breakdown silos is one of the goals of this president, but I think academic... The financial rewards are so, they're not collaborative, they're basically department based, so it's hard to build that collaboration, although I know that's one of the goals of the president; people are getting there, and they're trying to change the reward system to make that easier to do, but right now I don't think we're there.

The final statement in this section on *Supportive Internal Structure* asked participants to agree or disagree that their organizations had been devoting resources to the sustainability program consistently over time. Responses were consistently positive across all case studies (Figure 31). This is critical for many reasons, but basically shows underlying support for the efforts that need to be sustained over the long haul.



**Figure 31. Support Over Time**

The results from *Supportive Internal Structure* provide evidence that the case studies attempt to enhance interaction and integration through cross-functional teams, and have provided resources to support sustainability programs consistently over time (Table 28). Each case study

has a format to enhance integration. Fort Bragg has goal-based teams, ORNL has roadmap-based teams, and UNH has task force-based teams. Comments from the case study participants described challenges institutionalizing the teams, as much of the participation is voluntary and in addition to other job responsibilities. Fort Bragg's teams have a longer history and are more established, whereas the UNH and ORNL teams are still fairly fluid. Ensuring team participation is a challenge for each organization.

<b>Table 28. Evidence to Support Organization's Supportive Internal Structure</b>			
<b>Supportive Internal Structure</b>	<b>Evidence to support?*</b>		
	<b>Fort Bragg</b>	<b>ORNL</b>	<b>UNH</b>
Cross Functional Teams	+	+	<b>O</b>
Resources Devoted Over Time	++	++	++

\* key: **O** = Little to no support  
 + = Some support  
 ++ = Strong support

## 6.6 Summary of Activities and Attributes Findings

This chapter presented the significant results and findings associated with the research question: *Are attributes and activities that enable innovation present?* As shown in the previous chapters, the case study organizations have set sustainability goals and are bureaucratic in nature. This chapter shows that the case studies have mixed results when it comes to evidence of the required activities and attributes to ensure successful achievement of these goals (Table 29).

Each of the cases show evidence of orientation to the external environment, with the exception of external drivers motivating their efforts. Overall, there was a consistent disagreement with this statement. The case studies appear to be motivated as much by internal drivers as they are from external drivers, if not more so. This is consistent with observations that

large, stable organizations rarely feel threatened from external events. On the other hand, innovative organizations are more sensitive to these external drivers, enabling innovation. The cases have mixed evidence to support orientation to the external environment.

Participants from all of the case studies feel strongly there is leadership and cultural support for sustainability. The type of support and its consistency across organizational function is not as clear and the matter of debate, but there is evidence across each case study that leaders support sustainability and innovation.


Results for internal management systems did not show evidence that these critical aspects of change and innovation are in place at the case studies. There is weak to no support in this area. All of the case studies are struggling to identify, measure and report sustainability metrics.

Results on internal structure did not show evidence that the organizations have significantly changed organizational structures in support of sustainability efforts. Even though each case has implemented some sort of cross-functional team structure as a new type of organizational form overlain on the hierarchical, the effectiveness of the teams was questioned. Participation on the teams is difficult to enforce and they have limited decision-making capability. Individual personalities seem to strongly influence the success of the teams. Each of the case studies did feel positively that there is support for their sustainability program and that this support has been consistent over time. Overall results were mixed in this area.

The cases can be arranged in order from most evidence of each attribute and/or activity to the least evidence (Table 29). The UNH shows the least evidence of the expected activities and attributes consistently across each area. Fort Bragg shows the most evidence, with the exception of the Internal Management Systems. In this area, ORNL shows evidence of the most

connections between metrics, performance and sustainability. But overall, none of the cases show strong evidence in the Internal Management Systems.

When the results are compared with evidence of bureaucratic characteristics (previous chapter), it appears plausible that UNH has the least need for these activities and attributes as they are also the least bureaucratic. But this must also take into account levels of perceived success, which are discussed in the next chapter.

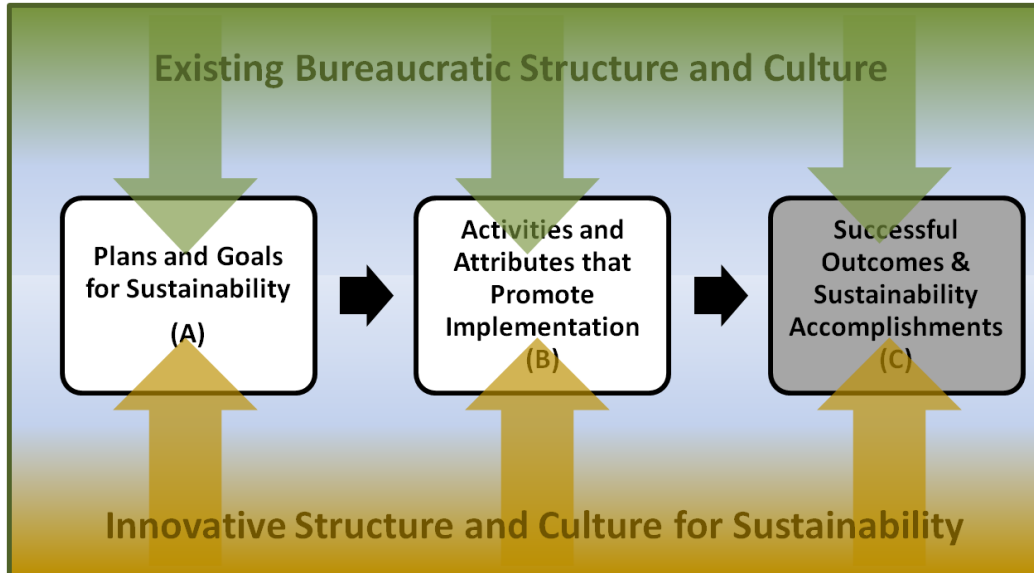
<b>Table 29. Summary Activity and Attribute Results</b>				
<b>Evidence of Activity/Attribute</b>	<b>Overall</b>			
Orientation to External Environment	Mix	Fort Bragg	ORNL	UNH
Supportive Leadership and Culture	Yes	Fort Bragg	ORNL	UNH
Effective Internal Management Systems	No	ORNL	Fort Bragg	UNH
Supportive Internal Structure	Mix	Fort Bragg	ORNL	UNH

## **CHAPTER 7**

### **SUCSESSES AND CHALLENGES**

This chapter present results on the level of success that each case study sustainability program has achieved. This area is difficult to assess, as previously described. There are no clear metrics, no clear starting points, and difficulties in separating sustainability program affects from other affects. In order to assess this area, information from the case studies about recent accomplishments was combined with interview data where the participants provided their perspective of success rates. Another important aspect of success was evaluated based on the extent to which the concept of sustainability has been incorporated in the core mission and integrated into other functional areas.

As shown in the proposed causal chain diagram (Figure 32), the case studies begin with setting plans and goals for sustainability (A), which then require changes in organizational activities and attributes (B) in order to ensure successful achievement of these goals (C). As summarized in the previous chapter, there is mixed evidence that expected attributes and activities are present at the case study organizations. This would imply mixed results for sustainability outcomes. As in the other chapters, information is organized in order to compare organizations to each other. This chapter reviews results associated with outcomes of the program, looks carefully at challenges and seeks to relate these to case study information. The approach for assessing outcomes relied upon the sustainability practitioners rating success in various environmental goal areas as described in Chapter 2. Each participant was asked to rate the level of success on a scale from no progress to goal achieved. And, also to give an explanation and/or examples for their ratings.



**Figure 32. Sustainability Outcomes and Accomplishments**

## 7.1 Sustainability Accomplishments

This section presents highlights of the recognition and recent accomplishments of each of the case studies. It was not difficult to identify and select the case studies as all three promote their programs at conferences and amongst their peers. The case studies have received external recognition for their efforts, and each has recent accomplishments attributed to their sustainability efforts.

Fort Bragg has won many awards for its program. In 2003 and 2004 Fort Bragg and Sustainable Sandhills consecutively won the first two Sustainable North Carolina Awards. The installation won the first Secretary of the Army Sustainability Award in 2008. This award recognizes outstanding sustainability initiatives by Army installations, activities and individuals. Fort Bragg won the 2008 White House Closing the Circle Award for its work with sustainable design. As of August 2008, the installation has registered more than 43 buildings, totaling 5.2



million square feet, in the Leadership in Energy and Environmental Design (LEED) Portfolio Program. The installation also won the Office of the Federal Environmental Executive's 2008 Federal Electronics Reuse and Recycling Campaign (845.3 tons of electronics). Most recently, the installation won a 2012 Federal Energy and Water Management Award for successfully constructing the Army's first LEED Platinum facility. The Community Emergency Services Station was designed to be 35% more energy efficient than a typical building.

Sustainability achievements are presented quarterly to the Sustainability Management Council. The organization continues to work to incorporate sustainable features into its new construction and existing buildings. Some recent initiatives include

- Creation of the Fort Bragg Arbor Board. The Board implements a tree mitigation policy and implements standardized landscaping and tree planting, amongst other things. Fort Bragg received a 2010 North Carolina Urban Forestry Award for the Board and its efforts.
- Inclusion of sustainability principles into the Installation Design Guide.
- Initiation of the Green Directorate Program. Organizations on the installation can become certified as a "Green Directorate," by implementing specific measures such as reducing waste, promoting recycling and engaging in environmentally preferred purchasing. The measures must also improve energy efficiency, conserve water and enhance air quality.
- Implementation of a Utility Monitoring and Control System. The installation continues to add utility meters and links the data with this system.
- Investment in a Sustainable Shuttle. Fort Bragg continues to invest in a shuttle system to reduce personal vehicle miles traveled.

ORNL has won several awards for their program. In 2008 the campus won the White House's Closing the Circle Award for Leadership in Environmental Stewardship for their Green Transportation Initiative. The efforts of ORNL have been recognized in 2008 by the Department of Energy's Office of Science for their Comprehensive Sustainability Initiative (Green Buildings). As of 2011, the campus has one million square feet of LEED-certified building space. The program has been recognized by the Department of Energy's Office of Science with

the 2010 Department of Energy Management Award and also in 2010 by the U.S. Environmental Protection Agency with the Federal Energy and Water Management Award. Recent accomplishments of the ORNL SCI include

- Hosting of a regional sustainability conference in 2011. The campus hosted a two-day summit on sustainability to share best practices.
- Publishing of the Sustainable Campus Initiatives's first *Annual Report*, available on the website: <http://sustainability-ornl.org/>
- Purchase of 90,000 Megawatt hours of Renewable Energy Credits (Fiscal Year 2011).
- Elimination of approximately 562 million pounds of waste, with an associated cost avoidance of more than \$8 million (Fiscal Year 2009 and Fiscal Year 2010).
- Use of milled asphalt for maintenance of non-paved surfaces at the Laboratory in lieu of purchasing newly quarried gravel for that purpose.

The UNH has won several awards for their sustainability efforts. Recent recognition includes being on U.S. News and World Report Top Ten Eco-Friendly Colleges 2012 list and Princeton Review's Green Honor Roll of Top Sustainable Colleges 2012 (UNH has been on the Princeton list for five years). Also in 2012, UNH was named Outstanding Community Tree Farm by the New Hampshire Tree Farm Committee for its efforts to educate the public on sustainable forestry. UNH achieved a gold rating from the Association for the Advancement of Sustainability in Higher Education's Sustainability Tracking, Assessment & Rating System (STARS). Gold status is the second highest level that can be achieved and UNH is just one of just 20 campuses in North America to receive STARS gold to date. The University also won the 2009 Association for the Advancement of Sustainability in Higher Education's Campus Leadership Award. The campus's EcoLine project won the 2008 Outstanding Civil Engineering Award by the American Society of Civil Engineers - New Hampshire Section. Recent accomplishments of the Sustainability Institute and UNH's sustainability efforts include

- Formation of the Student Sustainability Alliance to enable small, individual organizations working on sustainability-related issues to communicate their message more effectively across campus by working together.

- Second annual trash2treasure sale where students can buy items left by previous students to prevent items from becoming solid waste. "Students collected more than 15,000 discarded items, removed 57,000 pounds from the waste stream, and saved the university more than \$4,000 in disposal fees. They also donated more than 100 30-gallon bags of food to local food pantries, and more than 100 broken electronics were recycled."<sup>23</sup>
- Student energy and climate change groups gather on Friday nights to turn off lights and other electronics left on in academic buildings, they call it "Friday Night Lights Out." Information is shared with the UNH Energy Office.
- PrintSmart, the campus printing program, achieved over \$300,000 savings in printing costs through use of new printing devices, double-sided printing, increase in scanning, and other related efforts.

## 7.2 Sustainability Success Rate

A portion of the interview protocol was developed to measure the study participants' perspective of success in various areas of environmental sustainability (as described in Chapter 2). This was used to address one aspect of the central question: *Has the sustainability program been successful?* A scale was developed for capturing qualitative responses in a quantitative format, and each subject was given a code sheet to guide their responses for progress toward achieving success in environmental areas of sustainability. They were then encouraged to give additional details and comments regarding their numerical score. The scale ranged from No Progress to Goal Achieved. The scale is shown in Table 30, and the form used to collect their responses is shown in Table 31.

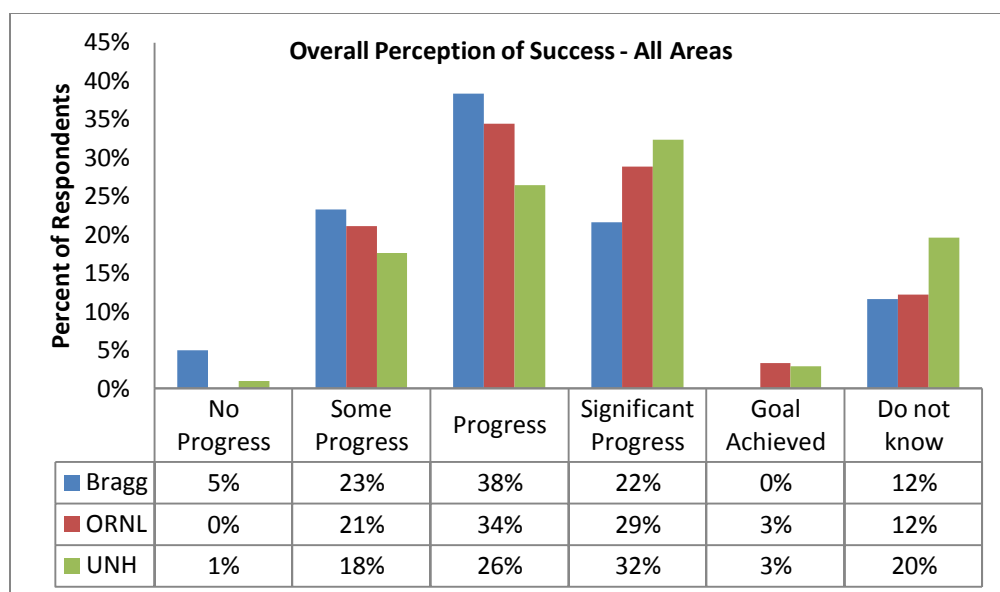
<b>Table 30. Scale Used for Rating Sustainability Success</b>					
<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Do Not Know	No Progress	Some Progress	Progress	Significant Progress	Goal Achieved

<sup>23</sup> MacAlaster, G. (2012) "At UNH sale, one student's trash is another student's treasure" *Union Leader.com*, available at: <http://www.unionleader.com/article/20120821/SPORTS0103/708219979>

<b>Table 31. Form for Rating Sustainability Success</b>		
<b>Rate the extent of progress made toward sustainability goals in the following areas:</b>	<b>Score</b>	<b>Comments and examples</b>
water conservation		
solid waste reduction		
water quality		
energy use reduction		
sustainable acquisition, or green procurement		
alternative energy use		

Overall, the results indicate positive perceptions of the sustainability programs at each organization (Table 32 and Figure 33). The responses clearly demonstrate how participants from each of the organizations feel they are making progress toward their sustainability goals and objectives in these environmental areas. There are very few responses of Goal Achieved, however. Over the six areas and 42 participants, this was selected as a response only three times. Likewise, the response of No Progress was only chosen four times. Figure 33 presents the percent of respondents in each of the response categories. There are a number of Do Not Know responses but, without those, Fort Bragg participants are the most pessimistic about their progress (averaged over all areas), and UNH the most optimistic.

<b>Table 32. Overall Perception of Progress by Organization (Average Score)</b>		
<b>Bragg</b>	<b>ORNL</b>	<b>UNH</b>
2.87	3.16	3.23
Some Progress - Progress	Progress	Progress



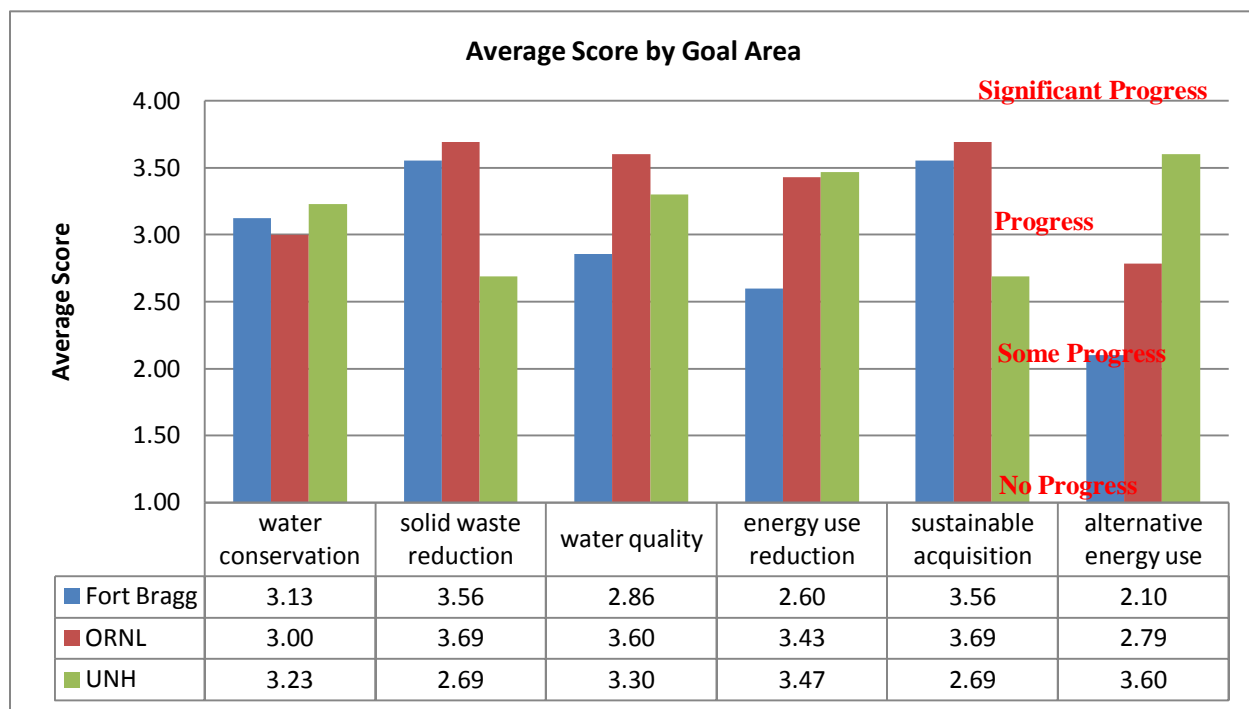
**Figure 33. Overall Perception of Success - All Areas**

Overall average scores by goal area were also calculated (Table 33). These values also show very similar perceptions of success, with scores averaging near 3.0 (Progress) for each area. The most positive perception of success overall is for water quality and lowest for alternative energy use. This makes sense as alternate or renewable energy projects typically have high capital cost and long return on investment time period. The available alternate energy options are also limited by geography. If it weren't for the EcoLine project at UNH and the biomass steam plant at ORNL, the alternate energy scores would likely be lower. These difference are not that great, however, the scores are all near 3 - for Progress (Table 33 and 34).

<b>Table 33. Overall Average Scores by Goal Area</b>	
<b>Goal Area</b>	<b>Overall Average</b>
Water conservation	3.12
Solid waste reduction	3.24
Water quality	3.30
Energy use reduction	3.23
Sustainable acquisition	3.24
Alternative energy use	2.92

Additional analysis of the reported scores was conducted to identify possible trends. A comparison across organizations shows similar perceptions between the organizations (Table 34) without any significant differences between them based on the goal areas. Notable, however, is that the both areas related to water had more Do Not Know responses than the other goal areas. This is especially evident for water quality, for which over a third of the interview subjects did not know if this area was achieving progress. Interview subjects are more knowledgeable regarding water conservation efforts, but this area also had many Do Not Know responses, 13-23% did not answer.

<b>Table 34. Average Score by Organization for Each Goal Area</b>				
<b>Goal Area</b>	<b>Fort Bragg</b>	<b>ORNL</b>	<b>UNH</b>	<b>Percent of "Do Not Know" Responses</b>
water conservation	3.13	3.00	3.23	13-23%
solid waste reduction	3.56	3.69	2.69	6-13%
water quality	2.86	3.60	3.30	30-40%
energy use reduction	2.60	3.43	3.47	0-12%
sustainable acquisition, or green procurement	3.56	3.69	2.69	6-13%
alternative energy use	2.10	2.79	3.60	0-12%



**Figure 34. Average Score by Goal Area**

Consistent with Fort Bragg's overall lower average, these interview subjects have lower perceptions than the other cases in the areas of water quality, energy use reduction, and alternate energy use. Comments made regarding water quality efforts indicate that the lack of a baseline metric and continued high intensity of land use cause challenges in this area. Fort Bragg's training mission places a unique and sustained pressure on the land surface throughout the training ranges. Interview subjects' perspective of lowering energy use at Fort Bragg revealed this has been difficult because energy users are not the energy bill payers, so there is no way to successfully influence individual behavior. Other challenges described include lack of meters on most of the buildings, changing utility rates, shifting building occupancy, and increasing personal electrical demand. Fort Bragg has not made significant investments in renewable or alternate energy projects. Interview subjects reported that only a few, scattered, small-scale

renewable energy projects have been installed so far. They are optimistic that larger projects are coming.

ORNL interview responses were very similar to the other organizations except for alternate energy. Even though the biomass steam plant was mentioned several times as a large and successful project, because it does not produce electricity -- which is the biggest energy demand at the laboratory -- interview subjects feel the overall impact is low. Installing other forms of alternate energy is a challenge, as solar and wind are not as reliable in the region, and also the payback on these large investments is not favorable as electrical power is low cost in the region.

Well, I don't quite know how to answer that. The southeast is not a very great place. I mean, you know, for... I'd say, you know, we have done a lot, so I'd say significant progress, but solar isn't great for us, the wind is nonexistent. We do have a \$90 million project to put in a bio boiler for the steam plant, and that will reduce our fossil fuel usage about 80%. So, while that's significant progress, it's not in the area we use the most energy, which is in electricity.

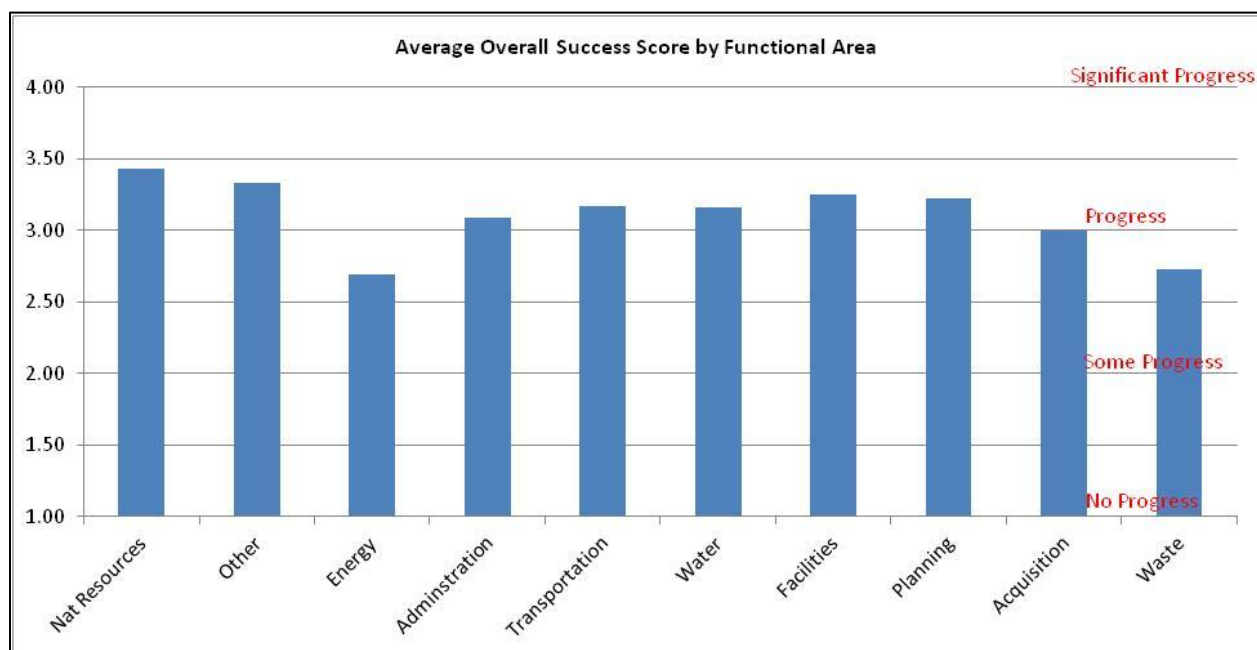
The UNH respondents gave positive responses for alternate energy compared to the other cases, but did not feel as positive about sustainable acquisition and solid waste reduction. Although there have been some initial areas of success in procurement, overall there are so many decentralized purchases that it is difficult to influence these decisions. Buyers tend to purchase what they always have. Respondents feel optimistic that improvements in recycling are coming, but currently there is not a consistent solid waste recycling program:

We have a very chaotic waste facility, you'll hear a lot about that, the fact that... Just collecting the basic data has been a challenge, but it looks like we're probably going to be moving to single stream, and I think that will make a huge difference hopefully. Hopefully we'll actually be able to do it and hopefully it will make a huge difference, and then from there I think we can start a more formalized process or service estimate of how our solid waste is doing, but I mean it's basically that UNH has had recycling since the 70s, but it's never been updated since the 70s, so we still have a 1970s era recycling system where, you



know, you sort of have the ad hoc bins and different things, and it's not very organized, and it's not very user-friendly, and no one knows what they can recycle, and if I recycle this is it actually going to get recycled?

Overall success scores were also compared across the functional areas interview subjects work in, again looking for evidence that certain functional areas have different perspectives than others. These results (Figure 35) did not reveal any functional areas as having a more positive or negative view of overall success (all success scores were averaged based on number of individuals in each category that responded), with the exception of Energy and Waste. Individuals that worked in these areas had a lower overall perception of success than individuals that worked in other functional areas. Responses were also examined to determine if there was any relationship between functional areas by each individual goal area, as well. For instance, do individuals that work in the water functional area feel similarly about more than one goal area (across all cases)? This analysis did not reveal any consistent trends, either (Table 35). For instance, water professionals were the most critical of water quality goals, which makes sense, but did not weigh in on water conservation (high or low). Individuals that work in Natural Resources feel the most positive about water conservation. On energy use reduction, acquisition personnel felt the best about progress with this goal, while waste personnel felt the least positive. There is not a clear linkage between areas the interview subjects work in and their perspective on progress in the various goal areas.



**Figure 35. Average Overall Success Score by Functional Area**

<b>Goal Area</b>	<b>Functional Area with Highest Average Score</b>	<b>Functional Area with Lowest Average Score</b>
Water Conservation	Nat Resources	Energy
Solid Waste Reduction	Other	Acquisition
Water Quality	Planning	Water
Energy Use Reduction	Acquisition	Waste
Sustainable Acquisition	Transportation and Water	Energy
Alternate Energy Use	Administration	Nat Resources

The information on success is summarized in Table 36 in order to evaluate if the sustainability programs are successful based on the subject responses to the rating questions in the interview protocol. This table indicates a mix of evidence to support that the sustainability programs are successful. As nearly all responses were close to 3.0 (progress) this is considered some support for success. No goal areas were rated in 4.0 significant progress - which would

have been strong evidence of success. Those below 3.0 were not considered as having evidence of success. Overall, however, there is evidence to support the programs are having implementation success. In fact, they seem to have very similar overall perceptions.

<b>Table 36. Evidence to Support Success in Environmental Sustainability Areas</b>			
<b>Environmental Sustainability Area</b>	<b>Evidence to support?*</b>		
	<b>Fort Bragg</b>	<b>ORNL</b>	<b>UNH</b>
Water Conservation	+	+	+
Solid Waste Reduction	+	+	<b>O</b>
Water Quality	<b>O</b>	+	+
Energy Use Reduction	<b>O</b>	+	+
Sustainable Acquisition, or Green Procurement	+	+	<b>O</b>
Alternative Energy Use	<b>O</b>	<b>O</b>	+

\* key: **O** = Little to no support  
 + = Some support  
 ++ = Strong support

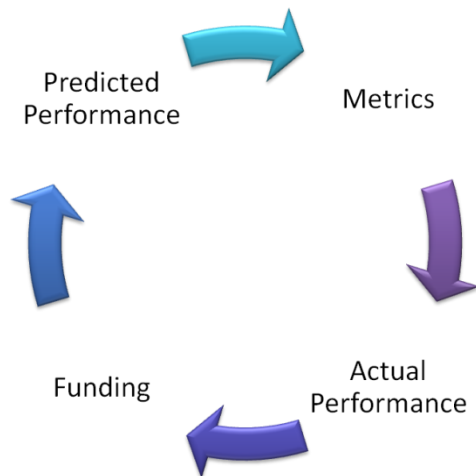
### 7.3 Implementation Challenges

Each interview subject was asked to answer an open-ended question about the challenges they face in implementing sustainability. The answers were reviewed for common themes both within each case study and across the case studies. Also, the ability to comment on their sustainability success rate scores also brought forward observations on challenges (some noted in Section 7.2). When an interview subject gave their organization a low score for a particular area, they often explained this in terms of the challenges they face within that area. Overall, it was difficult to group the challenges into specific categories, because the different challenges were often very intertwined, as the discussion demonstrates. Common themes related to *funding*,

*stability of support, and establishing the value of the sustainability program* were the most consistent challenges the study participants described.

### ***Fort Bragg***

The challenges identified more frequently than any others by the Fort Bragg interview subjects are related to funding and metrics. It is difficult to separate these, though, as they are often the same challenge in a reinforcing feedback loop. Issues associated with funding were not complaints that there was not enough money. They were more often about how decisions are made for allocating the limited resources available. Fiscal constraints are a given, it is about what you do with what you have. And, this is directly related to achieving desired outcomes. Managers must decide how to invest in human resources in order to most effectively meet his/her many requirements. As one interviewee stated: "Who do I need to eliminate: someone who turns a wrench or someone who turns your mind?" Funding is equated with support. Support ensures stability. Stability increases with success and vice versa. So, in order to justify the program, showcase its successes, and "prove the value of that expenditure of human resources" -- the sustainability program needs metrics. This feedback loop is shown in Figure 36. The frequency in which this challenge was described is an interesting contrast to the strong positive responses given in the structured portion of the interviews where most participants agreed with the statement that the organization has shown support for sustainability consistently over time.



**Figure 36. Metrics Feedback Loop**  
Funding is based on expected results. Without metrics to document results and substantiate funding, it is harder and harder to justify funding over time.

Metrics are needed that show decisions based only on first cost are more expensive over the long run than decisions based on life cycle costs. Metrics are needed to capture the savings from energy conservation efforts and justify investment in more energy conservation projects. Metrics can help show how changes in one functional area save money in a different functional area's budget. Metrics are needed to show that even though the more technically advanced equipment needs more training to properly maintain and operate, it still is worth the investment for the improved operational efficiency of the building. Showing the value of the program is necessary so the sustainability planners can earn their own keep and show they are making a difference. The metrics need to be linked to cost savings and goal achievement. Decision makers need to be able to show if the investment has enabled an existing requirement to be met more efficiently or effectively than before the investment was made. Multiple comments were made regarding the lack of metrics. These reinforce the comments made for this sustainability success factor under *Effective Internal Management Systems*. As highlighted in Chapter 6, none of the case studies show strong evidence that internal management systems were in place and effective.

Metrics help decision makers address funding issues, but they also help with accountability, another important challenge in a compliance-driven culture that was mentioned

frequently by Fort Bragg study participants. As one participant observed: "I can't mandate sustainability." Metrics are needed that can be linked to changes in behavior and can help overcome resistance to change, another challenge frequently mentioned. Participants noted that their organization was slow on innovation until it is "proven practice." It is hard to demonstrate proven practice without metrics.

Another challenge was getting people involved when they have other priorities. Especially if they are focused on getting their mission accomplished: "if it works that sustainability can be incorporated within the confines that have been imposed upon the individual project or the overall effort, then sure, sustainability is great to have and I fully support it." Sustainability is not the primary objective for many individuals and without metrics to support it, show its value, or enforce accountability, it is even harder to make it a priority. A lack of education and awareness was also mentioned as a challenge. Finally, keeping the forward momentum of the program was a challenge mentioned several times. Participants talked about "changing paradigms," "pushing boulders," and "just scratching the surface." One noted: "I get tired."

### ***Oak Ridge National Laboratory***

The most frequently identified challenges for ORNL revolved around funding and economic viability of sustainability projects. Very similar problems to Fort Bragg, expressed in different terms. Participants often noted that sustainability efforts frequently do not make the business case. They are cost prohibitive or cannot be justified based on life cycle, return on investment, or cost effectiveness. This is closely related to metrics, the second most frequently shared challenge. As with Fort Bragg, the interviewees noted that it was difficult to demonstrate the benefits and value of sustainability efforts due to a lack of metrics, but also to provide the

needed feedback for all stakeholders and to justify expenditures in one area over another. The study participants also identified other challenges that closely affect the cost-benefit calculation. First, the high level of (and increasing) energy use associated with the laboratory's mission, particularly the super computers, overwhelms energy conservation and reduction efforts completed elsewhere. Second, regional conditions negatively impact favorability of sustainability projects: cheap power, cheap and plentiful water, and lack of viable renewable energy sources came up many times. Finally, old and aging infrastructure was mentioned as a challenge for making progress in sustainability.

The remaining challenges were fairly equally represented and mostly revolve around engagement and sustaining the change effort. Participants feel they are having difficulty reaching the individuals that truly affect sustainability, facility operations and campus tenants, and that communication across all of the roadmaps was inadequate. It is difficult to elevate sustainability on people's list of priorities. They are busy and not motivated to add something new or make changes. The interview subjects discussed difficulties in engaging people outside the roadmap teams, lack of follow-through once changes are made, and, new equipment not being properly maintained and therefore not achieving desired outcomes. As one interviewee noted: "I think we tirelessly communicate, I just don't think people tirelessly listen." Study participants therefore believe external drivers or internal standardization are needed to provide the motivation that is currently lacking (e.g. more bureaucracy). A couple of times accountability was mentioned as a challenge. A related challenge is an overall resistance to change. "We have pretty entrenched ways of doing this. We have organizational inertia that in some cases exists for good reasons and in other cases just exists."

### *University of New Hampshire*

Interview subjects for the UNH offered a broad range of challenges, without any one area standing out. Funding and the stability of fiscal resources is a common theme. As with the other cases, there is a constant challenge to justify the sustainability program in order to ensure continued support over time. The UNH study participants spoke of making the business case for individual projects, but did not emphasize that nearly as much as the other case study participants. At the UNH there is sense that, because of the sustainability program endowment, the question of fiscal support has been resolved. As one participant noted about the general view within the organization: "Well, we have a sustainability office, [so] it's not our problem. We're done, problem's solved." Sustainability advocates are therefore faced with convincing the university community that sustainability should actually be everyone's priority. Resistance to change, keeping the forward momentum, ownership, engagement, and accountability are challenges that figure as prominently as funding. Very few interview subject mentioned metrics, also in contrast to the other case studies, but given the relationship of metrics to making the business case, this challenge can easily be inferred.

There were several challenges identified that are related to and affect the overall need to increase support and engagement. One of these is conflicts in priorities. Instability in the fiscal and political climate leads to shifting priorities. If individuals "just want to keep their jobs" they will not engage in innovation such as sustainability, as stated by an interview subject: "they just have other priorities on their plate right now." Leadership, too, is seen as shifting focus over time. "Top leadership is interested in sustainability when it's going to get then something they want, not necessarily is it the motivating factor for them to act." In a fiscally constrained environment, buyers will continue to purchase what costs the least. There is a feeling that:



"when I get a dollar you don't" -- so internal programs and departments are in competition with each other. If sustainability efforts cannot demonstrate payback, then commitment wanes -- "it was always seen as...a resource-draining commitment."

The UNH participants described other challenges related to garnering support for sustainability efforts. One of these was the need for effective communication. Several subjects noted the challenge of getting the word out in a highly decentralized organization like the UNH. With so many other programs vying for attention, and without an overall University message to help set direction, communicating in general is tough.

It's a very large institution and there are so many organizations, you know, student groups, everyone's sort of vying for attention of the community, and there's not a sort of strong channel coming from the central administration of like this is what we communicate as an institution, and this is how we communicate our values. It's all sort of like there are these certain communication channels that are out there with, you know, websites, and newsletters, and this that and the other thing, and every organization on campus is fighting each other to try to get their message into those communication mediums.

Other comments on education and communication focused on improving participation in recycling and improving user behavior for areas like energy conservation efforts. The UNH study participants also frequently described resistance to change as a challenge. They mentioned "institutional inertia," "bunker mentality," aversion to change and a "plateau of resistance." Comments regarding a general aversion to change were offered, such as individual procurement offices continuing to buy what they have always bought, or "we're just trying to just keep it going, we can't change anything now." Concern about keeping the program fresh and not just another "initiative of the hour" were also expressed.

As a final set of challenges, the UNH study participants also highlighted organization structural issues. There were two that were featured, one on the effect of having a sustainability

office that owns the program and the second related to the highly decentralized structure of the organization. Although the endowment and the establishment of a sustainability office at the UNH was noted as a strength by many participants, it also featured in some of the challenges identified because it has made it easier for other departments to disengage. There is a sense that the program belongs to "the sustainability guys" and they "worry about that stuff and I don't need to." Voluntary participation on the task forces and teams that have formed at the grass roots level has drawbacks, as well. Those that work in the Sustainability Institute have it as part of their job responsibilities...others do not. This enables the "ability of middle managers to sort of sabotage things...There's no requirement for them to participate in the horizontal organizations or the cross-functional groups, so if they are losing interest or they feel their interests are being challenged, they can just sort of stop the participation."

Another structural challenge noted by participants is the highly decentralized nature of the organization. This was highlighted generally as affecting engagement and successful communications (described above), as well as in procurement. The procurement system is based on decentralized management units, which plan and spend their individual budgets under University and State of New Hampshire guidance. Each unit procures what it needs independently and there's little standardization or tracking of these decisions.

So, central purchasing will be able to make sort of some overall decisions, you know, where we purchase from, but not *what* we purchase, and there has been some work on trying to get more training for purchasing, people to have the ability to purchase, but that's not really been formalized, and there's also so many different trainers in the different business services areas; there's like 20 different business units on campus that, you know, some people when they get a credit card, it allows them to make purchases, institutional purchases.

The decentralized structure means that each individual department must be approached and engaged because "people tend to get isolated in their areas of focus and sometimes have a very hard time working outside those areas."

#### **7.4 Extent of Integration of Sustainability within the Organization**

The interview protocol included three additional statements to explore the location of the sustainability programs and personnel. These statements were included to further explore how integrated sustainability is in the overall organization, and if it is perceived as an environmental effort. These results provide additional insights about success within the case studies.

According to the literature, if the sustainability programs are limited in their reach and affect, then they will be less successful.

It is also expected that the relationship of the core mission and the support functions within these organizations has an effect on the success of the sustainability program. In organic or learning organizational models, there is more horizontal interaction to discourage silos or over-specialization and allow for a more comprehensive and holistic view of the organization. According to this perspective, regardless of where sustainability is housed, if the core mission and support functions are integrated for sustainability efforts, then it will be easier to integrate the concept overall. If there is a strong disconnect between core mission and support functions, or if sustainability efforts are not perceived to be in support of the mission, then the challenges described earlier in this chapter will be even more intractable. Even with other justifications for sustainability programs, the relationship of sustainability to the core mission is an important one. Participants were asked to agree and disagree with statements using the same scale provided in Table 20 (page 106). Table 37 provides the statements that were used in the interview process.

<b>Table 37. Statements for Sustainability Integration</b>
The core mission of our organization has not adopted sustainability goals and objectives yet.
Sustainability is primarily a facilities operations program at this organization.
Sustainability is primarily an environmental program at this organization.

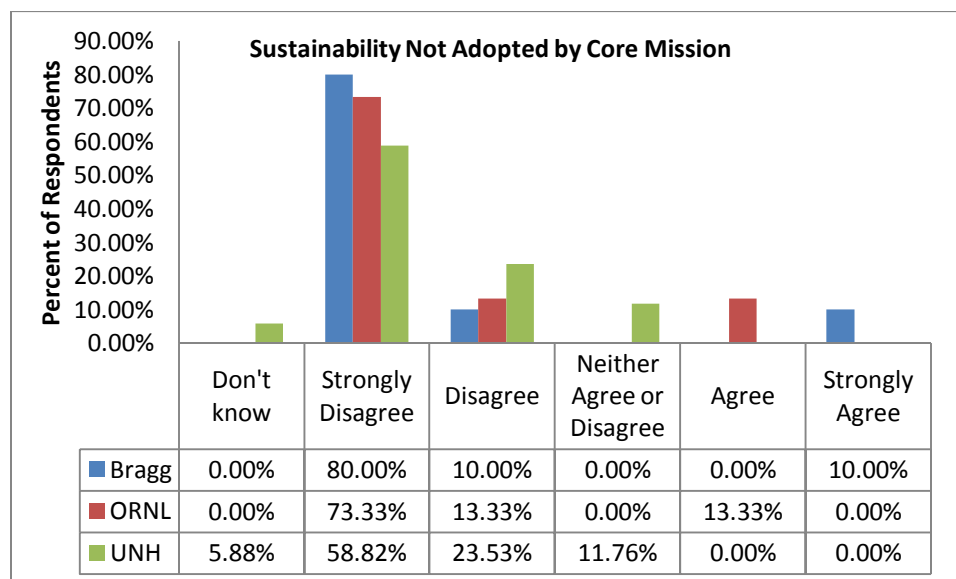
Participants were asked to agree or disagree with a statement that the core of their organization had NOT adopted sustainability goals and objectives. This statement was included to see if there was a perceived separation between the sustainability efforts and the core activities of the organization, military training, energy research and post-secondary education/academic research. Participants across each of the case studies strongly disagreed with this statement (Figure 37). Interestingly, the average response for each case study was the same, at 1.5.

These results tend to be at odds with the case study characteristics as outlined in Chapter 5 and revealed through the other data sources. At Fort Bragg and ORNL there are few active participants in sustainability outside of the support functions within these organizations. At the UNH, they struggle to engage support functions outside of campus development and energy. The Sustainability Institute answers to a Provost and is therefore located in the core mission side of the organization. Although participants at Fort Bragg and ORNL readily disagreed with this statement, indicating that sustainability *has been* adopted by the core mission, there were very few examples provided. This contradiction could be a result of the interview process and how subjects were selected. As previously noted, this dissertation focused on environmental aspects of sustainability and therefore a sub-set of the program participants at each case study were interviewed. If these conflicting results are due to the research method (i.e., the subjects are commenting only on environmental aspects of sustainability and are not aware of what is happening in other aspects), it would be logical that the interview subjects would have had some

interaction with the core mission (and vice versa) and could have shared these experiences during the interview process. Very little of this is evident from the interview comments. What is evident, on the other hand, was the ongoing challenge of engaging others at the organization in sustainability and keeping them engaged. This *is* clear. Apparently, this is a problem both for the core mission and the support functions, as UNH also had challenges engaging others outside of the Sustainability Institute. Two interview comment that seemed to capture this paradox are as follows:

I think they could do a little bit better, but considering over the past ten years, it has come a long way. Our [military] leaders are more apt to understand sustainability. Some of them still think it's totally environmental, but at least they're understanding something.

I think [the academic leaders] strongly adopted [sustainability] in principle and they're struggling to find out what that means in terms of how do we apply it.



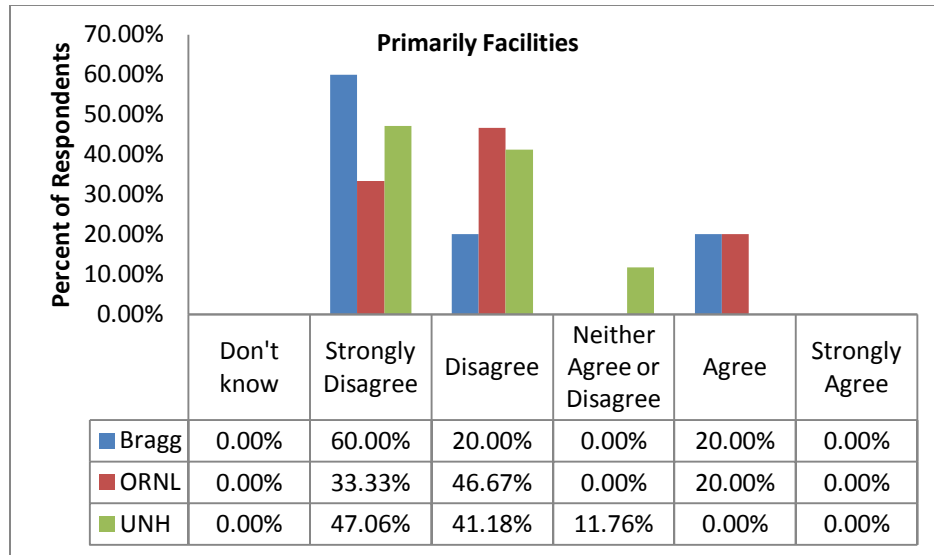
**Figure 37. Sustainability Not Adopted by Core Mission**

One area where the case studies differed was the primary home of sustainability. They all faced challenges successfully engaging the rest of the organization, however. The organizational structure of the case study organizations can be simplified into two main branches, core mission and facility operations, or support functions. There is the core mission side of the house and then all of the support functions that enable the mission, maintenance of the buildings, laboratories, and training ranges; provision of power, heat, water, and office supplies; services such as housecleaning, information technology support, garbage disposal, and everything else. At all three case studies, these main two functions of the organizations were distinct entities, with their own reporting lines, funding and leadership. What is interesting is that extent to which sustainability has bridged from its home over to the other main functional area. Fort Bragg's sustainability efforts are firmly grounded in the Directorate of Public Works (DPW), the support functions side of the house. Sustainable Fort Bragg has been able to gain acceptance for sustainability by the mission side, but there is little active engagement. Sustainability started in DPW and has had marginal success gaining traction elsewhere. There is support from the Directorate of Plans, Training, Mobilization and Security. But this entity, although closer to the military mission than DPW, is also there to support the mission by scheduling, constructing, and maintaining training ranges for use by the Soldiers. At ORNL, the SCI is jointly sponsored and operated by the mission side *and* the support side. As the laboratory has an energy-related research mission, there are many opportunities for overlap. Success in sustainability bolsters the overall research reputation of the organization. The program struggles, however to engage the researchers in changing how they use the facilities. It also has challenges engaging the crafts people, the personnel responsible for most daily operations and maintenance activities. At the UNH, the Sustainability Institute's foundations are in the mission side of the

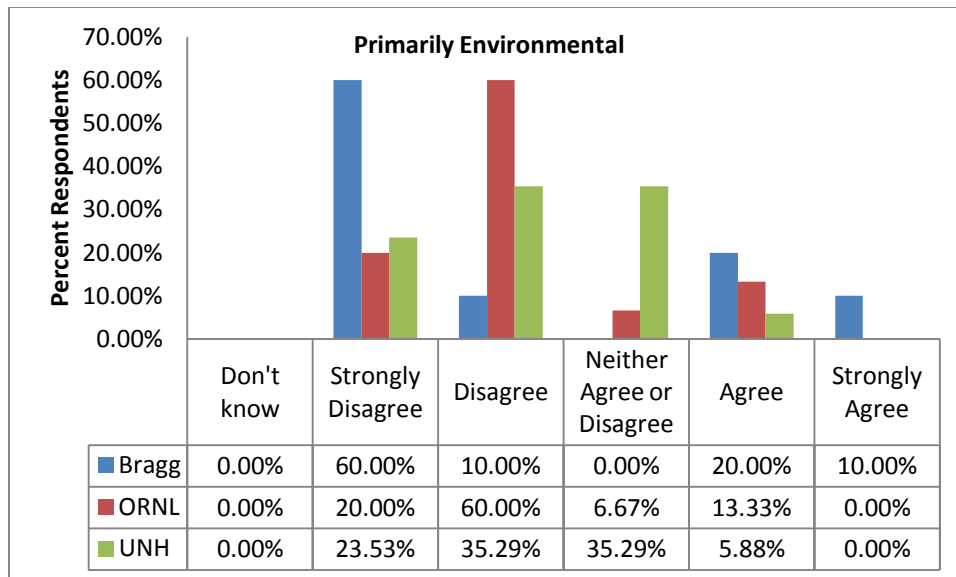
organization, so there are strong ties to academic programs, curriculum development and faculty research, which has made engaging the support functions a challenge. The UNH recognizes the value of sustainability for its academic reputation, but this is not enough to inspire innovation among its housekeeping and maintenance personnel.

There were two statements in the interview protocol focused on which part of the organization was primarily responsible for the sustainability program. One statement indicated that sustainability is primarily a facilities operations program and the second that it is primarily an environmental program (Figures 38 and 39). These results indicate that study participants across the case studies disagree or strongly disagree with the statement that sustainability is primarily a *facilities and operations* program. While the level of disagreement was strong, the strongest disagreement, based on the average score, was from the UNH. This makes sense, as the home for sustainability at UNH is in the core mission. But, the sustainability practitioners clearly understand the nature of what they are trying to accomplish requires more than just the facilities and operations area to implement.

Sustainability has environmental origins, so the second statement was designed to determine if this is still the overall perception and therefore the extent to which the concept is being integrated throughout the organization. The respondents tended to disagree with this statement as well. There was less disagreement from Fort Bragg and the UNH when compared to the level of disagreement that sustainability is primarily a facilities program, which is consistent with the environmental division home at Fort Bragg and the core mission association (environmental studies) at the UNH. Especially for the UNH, where the average value was 2.35, influenced by several respondents neither agreeing or disagreeing with the statement and showing that there is still some perception that this is an environmental program.



**Figure 38. Primarily Facilities**



**Figure 39. Primarily Environmental**

Respondents from Fort Bragg, where the sustainability is housed in the Environmental Branch of the Directorate of Public Works noted that it was due to the nature of sustainability that efforts involve all aspects of the organization:



I say that because you've got [Directorate of Plans, Training and Mobilization] and other Garrison organizations leading goal teams that are looking for green, or sustainability I should say, sustainability things in everything that we do. It is not just a facilities mentality and our Garrison commander has insured that everybody knows that.

We can't make it happen by ourselves. I mean you can come up with great ideas, but if you don't have the folks really doing the mission or doing the actual construction or whatever, again, that's not going to be able to do things sustainably.

At ORNL, where sustainability is jointly sponsored by Facilities and Operations Directorate and the Energy and Environmental Sciences Directorate, participants also noted that it was due to the nature of sustainability that their efforts involve all aspects of the organization:

It's very important and we've found and tried to communicate that the tenants have a huge impact on our sustainability; we cannot operate a facility in a sustainable manner if the tenants don't understand what their impact is on their energy use, on their solid waste, on a lot of different fronts, and here again we have the Sustainable Campus Initiative where we really try to engage the researchers as well to aid with the technology advances, so it's really anybody that works here that can affect the lab's sustainability.

We [Facilities and Operations] lead it, I think that we're a major part of it because what we're trying to do just happens to fall under facilities and operations, one that's operational, but the lab is trying to change the whole culture and way of thinking.

At the UNH, where sustainability is housed in its very own department -- the Sustainability Institute -- there is the same sentiment, that the entire university has to be on board for continued success.

Certainly if you were to ask me that question in 2005ish I would have given it a four, but it's kind of like we have moved now into a second generation of sustainability where the focus is really to make sure, as I said, in everything we do that it's part of our educational mission, that it's in all of our curricula, and so we're kind of in I'd say Sustainability 2.0 where yeah, it isn't just facilities; it's now about all of our pedagogy, and our curricula, and so I call it 2.0 on that, so it's definitely across all areas.

Participants in each case study organization, however, also commented that the various solutions and approaches they have are not perfect and they continue to struggle against the ownership issue. This is reflective of bureaucratic organizations. Responsibility and accountability for organizational goals always have a owner or a champion, someone is assigned that duty and responsibility. This presents a challenge for concepts such as sustainability, which *everyone* in the organization needs to own. Therefore, it is hard to engage everyone, but also hard to assign to a single office.

*Fort Bragg*

I think, again, it can go a little bit...they still stovepipe it into environmental, but they're making some headway. I'm sure everybody's mentioned our sustainable community goal. I think that it's really opened the eyes of a lot of people that it is beyond resource usage or our natural world resource usage.

Yeah, like I said on that other one, we're a team to get things done and if anybody doesn't play, you don't have success.

Strongly disagree because that has been something that we have been fighting that effort. That's one of our main thrusts is that it is not an environmental program. Well, and that's one reason why they have planners embedded in the different directorates.

*ORNL*

No, quite the contrary, again I tell my bosses that the sustainable campus cannot be successful if I'm not successful, because the reality is that a lot of the other roadmaps are actually funded out of the energy savings. Right, so I mean it's critically important that we not only meet that target, but we need to continue to improve on that even beyond the mandates from DOE. And I work really, really hard to sort of reach out to those other roadmaps, and what we've discovered is as roadmap owners we have a sponsor who's on the research side, and we have a sponsor, and on the facilities and operations side... And if multiple roadmap owners are talking to both of them about the importance of a specific thing, it helps. So, we network that way.

## *UNH*

I would say it had more support on the academic side than on the facilities side. Certainly the operations side of things; on the planning side is sort of more of a different story. On the planning side of things it's also strong support for sustainability.

So, people don't, it's definitely not tied to facilities, which is a good thing; I think sometimes if you're tied to facilities and you basically have inherited some sustainability role because you're required to, and they give it to, you know, somebody will become their recycling coordinator who's really, you know, something else. So, I think it's good in the way that you have kind of this standalone group that is sustainability, and then they can get in everybody's business. Whereas if it was facilities, you're really limited to who you can reach out to. The downside of that is that you've got this one group that, because they're trying to say how responsible and how sustainable the organization is, a lot of times they have to say that they're doing things that other people really did. So, I think that you get sometimes some negative feedback from people outside of this office saying, "Why are you guys getting an award for this when it was our project?" That type of thing. But I think if you put all that ego stuff aside, it's probably a pretty good way that it's set up.

Because there are people that do still think it is environmental, but not everybody; most people are seeing that everybody has the ability to impact sustainability.

Evidence of success in sustainability program implementation is supported for each of the case studies (Table 36). Each of the case studies have received multiple awards and have many recent accomplishments. The interview responses for the environmental goal areas show a perception that progress has been made consistently across all areas. The UNH has the most evidence of core mission adoption, although many respondents across all of the case studies felt strongly this is happening. Integration with other aspects of the organization shows evidence of success based on interview responses, although this is less clear from the other case study information. The UNH and Fort Bragg show similar levels of evidence over ORNL for integration outside of facilities and environmental functions. When all of these information

sources are brought together, it appears the UNH has more evidence of success than the other cases, but this is a slim margin.

<b>Table 38. Evidence to Support Success in Sustainability Program Implementation</b>			
<b>Sustainability Program Success</b>	<b>Evidence to support?*</b>		
	<b>Fort Bragg</b>	<b>ORNL</b>	<b>UNH</b>
Awards and Recent Accomplishments	++	++	++
Environmental Sustainability Areas	+	+	+
Core Mission Adoption	+	+	++
Sustainability Integration	+	+	+

\* key: **O** = Little to no support  
 + = Some support  
 ++ = Strong support

## **CHAPTER 8**

### **ANALYSIS**

In this chapter the research results are summarized and analyzed based on the underlying expectation that the three case studies will show evidence that: 1) they exhibit bureaucratic characteristics; 2) they have adopted sustainability goals and objectives; 3) they have implemented similar activities in support of these goals; and, 4) success, in some form, has been achieved (Figure 40). Contingency theory predicts organizations will make the adjustments in culture and structure as needed to ensure success. Environmental planning theory predicts bureaucratic organizations will need to adopt practices more similar to organic or learning organizations to meet the demands of sustainability (i.e. collaboration, participation, adaption and a integrated perspective of the organization). These two bodies of literature predict that there should be a correlation between the level of success and the extent to which expected activities and attributes are present (Figure 41) and were used to develop the theoretical propositions tested by this research.

The analysis consists of comparisons between the case studies. Although the basic format of the case study sustainability programs differ, overall, the results reveal striking similarities in the challenges they face and the overall perception of success by case study participants. Although the case study organizations design and execute their programs differently, they each implement cross-functional interaction to overcome some of the challenges of their bureaucratic structure and culture. Also striking is the similar perception that internal drivers motivate the organizations more than external drivers. They all seem to share a challenge

integrating the mission and support functions under a common understanding of sustainability and what it means to their organizations.

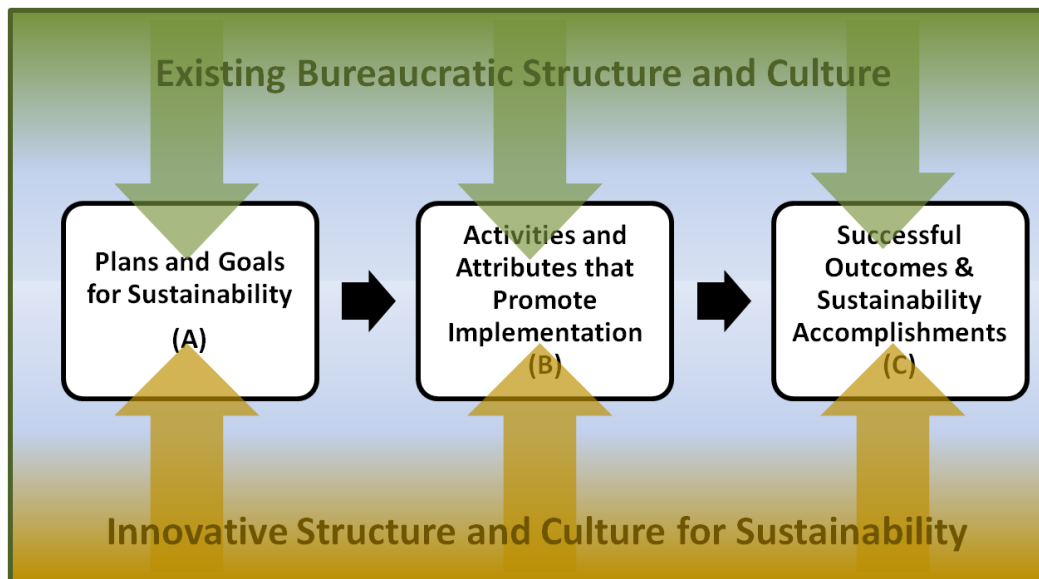


Figure 40. Proposed Causal Chain

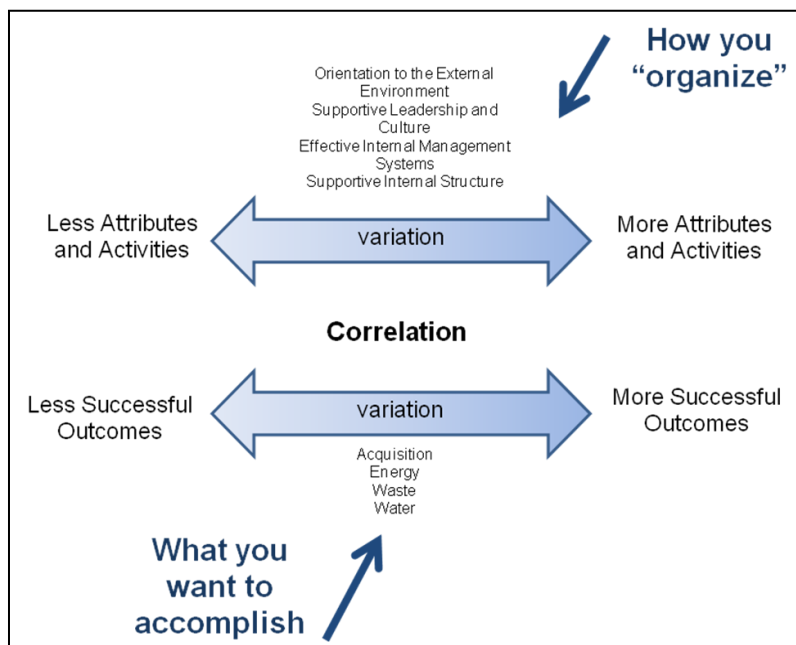


Figure 41. Correlation Between Outcomes and Activities

## 8.1 Sustainability Goals

Case study information shows how each organization has established programs and goals related to sustainability. Fort Bragg's are the most formal, captured in the strategic plan for the installation and articulated with goal teams. The program is housed in the Directorate of Public Works Environmental Division (support function). ORNL's were less formal, but still articulated in the roadmaps with specific targets. Ownership of sustainability is split between the Facilities and Operations Directorate (support function) and the Energy and Environmental Sciences Directorate (core mission). The UNH has very high-level statements in the University strategic and master plans, but little formalization in the task forces, specific sustainability targets do not exist outside of the greenhouse gas reduction goals. The UNH has a Sustainability Institute accountable to the Provost (core mission). The relationship of sustainability programs to the core mission and support functions varied between the cases and was, in fact, the strongest area of difference (Figure 42). This ownership distinction did not translate into improved outcomes, however, as evidence showing one case was more successfully than the others was not clear.



**Figure 42. Sustainability Home**

## 8.2 Bureaucracy

Each of the case studies shows evidence of bureaucratic characteristics such as hierarchical reporting chains, formalized roles and responsibilities, and functional separation.

Interview responses and case study literature review indicate that ORNL had the strongest evidence of a bureaucratic characteristics, followed by Fort Bragg, with UNH showing the least evidence. In particular, the UNH participants did not agree they have hierarchical reporting chains, which is reflective of the highly decentralized nature of the various colleges, schools and institutes, each with its own mission. All three cases show strong functional divides between the core mission and support functions. Comments from the participants shows that, even though their organization is bureaucratic, they have ways of working within and around these attributes to get their jobs done, they feel empowered to affect decision-making, and they understand the unique requirements of sustainability. In particular, they typically work across functional divides, especially to implement sustainability. So, even though functional divides exists, they feel able to work across them. This is evidence of the more organic organizational cultures and structures overlain on the bureaucratic, as expected.

### **8.3 Activities and Attributes**

The results from the data collection show that the case studies have implemented activities and attributes predicted by the literature that will be needed for successful sustainability programs, but the results are mixed. Results from *Orientation to the External Environment* clearly show that sustainability-related activities that engage external stakeholders, professional organizations, peer institutions, parent organizations and suppliers are very common across the case study organizations. The organizations are all willing to share information on their programs with interested external parties through their websites and conference presentations. The UNH published a book on their efforts. On the other hand, the organizations are not driven as much by external influences as expected. The interview subjects described many different motivations, much of it considered to be internal. Generally, the external drivers



are related to mandates from higher headquarters and legal or economic drivers. The internal drivers are related to reputation, long-term mission success and doing the right thing. Overall, the results show mixed evidence of orientation to the external environment with Fort Bragg showing strongest evidence and the UNH the least.

The research results provide evidence that these organizations have *Supportive Leadership and Culture*, with Fort Bragg and ORNL showing more evidence than the UNH. The leadership support is reported as inconsistent by most respondents, but still significantly present. It is interesting that the UNH showed the least evidence for bureaucratic organizational characteristics when compared to the other two cases, but also shows the least evidence of leadership support and innovation-supportive culture. Theoretical background predicts that the more bureaucratic organizations are least likely to innovate but, with these three cases, those with the stronger bureaucratic characteristics also have employees who feel strongly they have leadership and cultural support to be innovative. The leadership at the UNH is more strongly tied to functional area and academic specialties and these areas are fairly autonomous, which may be an explanation. Regardless, the results indicate that individual motivation plays a significant part in pushing sustainability at these organizations, as the sustainability professionals are willing to test the limits of their bureaucratic boundaries.

Results from the *Effective Internal Management Systems* portion of the activities and attributes research reveals little evidence of effective internal management systems at these organizations in relation to sustainability program implementation and monitoring. Fort Bragg and ORNL show more evidence of these activities than the UNH, which is consistent with their more bureaucratic nature but, overall, none of the cases are strong in this area. Although there is evidence that metrics are in place and efforts are made to collect sustainability-related data, there

is little evidence that the information is communicated effectively in support of the program's goals, or that individual employees have accountability for sustainability performance in their evaluation systems. These issues correlate with actions required to institutionalize change efforts. They also correspond well with the challenges that were consistently identified across the case studies when it comes to justifying sustainability investments and documenting the impact of the program. Interview comments reveal a perception that metrics are part of Sustainability 2.0, the next important implementation step that all the cases are struggling with.

It's only in the past year or two that I'm starting to feel like we have the data collection and the routines down that the accuracy of this stuff is plus/minus X percent. But, it's been a tough slog to get there. We're just doing a lot more online stuff where the data's getting better and better, but we're making good progress but we have a long way to go on all that. And then I think that part stays 1.0... At 1.0 you're like just do it, just do the things, and like you forget like that you need to measure, evaluate, and adjust; that's what 2.0 is. With consistency, so that you know if person X leads, that the person who comes in is going to use the same methodology and the same data; institutionalize that, and that's where we're trying to get to that part.

The *Supportive Internal Structure* results show that each organization has implemented team structures in an attempt to enhance cross-functional interaction. Fort Bragg has teams for each sustainability goal area under the main strategic goal. ORNL has teams shaped by each individual roadmap, and the UNH has task forces based on overarching topical areas. These attempts to bridge functional divides face many challenges and are not strong organizational structures when compared to the existing functional divides and hierarchies. They are, however, important aspects of the sustainability programs in recognition of the need to engage across stovepipes to accomplish the overarching sustainability goals. Fort Bragg participants feel the most positive about these team efforts, with the UNH respondents feeling the least positive. Comments about the team structures, however, by all cases indicate these teams are not realizing

the full potential that is needed. As a result of these comments, there is mixed evidence of supportive internal structure. Also evaluated under this section was the extent to which the organizations provide support consistently over time for their programs. Even though funding challenges are commonly observed through interview comments, all three case studies show evidence that this support has been in place by strongly agreeing with this statement.

#### **8.4 Successful Outcomes**

The interview statements asking participants to rate the success of the environmental aspects of their sustainability programs were a big part of determining if the programs are successful. Also used was the case study information on recent accomplishments and the interview questions regarding the extent of integration of the program with other aspects of the organization. Based on these data, the results are mixed. Interestingly, participants overall feel similarly about their programs, consistently reporting progress. Analysis of the data did not reveal any consistent trends in perception by organization, goal area, or functional area.

Evidence that the programs have been integrated into other functional areas outside of their homes was found based on interview responses. Likewise, interview subjects consistently disagreed that the programs were primarily facilities or environmental in nature. Participants in each case study organization, however, also commented that the various solutions and approaches they have are not perfect and they continue to struggle with the ownership issue. This is reflective of bureaucratic organizations. Responsibility and accountability for organizational goals always have a owner or a champion, someone is assigned that duty, if not, then there is no one to hold accountable. This presents a challenge for concepts such as sustainability, which *everyone* in the organization needs to own for the innovation to occur. Yet there needs to be ownership for it to sustain forward momentum and manage incremental change

over time, the tension between innovation and bureaucracy is very evident here.

But I'm trying to answer the question in the way that it's kinda like there's so much more we could do. It seems to me that everybody is looking to one or two people to be the persons that are – I don't know how I'm trying to say this – (The champions?) Yeah, it's like being the sustainability champion. That would be a good way of saying it – sustainability champion. We have an architectural champ. We have a civil engineering champ. We have ... the environmental champ. [We have an] urban forestry champ kinda thing...My point is there isn't a sustainability champion.

But I'm trying to convey a concept there – That there's studies. There's inventories. There's stuff like that that could be done to help us get our hands around our sustainability posture better that are just plain not being done because we don't really have a champion.


The UNH has the most evidence of core mission adoption, although many respondents across each of the case studies felt strongly this is happening. Integration with other aspects of the organization shows evidence of success based on interview responses, although this is less clear from other case study information, such as the interview comments. The UNH and Fort Bragg show similar levels of evidence over ORNL for integration outside of facilities and environmental functions. When all of these information sources are brought together, it appears the UNH has more evidence of success than the other cases, but this is a slim margin.

## **8.5 Case Study Comparison**

The case study method used in this dissertation looks for trends and themes in multiple sources of data. This research found several interesting trends. The UNH is the least bureaucratic and also has the least evidence of the activities and attributes necessary for sustainability success (Table 39). This makes sense based on contingency theory. If less bureaucracy implies sustainability is easier to implement then the UNH will not have as many barriers and will not need to change (new activities and attributes). This conclusion can not be substantiated, however, as it is difficult to compare success rates. The data collected indicate

fairly similar results for sustainability success across the cases, with possibly UNH showing more evidence of success. Likewise, since ORNL was the most bureaucratic, it should have the most evidence of the attributes and activities expected for success, but it was Fort Bragg that shows the most evidence of these. Fort Bragg, however, did not show significantly higher levels of success related to the stronger evidence of expected attributes and activities. Clearly there are many variables influencing the complex relationship between organizational structure and culture and its achievement of sustainability goals.

On the other hand, there are striking similarities across the cases as to which of the activities and attributes they are strong (i.e., leadership) and weak (i.e., metrics and communication). The presence of many common activities and attributes including strong internal and external drivers, strong leadership, feeling of empowerment by sustainability practitioners, cross-functional teams, and consistent support over time, clearly show the essential elements for any sustainability program, as is consistent with the sustainability and organizational change literature. The similarities between the case studies in challenges faced, perceptions of success, and evidence of activities and attributes overwhelm the differences. Even with the different missions, different starting points, different team structures and different organizational homes for sustainability, the cases had more in common overall than different when it comes to successfully implementing sustainability programs.

<b>Table 39. Overall Case Study Comparison</b>				
	<b>Overall</b>			
<b>Evidence of Bureaucratic Characteristics</b>	Yes	ORNL	Fort Bragg	UNH
<b>Evidence of Activity/Attribute</b>				
Orientation to External Environment	Mix	Fort Bragg	ORNL	UNH
Supportive Leadership and Culture	Yes	Fort Bragg	ORNL	UNH
Effective Internal Management Systems	No	ORNL	Fort Bragg	UNH
Supportive Internal Structure	Mix	Fort Bragg	ORNL	UNH
<b>Evidence of Success</b>				
Overall average score by participants	Yes	UNH	ORNL	Fort Bragg
Adoption by Core Mission	Yes	UNH	ORNL	Fort Bragg
Integration with other Functions	Yes	Fort Bragg	UNH	ORNL

The case studies share more in common than they differ. The organizations all established teams to overcome functional divides and have similar concerns about the effectiveness of these teams. They are all open to the external environment but do not feel driven by it. They all feel leadership is supportive, but that some leaders are more so than others. They all are challenged in engaging more individuals in the sustainability goals, establishing relevance is a problem throughout the organizations.

One was we're all fired up. Two, we're getting to eat the low-hanging fruit. Three, we're starting to make it in some harder stuff. That's the thing that gets you. That's in the four part I think. The four part is the number – the step four – three and a half kinda thing is when those teams are out there doing stuff...It's where teams cannot help you. There is not a matrix manage team that's doing – there is a thing – there is a little area there between your personal behavior of things like putting your plastic bottle [in recycling bin] – I've learned to do that. I do that every day for lunch. When I brush my teeth, I turn off the water – those

kind of things, all right. You bring those things with you. They're at work, and they're at home. But there are things that you do in your job that a team is not gonna help you. That's what I'm talking about. It's between those things. It's between the simple, automatic behaviors and the things that teams can help you with. I'm sorry if I can't describe it any better than that.

And every one of us, every day, are doing little things in our job. It's not just little behavior things like throwing paper away or not – or buying recycled – I'm talking about doing things in your job like doing preventive maintenance on this thing if you're a maintenance mechanic or a little thing in your job like counseling an employee. Every little thing you do, that you do in your job, if you approach it from a sustainability kind of a thing, there is so much more we can do – so much more we can do. I know that sounds real hokey and green all that kinda stuff.

...so the challenge we face now is how do we take this to the next level? I think people are onboard with doing it, the people are onboard with sustainability; it's something they should continue to embrace and to grow, but how do you do that in an environment that's facing some financial difficulties, and how do you get people not to be complacent?... So, I think the challenge we face is how do we keep people engaged, especially at a university where if I get a dollar, you don't, and so that's I think underlying people's reluctance sometimes is sustainability already has enough, why should we put more money into it? That's going to be our biggest challenge.

There is mixed evidence of success for each case, just as there is mixed evidence of the organizations making changes to their structures and cultures to implement their sustainability programs. Stronger implementation of the necessary activities and attributes should result in stronger results. But there are challenges with measuring and monitoring that make this fairly impossible to document. Fort Bragg has been working hard at sustainability for over 10 years and still has the same problem of justifying the program and its reason for being. There does not appear to be anything about ORNL's or the UNH's approaches that will help them solve this problem more effectively than Fort Bragg. The organizations still need to *define sustainability* in terms the bureaucracies can deal with. As stated by a respondent: "It's still this voluntary model and get buy-in, you know, seeking buy-in model, and less of the, you know, well, this is the way we do things here model..."

The areas that challenge the organizations are very similar -- they are all struggling to get to Sustainability 2.0 where the goals, objectives and accomplishments of their programs are institutionalized, achieving the "this is the way we do things here" model. In version 2.0, the sustainability information has become widely known and is closely linked to what individuals do every day. There are strong connections between sustainability efforts and the core mission as well as the support functions. Everyone shares a common understanding about what sustainability means to their organization and what their role is in implementing it. In version 2.0, sustainability has become part of the bureaucracy.

On the other hand, Sustainability 2.0 also requires that Sustainability 1.0 continues to be strong. Sustainability 1.0 is the "just do it" version and "seeking buy-in" model. It thrives on individual motivation and innovation, members of the organization that are willing to push the boundaries and try new things just to see if they will work. Sustainability 1.0 is based on the energy and enthusiasm of the change agents. Sustainability 2.0 will not get far without them. They need to feel empowered and that their attempts at innovation are encouraged. They need to interact with other functional areas to understand the effects of what they are trying to do. This is the essence of the duality between bureaucracy and sustainability. And, it was communicated through interview comments as the participants also struggled to explain this difficult balance (emphasis has been added to the below interview quotes).

There are organizations – I mean there are office – I don't wanna say offices. I'm trying to choose my words right. They're not really organizations, necessarily. They're not really offices because those put more structure to them than they really have. But there are workgroups within this directorate and garrison that have embraced a matrix management style where there really isn't a person – there's a leader just to get them together and keep them on track, but not a leader making the decisions. Because of that, those people have felt empowered and are in certain – and are not standing around waiting for a senior leader to make decisions. *They got the guidance. They're saluting the guidance. They're*



*running up until they hit the edge of the guidance. Then they bounce back to the center.*

I think the kind of thing that I would like to say there is that because of the traditional culture of our organization we have tended to be, what's the word? What am I trying to say? Let me think of a better phrase. Let's not write until we come up with a better way to say this. We are in such a... We are in such an externally constrained organization in terms of the rules and mandates by which we have to live, and *what we are trying to do in order for us to truly embrace sustainability is to deviate from what has been the traditional and somewhat easier path of dictating behavior to employees, and we're taking on the challenge of trying not to mandate, but to educate, because ultimately we will not get where we want to be unless we genuinely, genuinely get people's hearts and minds engaged in this process, and we cannot get there through mandates.* We want to get there by educating people so that they will choose to make sustainable business choices, because this is a culture that is quick to mandate given the opportunity.

So, for me as a research staff member this is very different from the facilities and operations part of it, because when they have a budget they come in and do their work... But right now all my sponsors are pretty much DOE-related except for the sustainable campus, so within that I've got quite a lot of autonomy, quite a lot. *In terms of my managerial role, this formalized kind of, you know, this team leader thing, I guess I still have some autonomy, but the role is so significantly different, it's...* I don't have power to make any real decisions; I approve time, I, you know, I try to help people out if they're funding is short or they have some other kind of issue, but I don't have the power.

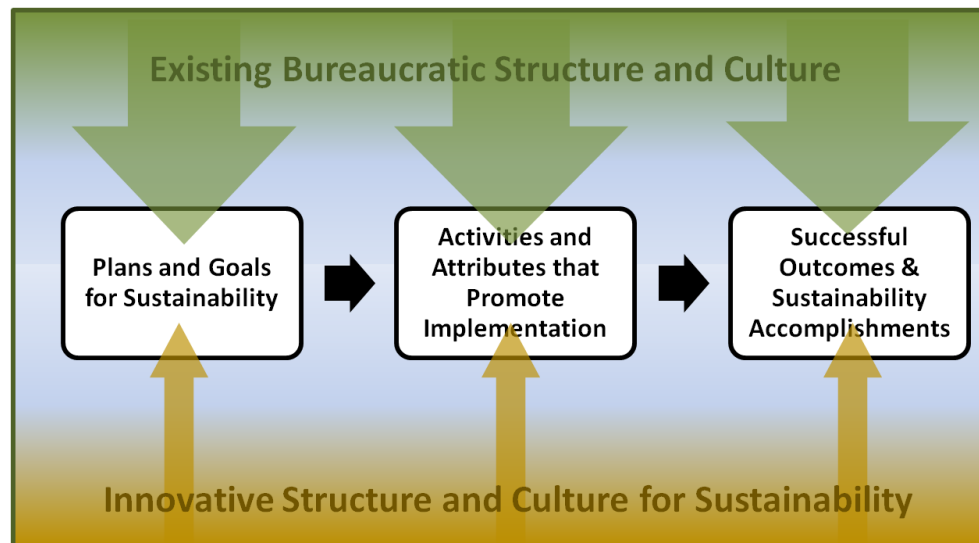
Certainly there's a whole side of the house that makes the place function, as job descriptions, and annual evaluations, and all of those sorts of things, and we're really trying to be very current and very state of the art about those review processes. Probably not quite as good as some in the private sector, but we're getting there, but then there's, you know, again evaluation of faculty that's more collaborative. In our faculty or on the tenure committees, promotion committees, so there are really one of the things, as an aside it makes it so interesting, because we have all the various cultures are here. *We have the command and control pieces, and then we have the sort of creative, loosely organized kinds of pieces as well.* So, to have to live in all those environments at the same time is really, really interesting.

Ironically enough, even as these sustainability efforts are the seeds of innovation in bureaucratically-dominant cultures, they do not seem to have taken full advantage of what the bureaucratic aspects can do to promote sustainability. They appear to not have taken full

advantage of their respective bureaucracies to institute the sustainability programs. Why is this? One explanation is that sustainability still has not been defined outside of the support functions. At Fort Bragg and ORNL, it seems to be viewed more as a way of efficiently operating the buildings and not as a core value of the organization. But even if sustainability is defined more from the core mission, as at the UNH, there are still challenges crossing the functional divides, both to other academic areas and to the support functions. Progress is slow at all three case studies. There is no clear formula for how much of each is needed, bureaucratic over organic, only that both are. In a bureaucracy, when tasks are mandated from on high, they get done. In an organic/learning organization, individuals feel empowered to change the course of not just their functional specialization, but the overall mission and how the pieces inter-relate. Both are needed for sustainability.

The data collected supports contingency theory as an explanation for how these organizations have responded to the sustainability challenge. These organizations have taken, and continue to take, actions to change specific aspects of their structure and culture in support of sustainability goals. They have set aside funding, hired staff, designated roles and responsibilities, and instituted cross-functional teams in otherwise strictly segmented and hierarchal reporting chains. They have opened their fairly closed internal operations to outside attention, making sustainability a key point of communication both internally and externally about their values as organizations. There is a daily tension experienced by the sustainability practitioners at these organizations as they attempt to be innovative in a culture that is resistant to innovation. They also struggle to define sustainability in terms that can be mandated by their existing bureaucracies, recognizing this will help but won't get them where they need to go

(Figure 43). The tension of the two modes of organizing is evident, with the bureaucratic characteristics still very dominant over the more organic or learning aspects.



**Figure 43. Effect of Organizational Structure and Culture at the Case Study Organizations**

This research did not reveal which case studies' approach to implementing sustainability is stronger. As described previously, there are very similar levels of success perceived across the case studies. The areas of where the case studies are being challenged are also similar. Nothing was found that consistently points to one approach being stronger than the other. The need to fully engage across both side of the house is evident, however, regardless of where you start. Everyone needs to be on board. Without the support functions engaged, you will have trouble truly changing the important sustainability metrics you seek to influence. You need to install and maintain water efficient plumbing fixtures, use bio-preferred lubricants and cleansers, keep focused on the new HVAC system, even if it has more maintenance issues than the old one, and enforce sustainability goals in new construction and ongoing renovations. Likewise, the core mission side of the house needs to be engaged. They need to see the value of sustainability in

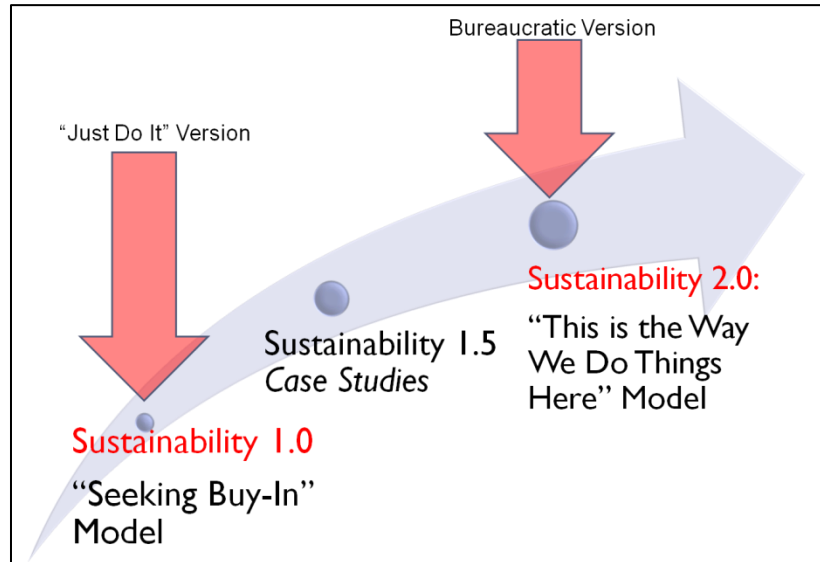
accomplishing the mission. Once this occurs, Soldiers will recycle in the barracks or use the post shuttle system. Students will question the electricity use of the University's classroom buildings or look for food from local markets in the cafeteria. Researchers will look for more water-efficient ways to clean and sanitize their equipment or alternative energy sources for their experiments. Success builds upon success.

Sustainability is a complex idea and large organizations are complex systems. If the mission side does not support the operation and maintenance efforts, there will continue to be a struggle for resources needed to employ dedicated sustainability personnel, install new water pipes, or add insulation. Sustainability efforts must be able to demonstrate value to the mission side and vice versa. Measurement and communication systems need to show how savings benefit the entire organization, but in large bureaucracies, many stakeholders are not motivated by big goals, rather they have more immediate concerns in their functional area. Incentives at each level must be aligned with the sustainability goals. For instance, when energy savings are realized they are not recognized because the energy users do not pay that bill. The financial systems may need to be re-designed in order to ensure the incentives are in place, as saving money often means losing that money in next year's budget. These types of changes require innovation, discontinuity with how things have always been done.

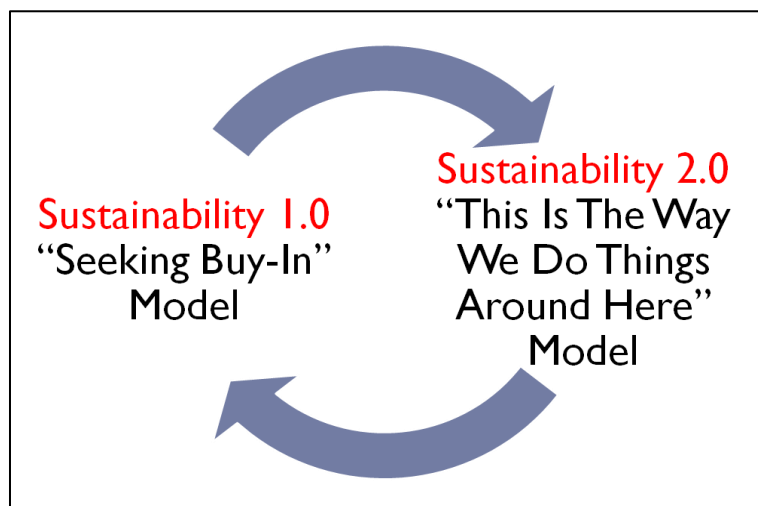
A theory of sustainability implementation in large public organizations as moving through phases was articulated in the literature and again by study participants (Figure 44). Sustainability typically starts by a champion (or champions) with a change effort kick off to get folks excited, sell them on the idea, communicate the need and goals. Here is where the seeds of innovation must be planted and then cultivated, the cross functional teams are clearly a sign of this. Empowering change agents is another. Accepting higher risks for new management

approaches or technologies also a sign of the innovation seed. As the program matures, it must slowly get adopted by the bureaucracy and become part of what is every day business, referred to as Sustainability 2.0. This phase is more consistent with the existing organizational structure and culture. This theory of sustainability for large public organizations seems linear, or sequential, with a Sustainability 3.0 as yet undefined. Sustainability 3.0 may be thought of as the engagement at the individual level, ensuring sustainability programs actively incorporate the incentives, drivers and motivations of the people that make up the organization, as consistent with Sharp (2009) and observations by study participants.

The research conducted here supports a slightly different theory of sustainability in large public organizations (Figure 45). This is not a theory of sequential phases, but a constant back-and-forth in reinforcing fashion between Sustainability 1.0 and 2.0 as these are easily equated with the two modes of organizing and the constant tension between them. This theory of sustainability reminds organizations to not only expect the tension, but to encourage it. There is not a next phase or Sustainability 3.0, the raw material for success is already there. The important finding is that the organizations must continually refresh, support and encourage the innovation seed planted by Sustainability 1.0 because it is pushing against much internal resistance. This can be done with annual workshops or conferences, additional funding, new hires, new goals, employee recognition, and applications for awards. All those activities and attributes that enabled Sustainability 1.0 must be continually and conscientiously reinforced.



**Figure 44. Theory of Sustainability in Large Public Organizations, Based on Literature**



**Figure 45. Theory of Sustainability in Large Public Organizations, Based on Research Findings**

## CHAPTER 9

### CONCLUSIONS

The results of this dissertation provide valuable insights into sustainability implementation at large public organizations. The results show that the case study organizations, as large public organizations, have actively provided a context for their employees to innovate which is not typical for their existing structure and culture. This is predicted by contingency theory, as long as the goals and objectives of sustainability are important to these organizations. The case studies also provide a structure to enforce goals and objectives. They do not appear to have achieved a balance between bureaucratic and organic structural forms, as the bureaucratic is still very dominant. But they are making strides in balancing the two in support of their sustainability efforts. This research did not indicate how much of one over the other is preferable for success, only that both are indeed present at these organizations. As consistent with contingency theory, as the goals of the organization change, the organizations seek to adapt structures and cultures to ensure success. As consistent with environmental planning theory, sustainability creates unique demands on organizations as they seek to reduce negative environmental outcomes through voluntary efforts. The level to which bureaucracy inhibits innovation seems to be balanced by bureaucracy's ability to institutionalize change, but *both* areas need to be stronger to achieve more dramatic results. Significant implications for large public organizations, environmental planning, and sustainability are outlined in this chapter. First, however, the propositions developed are revisited to analyze the extent to which the case studies support theory development in this area.

**Proposition 1.** Bureaucratic organizations will be successful in implementing sustainability if the organization has a strong orientation toward the external environment.

The research results support this proposition, as evidence of orientation to the external environment was found across the case study organizations. The organizations engage external stakeholders, professional organizations, peer institutions, parent organizations and suppliers in support of their sustainability programs. They all share information on their programs with interested external parties through their websites and conference presentations. On the other hand, the organizations are not driven as much by external influences as expected. The interview subjects described many different motivations, much of it considered to be internal such as long-term mission success and doing the right thing. The influence of internal drivers was consistently reported across the organizations as more significant than external drivers, so the role of internal drivers is clearly important to sustainability success and needs to be incorporated into this proposition.

**Proposition 2.** Bureaucratic organizations will be successful in implementing sustainability if the organization has leadership that is supportive of and knowledgeable about sustainability.

The research results support this proposition, as evidence of leadership support was found across the case study organizations. Respondents from all three organizations agree there is positive support from their leadership. They also agree leaders are knowledgeable about sustainability. In bureaucracies, little is accomplished without leadership direction. The interview comments reflect uneven leadership support, however, and for some aspects of the organization, there is no engagement by leadership. The proposition, therefore, could be refined to reflect the different roles of leaders. Certain leadership qualities appear to be more influential



than others, particularly with reference to the leader's location in the hierarchy and therefore to the leader's immediate influence on the sustainability practitioners. Strong leadership statements at the very highest levels are essential to success, but so is the day-to-day support by leaders at lower levels of the organization. The leaders that are closest to sustainability implementation appear to need the most knowledge about the values and operating principles of sustainability. Middle management leaders appear to have a critical role, as well, when accounting or procurement processes must be changed. This proposition needs further development that articulates these variations in leadership support.

**Proposition 3.** Bureaucratic organizations will be successful in implementing sustainability if the organization has leadership and culture that supports innovation.

The research results support this proposition, as evidence of leadership and culture supportive of innovation were found in the case study organizations. Comments from the participants shows that, even though their organization is bureaucratic, they have ways of working within and around these attributes to get their jobs done, they feel empowered to affect decision-making, and they understand the unique requirements of sustainability. In particular, they typically work across functional divides to implement sustainability. So, even though functional divides exists, they feel able to work across them. They also feel leadership will listen to their ideas and if a solid argument is made, leadership will support these ideas. These feelings of empowerment toward the unique aspects of their roles are evidence of a supportive leadership and culture, especially since they often noted that what they were trying to accomplish was an uphill battle within the predominant culture. Sustainability practitioners that participated in this research understand the unique challenges of sustainability and feel empowered to take some risks, even when moderated by strongly risk-adverse cultures of their organizations. At the same

time, the concept of culture is difficult to measure so it is difficult to document the precise effect leaders have on the organization's culture in support of sustainability. More research and theory development is needed to articulate specific actions leaders in these bureaucracies have taken to encourage innovation by their personnel.

**Proposition 4.** Bureaucratic organizations will be successful in implementing sustainability if the organization has effective internal management systems focused on sustainability.

The research results reveal little evidence of effective internal management systems at these organizations in relation to sustainability program implementation and monitoring. Although there is evidence that metrics are in place and efforts are made to collect sustainability-related data, there is little evidence that the information is communicated effectively in support of the program's goals, or that individual employees have accountability for sustainability performance in their evaluation systems. At the same time, the need for effective metrics is also consistently identified as a challenge across all of the case studies when it comes to justifying sustainability investments and documenting the impact of the program. Interview comments reveal a perception that metrics are the next important implementation step and a critical need. Participants also linked this challenge to their overall success rate in many goal areas. So, even though the case studies did not have effective internal management systems as expected, this was acknowledged as important to their success in the long run. More research is needed to document the types of metrics that can be used and how to incorporate these into existing decision support systems. This type of information can help the case studies as well as other organizations working on sustainability.

**Proposition 5.** Bureaucratic organizations will be successful in implementing sustainability if the organization has structures that encourage cross-functional interaction.

The case studies have all instituted cross-functional team structures as part of their sustainability programs. Fort Bragg has teams for each sustainability goal area under the main strategic goal. ORNL has teams shaped by each individual roadmap, and the UNH has task forces based on overarching topical areas. These attempts to bridge functional divides are important aspects of the sustainability programs in recognition of the need to engage across stovepipes to accomplish the overarching sustainability goals. This proposition is therefore supported by the research findings. At the same time, while the research indicates a need to strengthen these teams, it provides no clear evidence as to what actions can be taken to accomplish this. These teams are not strong organizational structures when compared to the existing functional divides and hierarchies. Participants consistently expressed concerns about the effectiveness of the teams in implementing change efforts. Given that the ability of the teams to influence decision making is a critical component for sustainability success, this proposition needs further development.

**Proposition 6.** Bureaucratic organizations will be successful in implementing sustainability by providing stable funding to the program over time.

The research results support this proposition, as evidence of sustained financial and leadership support over time was found at each of the case study organizations. The organizations have dedicated funding to personnel -- sustainability planners at Fort Bragg, coordination personnel at ORNL, and administrative staff at the UNH. Seed money for projects is available at ORNL and the UNH. Sustainability professionals at the case studies strongly agree that leadership is behind their efforts and that this is evident in sustained financial support.

Even with this evidence, it is also obvious from the challenges described that the sustainability practitioners must still constantly justify the funding for sustainability programs as a result of the fiscally constrained environments they work in. They struggle to measure success and equate this to investments such that the funding continues.

**Proposition 7.** In the absence of conditions identified in Propositions 1-6, bureaucratic structures and cultures will inhibit implementation of sustainability initiatives.

This final proposition is also supported. The results of this research show mixed evidence of success. Although examples of recent accomplishments were documented and participants consistently report progress towards environmental sustainability goals, implementation challenges were described which indicated much more could be accomplished. As noted above, evidence of the expected activities and attributes associated with strong sustainability programs (Propositions 1-6) is uneven, and this unevenness of precursors to sustainability is consistent with mixed evidence of success in implementation. The sustainability programs appear to only have made small inroads in the predominantly bureaucratic cultures and structures (Figure 43), indicating that all expected activities and attributes have not been implemented in an integrated fashion in support of sustainability. The research did not find clear evidence of innovative activities; most of the activities conducted to date can be considered incremental changes consistent with the existing mission and goals of the organization. Additional research is needed to clarify this relationship. This will require a clearer operationalization of what constitutes evidence of innovation in support of sustainability, such that this can be documented. Creating cross functional teams in support of sustainability can be considered innovative, but only if these teams result in significant outcomes that could not

otherwise be achieved. More research is needed to support this proposition and resulting implications for sustainability implementation in large public organizations.

### **9.1 Implications for Implementing Sustainability in Large Public Organizations**

This research provides a pragmatic view of establishing a sustainability program within a large public organization based on the efforts taken by the case studies. A few of the more important implications can be summarized as follows. Based on the case studies, organizations interested in implementing sustainability should set up new organizational structures within their existing hierarchies that are team-based and intentionally cross-functional. There will be a tension between the predominantly bureaucratic structure and culture and these teams as the members attempt to view the organization as an integrated whole and come up with innovative solutions. Sustainability practitioners are needed that have specific roles to support the programs. These personnel are funded separately from the team members that will take time from their assigned duties to participate on these teams. Organization leadership should become informed on sustainability principles and what these imply for their organization. Leaders should encourage sharing of credit for any sustainability successes to overcome internal competition for resources. Organizations implementing sustainability programs will need to develop metrics that inform sustainability efforts and link these across functional divides. These will likely be new metrics and may require an investment in more electric or water meters, new information systems, and new reporting chains. Based on the research results, organizations should recognize that bureaucratic inertia will negatively affect the sustainability practitioners and teams, so activities to encourage innovation will be needed. These organizations will need to link sustainability efforts to the success of the core mission. Leaders should understand the

threats (current and future) and how sustainability will reduce these risks and make their organizations more resilient.

## **9.2 Implications for Environmental Planning**

The primary implication for environmental planning is that even though improved environmental outcomes may be the goal, environmental planners cannot achieve these outcomes without substantial involvement by other stakeholders in the bureaucracy. In this latest phase of environmental planning as predicted by the literature and as supported by this research, planners will be embedded within the organizations, they will no longer dictate behavior from the outside. At this phase in its adoption, sustainability for large public organizations is about operating facilities. Most of those who implement sustainability are not environmental professionals. They are engineers, procurement specialists, architects, or operations and maintenance personnel. They are individuals who were not trained in environmental issues, and don't necessarily see them as part of their responsibility. This is true independent of where sustainability is housed, core mission or support functions, as engagement with those outside of this home will still be a central challenge. Bureaucracies are good at assigning roles and responsibilities, at stove piping expertise and knowledge. A champion must be assigned (the environmental planner). But, the downside of this assignment must be aggressively addressed. Sustainability is a responsibility that everyone shares. Someone does have to be responsible, or the program will go nowhere, but once this responsibility is assigned, it must continue to spread outward.

When environmental planners try to improve environmental outcomes in their organizations, they must work within existing roles and responsibilities to inspire and motivate. They must do this over long periods of time with little budget and possibly inconsistent support from leadership. They must be creative in engaging and showing success when they have little

control over the performance reviews and job expectations of their peers. They need to cajole, convince and stay positive. They no longer have the big stick or even the carrot; this isn't about regulations or requirements. Sustainability for organizations is about more efficient operations, about being a leader among its peers, about being responsible to future generations.

Environmental planning must therefore be informed by the concepts and research findings from the public management, organizational change and organization theory literature to enable a broader understanding of what organizations will face as they seek a more sustainable future for their operations, missions and the states and nations they serve.

### **9.3 Implications for Sustainability**

The implication for sustainability as a guiding principle for the improvement of environmental outcomes is twofold. First, sustainability does imply the need for approaches that are integrated, holistic, collaborative, pluralistic, strategic, interactive, place-based, future-oriented, systems-based and adaptive. In other words, sustainability requires large public organizations to be both innovative and bureaucratic. Second, sustainability needs to become a core value for organizations. Once it becomes a core value, then contingency theory tells us that the organizations will change to express their new core value and all the implied goals and objectives associated with that value.

What does sustainability mean for the core mission? How can sustainability be defined so the bureaucracy can take charge? Sustainability for facilities and campus operations, the support function, is fairly well defined. It implies lower energy use, lower water use, less solid waste generation, more use of non-hazardous materials, and more local procurement to reduce environmental footprint. But, what does this mean for the core mission? Where do these goals intersect? If the sustainability goals are to operate the campus with less negative environmental

impacts, then it doesn't appear the lack of sustainability goals for the mission functions matter unless the mission activities are directly causing the impacts. But it is a single organization and all members have an effect on sustainability. The various branches and divisions of an organization should all be striving for the same overarching goals for the organization as a whole. For manufacturing organizations, this is a much easier link to make. These organizations know that inputs become outputs and can equate one to the other rather well. So much water, raw materials, labor, and energy equals so much product and thus profit. For non-manufacturing organizations that are not profit-driven, this is a harder connection. Yet organizations that produce knowledge, educate, and defend have significant effects on environmental conditions, their footprint is not any lighter than another organization. They consume natural resources, discharge wastes, contaminate storm water and change land use. They generate GHGs and procure goods that have life cycle impacts far from the campuses. Furthermore, the individuals educated and trained by the UNH and the U.S. Army will have an effect on society based on what they learn, or do not learn, with their time at these organizations. Sustainability needs to become a core value, just as safety, honor, integrity, or ingenuity are core values. This will drive the organizational changes needed for sustainability success.

#### **9.4 Limitations**

There are several limitations to this research, specifically within the design of interview questions, the selection of interview subjects and the selection of the cases. The interview questions were based on activities and attributes that *should* be present to enable success. This made it very easy for the respondents to agree, because these are things they could easily recognize they need. Overall, it may have presented a more positive picture of the programs than would be obtained from more precise measures of organizational functions. Likewise, only



individuals with responsibility for sustainability were interviewed; they may have answered more positively because they felt the results were a reflection of their performance. Even though they were assured of anonymity, they may still have felt protective of their position, division or leadership. This affects the validity of inferences about the presence of certain attributes or activities.

Measuring the success of sustainability programs is challenging for the case study organizations, this research, and the field of environmental planning. There are multiple approaches that could be used to measure sustainability success and the approach used in this research relied heavily on the opinions of the participants. It is therefore subject to the same validity issues as stated above.

This research explored possible causal relationship between attributes and activities and desired outcomes of an organization. This relationship is extremely complex and many variables may have been missed. The cases were selected due to their successful implementation of sustainability; cases not achieving success could be added to the research design in order to identify variables that were missed in this research.

### **9.3 Future Research**

There are many different avenues that can be pursued as a consequence of what was presented in this dissertation. In order to support the generalization of these results to other organizations, additional case studies are needed. It would be informative to interview more subjects from a single organization, making sure the sample is representative of the functions and personnel overall and not just those responsible for sustainability implementation. At organizations the size of those examined here, random sampling methods could be used. Another enhancement would be to look at the full range of sustainability implications, focusing

on economic and social outcomes as well as environmental. Either of these approaches will give a more balanced perspective of the effect of sustainability programs. The extent to which other individuals know about the program, are engaged in it, and feel its effect will be very telling.

Other areas of future research should examine case studies of differing characteristics and that would also help substantiate the findings presented here. This could be *small*, public organizations or large, *private* ones, for instance. Likewise, case studies of large public organizations who have attempted sustainability but have had limited success would be very informative. As stated in section 6.2, additional research on the data collected here could be conducted using the theoretical lens of boundary spanning to examine possible implications for sustainability implementation from this body of literature.

Finally, a pragmatic area of needed research is to define sustainability performance measures for large public organizations that operate campus settings in support of their missions. Each of the case studies is struggling with this and research that identifies various measures, compares what works and what does not, and shares lessons learned would help these and future organizations define sustainability and support their on-going efforts more effectively, thus shortening the learning curve for all involved. Such a research effort will also help shape the theory of what a sustainable organization looks like, leading to planning, organizing and implementing what should be.

**Appendix A**  
**Sustainability Outcomes Comparison Matrix**

**Table A.1 Sustainability Outcomes Comparison Matrix**

<b>Topic Area/Media</b>	<b>Executive Order 13514</b>	<b>Sustainability Tracking, Assessment &amp; Rating System (STARS)</b>	<b>Global Reporting Initiative (Core Requirements Only)</b>	<b>College Sustainability Report Card</b>
<b>Greenhouse Gas (GHG) Emissions</b>	Reduce scope 1, scope 2, and scope 3 GHG emissions	GHG emissions reduction		Commitment to GHG emissions reduction Realized GHG emissions reduction
	Pursue opportunities with vendors and contractors to address and incorporate incentives to reduce GHG emissions		Financial implications and other risks and opportunities for the organization's activities due to climate change	
	Establish and support a comprehensive inventory of absolute GHG emissions, including scope 1, scope 2, and specified scope 3 emissions	GHG emission inventory	Total direct and indirect GHG emissions by weight Other relevant indirect GHG emissions	GHG emissions inventory
<b>Transportation</b>	Support lower-carbon commuting and travel by staff	Employee commute modal split		Local Transportation Alternatives; Bicycle Program; Car-Sharing Program; Parking Policies
	Participate in regional transportation planning and recognize existing community transportation infrastructure			
	Consider sites that are pedestrian friendly, near existing employment centers and accessible to public transit when planning new facilities or leases	Student commute modal split		Planning: promote pedestrian- and bike-friendly campus
<b>Energy</b>	Reduce energy intensity in buildings	Building energy consumption	Direct energy consumption Indirect energy consumption	Energy efficient technologies; Retro commissioning of HVAC systems and/or installing technologies
	Increase use of	Renewable energy		Renewable energy

<b>Topic Area/Media</b>	<b>Executive Order 13514</b>	<b>Sustainability Tracking, Assessment &amp; Rating System (STARS)</b>	<b>Global Reporting Initiative (Core Requirements Only)</b>	<b>College Sustainability Report Card</b>
	renewable energy			generation Renewable energy purchase
	Implement renewable energy generation projects on agency property			On-site combustion; generating energy for heating and/or cooling from renewable sources
	Ensure that all new buildings that enter the planning process are designed to achieve zero-net energy			
	Implement best management practices for energy-efficient management of servers and data centers			Energy conservation; programs with incentives for member of campus community to reduce energy use
<b>Hazardous Materials &amp; Hazardous Waste</b>	Reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of	Hazardous waste management	Emissions of ozone-depleting substances by weight	
<b>Hazardous Materials</b>	Increase use of acceptable alternative chemicals and processes in keeping with the agency's procurement policies	Integrated pest management		
<b>Pollution Prevention</b>	Implement integrated pest management and other appropriate landscape management practices			
	Minimize the generation of waste and pollutants through source reduction		Total number and volume of spills NOx, SOx and other significant air emissions by type and weight	
	Continue implementation of formal environmental management systems at all appropriate organizational levels			

<b>Topic Area/Media</b>	<b>Executive Order 13514</b>	<b>Sustainability Tracking, Assessment &amp; Rating System (STARS)</b>	<b>Global Reporting Initiative (Core Requirements Only)</b>	<b>College Sustainability Report Card</b>
<b>Solid Waste</b>	Divert 50% of non-hazardous solid waste, excluding construction and demolition materials and debris	Waste diversion	Total weight of waste by type and disposal method	Recycling of Traditional Materials (bottles, cans, cardboard)
	Divert 50% of construction and demolition materials and debris	Construction and demolition waste diversion		Divert nonhazardous construction and demolition waste from landfills
	Reduce printing paper use and acquire uncoated printing and writing paper containing at least 30% post-consumer fiber	Office paper purchasing		
	Increase diversion of compostable and organic material from the waste stream			Food Composting and Waste Diversion; Composting (Aside from Dining Facilities)
		Waste Reduction		Source Reduction
<b>Sustainable Acquisition</b>	Ensure that 95% of new contract actions including task and delivery orders, for products and services are energy efficient, water efficient, biobased, environmentally preferable, non-ozone depleting, contain recycled content, or are non-toxic or less-toxic alternatives, where such products and services meet agency performance requirements	Food purchasing Cleaning product purchasing	Material used by weight or volume Percent of materials used that are recycled input materials	Green Purchasing; mandating though a formal policy or informally prioritizing the purchase of reusable or green-certified materials, including, but not limited to, Energy Star products, environmentally preferable paper products, and eco-friendly cleaning products Locally Grown and Produced Food; Organic and Sustainability Produced Food; Fair Trade Products; Dishware and Eco-friendly Incentives;
	Ensure procurement preference for EPEAT-registered	Computer purchasing		

Topic Area/Media	Executive Order 13514	Sustainability Tracking, Assessment & Rating System (STARS)	Global Reporting Initiative (Core Requirements Only)	College Sustainability Report Card
	electronic products			
	Establish and implement policies to enable power management, duplex printing, and other energy-efficient or environmentally preferable features on all eligible agency electronic products	Vendor Code of Conduct		
	Employ environmentally sound practices with respect to the disposition of excess or surplus electronic products	Electronic waste recycling program		Recycling of electronic waste
	Ensure the procurement of Energy Star and FEMP designated electronic equipment			
<b>Sustainable Building</b>	Ensure all new construction, major renovations, or repair and alternation of buildings complies with the <i>Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings</i>	Indoor Air Quality		Renovation and Retrofits (LEED-Existing Buildings, Energy Star, etc.)
	Ensure that at least 15% of buildings (above 5,000 gross square feet) and building leases (above 5,000 square feet) meet the <i>Guiding Principles</i> and that annual progress is made toward 100-percent conformance with the <i>Guiding Principles</i>	Design and construction		Green Building Policy; Green Building Standards
	Pursue cost-effective, innovative strategies, such as highly reflective and	Building operations and maintenance		

<b>Topic Area/Media</b>	<b>Executive Order 13514</b>	<b>Sustainability Tracking, Assessment &amp; Rating System (STARS)</b>	<b>Global Reporting Initiative (Core Requirements Only)</b>	<b>College Sustainability Report Card</b>
	vegetated roofs, to minimize consumption of energy, water, and materials			
	Manage existing building systems to reduce the consumption of energy, water, and materials, and identify alternatives to renovation that reduce existing assets' deferred maintenance costs			Install energy efficiency and water conservation retrofits
	Identify opportunities to consolidate and dispose of existing assets, optimize the performance of the agency's real property portfolio, and reduce associated environmental impacts when adding asset to the agency's real property inventory			
	Ensure that rehabilitation of historic buildings utilizes best practices and technologies in retrofitting to promote long term viability of the building			
<b>Fleet Management</b>	Use low greenhouse gas emitting vehicles (including alternative fuel vehicles)	Campus fleet		Campus Motor Fleet, vehicles that run on clean-burning fuels or electricity, Minimize GHG emissions form campus vehicles
	Optimize the numbers of vehicles in the agency fleet			
	Reduce fleet consumption of			



<b>Topic Area/Media</b>	<b>Executive Order 13514</b>	<b>Sustainability Tracking, Assessment &amp; Rating System (STARS)</b>	<b>Global Reporting Initiative (Core Requirements Only)</b>	<b>College Sustainability Report Card</b>
	petroleum products 2% annually			
<b>Water</b>	Reduce potable water consumption 26%	Water consumption	Total water withdrawal by source	
	Reduce industrial, landscaping, and agricultural water consumption by 20%			
	Identify, promote, and implement water reuse strategies, as consistent with State law		Total water discharge by quality and destination	
<b>Stormwater</b>	New construction projects must restore predevelopment hydrology with regard to temperature, rate, volume, and duration of stormwater flow (Low Impact Development)	Stormwater management		
<b>Biodiversity</b>			Location of high biodiversity areas and description of significant impacts to protected areas and high biodiversity areas	
<b>Planning Administration Engagement</b>	Senior Sustainability Officer			Advisory Council; integrating multiple stakeholders, involving students Sustainability Staff; Sustainability office or department
	Strategic Sustainability Performance Plan	Coordination and Planning: Coordination, strategic plan, campus plan, sustainability plan, climate plan		Sustainability Policies; commitment by president and senior administration; mission statement, strategic plans, master plans, endorsements Website
<b>Human Rights, Labor Practices</b>		Diversity and Affordability: coordination (diversity and equity), campus diversity culture,	Investment and Procurement Practices: human rights clauses, screening (includes suppliers)	

Topic Area/Media	Executive Order 13514	Sustainability Tracking, Assessment & Rating System (STARS)	Global Reporting Initiative (Core Requirements Only)	College Sustainability Report Card
		support programs under-represented groups, support programs future faculty, affordability and access programs		
		Human Resources: Sustainable compensation, employee satisfaction, staff professional development in sustainability, new employee orientation, sustainability educators program	Employment (diversity & equal opportunity); Labor/Management Relations; Occupational Health and Safety; Training and Education	
			Non-Discrimination; Freedom of Association and Collective Bargaining; Forced and Compulsory Labor; Child Labor	
<b>Transparency, Responsibility</b>		Investment: Committee on socially responsible investment, stakeholder advocacy, positive sustainability investments	Customer Health and Safety; Product and Service Labeling; Marketing Communications; Customer Privacy; Compliance Coverage of benefit plan obligations	Endowment Transparency: investment holdings, proxy voting record, accessibility
		Public Engagement: Community sustainability partnerships, inter-campus collaboration in sustainability, sustainability in continuing education, community service participation, service hours, policy advocacy, trademark licensing	Community: impacts of operations; Corruption/ethics; Public Policy positions and participation; Compliance	Student Engagement: residential communities, new student orientation, internships and outreach, student organizations, sharing with other universities, competitions Stakeholder Engagement: proxy vote decisions, stakeholder involvement, school community input, sustainability voting record
			Policy, practices and proportion of spending	Investment Priorities: renewable

<b>Topic Area/Media</b>	<b>Executive Order 13514</b>	<b>Sustainability Tracking, Assessment &amp; Rating System (STARS)</b>	<b>Global Reporting Initiative (Core Requirements Only)</b>	<b>College Sustainability Report Card</b>
			on locally-based suppliers at significant locations of operation; Procedures for local hiring; Development and impact of infrastructure investments and services	energy and sustainable investments, community investments, on-campus sustainability projects, donor fund option, optimizing investment return
			Financial assistance received from government	
<b>Mission, Core Activity</b>		Co-Curricular Education: Student and Educators programs, outreach, orientation, materials and publications	Initiatives to mitigate environmental impacts of products and services, and extent of impact mitigation	
		Curriculum: Sustainability courses (focused, related, by department), learning outcomes, undergraduate program, graduate program, immersive experience, literacy assessment, incentives	Percentage of products sold and their packaging materials that are reclaimed by category	
		Research: Faculty and department involvement, incentives, tenure and promotion	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations	
			Economic Performance: economic value generated (revenues, operating costs, employee compensation, donations, earnings, payments to capital providers and governments)	

**Appendix B**  
**Innovation and Sustainability Literature**

**Table B.1. Orientation to the External Environment**

Summary of Characteristics from Literature Innovative, Sustainable Organizations will...	Source	Expected Activities/Attributes
Cross sectors Focus on interest convergence, coalition building, partnerships, and otherwise developing and promoting common interests	Levins & Senger, 1994	<p>Organization has outward focus that results in interaction with the external environment</p> <p>Examples:</p> <ol style="list-style-type: none"> <li>1) Participation in conferences, workshops, professional societies specifically oriented on promoting sustainability principles and practices</li> <li>2) Sharing of information on its internal sustainability metrics</li> <li>3) Participation in external work groups (focused on sustainability solutions)</li> </ol>
<p>Work with “peak” organizations (professional associations, environmental nongovernmental organizations, etc) on sustainability issues</p> <p>Take political action to promote sustainability</p> <p>Behave in ways that are congruent with other levels in the system</p> <p>Initiate and be involved in numerous environmental partnerships and external stakeholders</p> <p>Utilize conflict resolution strategies for external issue resolution</p> <p>Apply extensive resources to inter-organizational cooperation</p> <p>Be involved with external education and awareness forums</p> <p>Adopt marketing and procurement policies emphasizing sustainable products and services to enlarge markets for such services</p> <p>Provide information about their sustainability performance to external media</p> <p>Encourage and assist other organizations to adopt sustainability oriented activities</p>	Starik & Rands, 1995	
<p>Be subject to external turbulence and shocks</p> <p>Receive support from external stakeholders for the innovation</p> <p>Collaborate with external stakeholders/entities</p> <p>Obtain financial resources from external sources to support change efforts</p>	Light, 1998	
<p>Have a “whole systems” perspective; it recognizes that it is part of a larger system of relationships and promotes its sustainability agenda throughout all of these</p> <p>Communicate with outside stakeholders and seek to influence these</p> <p>Create partnerships</p> <p>Participate in scientific networks, sustainability workshops</p> <p>Publish sustainability reports</p>	Nattrass & Altomare, 1999	<p>Organization lobbies for supportive external regulations, policies, guidance, etc., including from higher headquarters (parent organization)</p> <p>Organization seeks to influence suppliers and customers toward sustainable practices</p>
<p>Have external orientation, allowing it to learn from others</p> <p>Work across organizational boundaries to look for innovative solutions by bringing together different expertise</p> <p>Participate in inter-organizational work groups, external conferences, professional networks</p>	Borins, 2001	
<p>Make a compelling case for sustainability based on crises or shocks</p> <p>Interact with and involve powerful external individuals and groups</p>	Doppelt, 2003	

Summary of Characteristics from Literature Innovative, Sustainable Organizations will...	Source	Expected Activities/Attributes
Develop myriad external economic, social, and environmental alliances, networks, and relationships with other firms, governments, interest groups, communities, activists and so forth	Stead & Stead, 2004	
Be responsive to external environment	Osborne & Brown, 2005	
Engage in collaborative approaches Lobby industry bodies Engage and communicate with stakeholders about the importance of sustainability Use sustainability criteria to encourage suppliers to adopt sustainability practices Participate in global sustainability partnerships Participate in industry groups, green building councils, conferences	Stubbs & Cocklin, 2008	

**Table B.2. Supportive Leadership and Culture**

Summary of Characteristics from Literature Innovative, Sustainable Organizations will...	Source	Expected Activities/Attributes
Have strong leadership – “management matters” Have leaders with entrepreneurial and flexible attitudes Be adaptive, conduct informal experiments Will support iterative, experiential learning and risk-taking; have a tolerance for mistakes Understand and manage organizational culture Promote success and early gains; recognize contributions Have a well-defined mission and be vision-focused Have a long-term perspective	Levins & Senger, 1994	<p>Organization has leaders that are knowledgeable about sustainability and aggressively support the incorporation of the concept into the entire organization’s operations</p> <p>Examples:</p> <ol style="list-style-type: none"> <li>1) Participation in visioning and strategic planning workshops</li> <li>2) Constant communication of the vision and goals within all levels of the organization and with external stakeholders</li> <li>3) Make a compelling case for the need for change</li> <li>4) Have a long-term perspective</li> </ol> <p>Organization has leaders that support a culture of innovation</p> <p>Examples:</p> <ol style="list-style-type: none"> <li>1) Institute reward and recognition programs</li> <li>2) Share power, share credit, and consider new ideas</li> </ol>
Have leaders who incorporate sustainability considerations into decisions Have leaders who are personally involved in the sustainability efforts and support environmental values Design organization to empower individual innovation (budgeting and reward systems, communication systems, organization structure, decision making systems) Develop a culture based on shared sustainability values (slogans, symbols, rituals, etc.)	Starik & Rands, 1995	
Have leadership that is not about being “heroic” – rather is about creating conditions for others to succeed; they are able to share power, share credit, and consider new ideas Create a compelling vision and communicate it broadly and consistently Communicate and celebrate its successes Have leadership that is “durable” (in it for the long haul) Set up formal and informal activities that help the organization learn Understand that employees are not motivated only by	Light, 1998	

Summary of Characteristics from Literature Innovative, Sustainable Organizations will...	Source	Expected Activities/Attributes
pay		<p>Organization has a culture that supports and rewards innovation Examples:</p> <ol style="list-style-type: none"> <li>1) Ongoing training programs in sustainability</li> <li>2) Support of information sharing regarding sustainability</li> </ol> <p>Organization has a clearly articulated vision of sustainability which it tirelessly communicates</p>
<p>Have endorsement and active support for sustainability from the top</p> <p>Have a well articulated vision, and compelling strategies</p> <p>Have a positive attitude toward change that supports experimentation</p> <p>Learn from mistakes</p> <p>Have extensive employee involvement at every level</p> <p>Training, awards and recognition geared towards sustainability</p>	Natrrass & Altomare, 1999	
<p>Have sponsorship for change program from senior managers</p> <p>Establish organizational priorities</p> <p>Provide conduit for communication</p> <p>Provide active recognition and legitimacy</p> <p>Create conditions for all staff to contribute</p> <p>Give innovation awards and prizes; public recognition for success</p> <p>Believe innovation is “everyone’s responsibility”</p>	Borins, 2001	
<p>Have leaders that lead</p> <p>Devise new forms of governance that encourages employee engagement and participation</p> <p>Support risk taking, and accept mistakes</p> <p>Invest in sustainability training and knowledge sharing; skill, knowledge and understanding of sustainability must continually expand</p> <p>Tirelessly communicate sustainability vision, goals, objectives and progress</p> <p>Promulgate discontent with prevailing mindset (take-make-waste)</p>	Doppelt, 2003	
<p>Have leaders that are “stewards”</p> <ol style="list-style-type: none"> <li>1) They commit themselves to something larger and more important than themselves</li> <li>2) They do not use, waste and discard for short-term gain, rather they nurture, preserve, and save for long-term survival and success</li> <li>3) They stand in service of the organizational vision, values, stakeholders and employees</li> <li>4) They instill core values which serve as the foundation for the sustainability vision and strategy</li> </ol> <p>Create structures and processes in which learning can take place</p> <p>Provide for continuous open, accurate, and honest dialog among organizational members</p> <p>Inspire and motivate employees to be part of the process and to sustain its momentum by empowering them</p> <p>Provide training, development and continuous learning programs</p> <p>Has a clear mission statement and understands how sustainability supports this mission</p>	Stead & Stead, 2004	
<p>Articulate a vision that incorporates a view of the future for the organization</p> <p>Members that have clear focus and motivation</p> <p>Communicate</p>	Osborne & Brown, 2005	

<b>Summary of Characteristics from Literature Innovative, Sustainable Organizations will...</b>	<b>Source</b>	<b>Expected Activities/Attributes</b>
Have values and a culture that encourage and stimulate innovation; “innovation-friendly” Have leadership and champions for change effort throughout the organization Ensure a wide spectrum of staff and stakeholders receive credit Take responsibility for mistakes, and don’t blame the innovation for problems		
Have skilled leadership Have commitment from management Have leaders with vision and passion for sustainability, even in unprofitable periods Have sustainability champions who educate staff and drive change Conduct ongoing education and “relentless communication” between sites and functions Incorporate sustainability into vision and mission	Stubbs & Cocklin, 2008	

**Table B.3. Effective Internal Management Systems**

<b>Summary of Characteristics from Literature Innovative, Sustainable Organizations will...</b>	<b>Source</b>	<b>Expected Activities/Attributes</b>
Design and implement mechanisms that sense accurately, interpret and promote corrective action (negative environmental, social or economic feedback) Develop and institute full-environmental-cost accounting procedures Build sustainability expectations into formal job descriptions and performance appraisals	Starik & Rands, 1995	Organization has measurement and accounting procedures that reflect sustainability metrics and provide constant feedback about the change efforts to all levels of the organization  Organization designs and implements employee performance appraisal systems that incorporate sustainability criteria and reward sustainability contributions
Establish systems to enable idea generation and communication Have strong accountability and governance systems Manage their budget	Light, 1998	
Build a knowledge base about sustainability (training materials, access to expertise) Develop appropriate metrics and use these for benchmarking and documentation Collect feedback based on these measurements at every level Institute Environmental Management Systems (i.e ISO 14000) Incorporate sustainability goals into their business plan Include sustainability criteria in financial reporting requirements, purchasing decisions, capital requests	Nattrass & Altomare, 1999	
Have internal management systems that enforce accountability and responsibility Have evaluation mechanisms in place to learn from experiments	Borins, 2001	
Have clarity of purpose – vision of how the organization will look, then think backwards; “ends” planning with sustainability principles	Doppelt, 2003	



<b>Summary of Characteristics from Literature Innovative, Sustainable Organizations will...</b>	<b>Source</b>	<b>Expected Activities/Attributes</b>
Measure progress and constantly communicate these metrics Develop and improve “sustainability data systems” : view organization as a whole system; evaluate existing conditions; develop strategy and tactics; develop implementation plan; link incremental improvement with major innovations		
Evaluate and communicate the results of the change effort Conduct environmental analysis that is based on systems thinking and focused on developing information flow, feedback loops, analytical processes, and dialog processes that will allow the organization to recognize, understand and capitalize on the turbulence that surrounds them Design performance appraisal systems that measure employee contributions to the firm’s sustainability performance criteria Regularly assess the degree to which the change effort achieve the goals and objectives	Stead & Stead, 2004	
Create evaluation mechanism from outset to learn positive lessons	Osborne & Brown, 2005	
Have a management system to track progress toward sustainability based on the Triple Bottom Line approach	Stubbs & Cocklin, 2008	

**Table B.4. Supportive Internal Structure**

<b>Summary of Characteristics from Literature Innovative, Sustainable Organizations will...</b>	<b>Source</b>	<b>Expected Activities/Attributes</b>
Develop formal methods and integrative mechanisms to unify and orient organizational units	Starik & Rands, 1995	<p>Organization has addressed the need to enhance interaction and integration amongst its functional units</p> <p>Examples:</p> <p>5) adjust organizational structure to one that is more “organic” (flat and team-based)</p> <p>6) formally implement and support cross-functional teams</p> <p>Organization has devoted resources to sustainability implementation consistently over time</p>
Have a “thin” organization – not too many layers between the “front line” and the top (especially for ideas to travel) Be very diverse demographically Experience internal turbulence Have few internal boundaries Have internal slack (resources available for innovation projects)	Light, 1998	
Provide the resources necessary for implementing sustainability	Nattrass & Altomare, 1999	
Provide the resources needed for the change efforts; carry surplus from one year to the next to fund innovation Foster diversity: broad job descriptions (over narrow); mandate staff diversify skills (over narrow specialization); promote cross-professional, cross-	Borins, 2001	

Summary of Characteristics from Literature Innovative, Sustainable Organizations will...	Source	Expected Activities/Attributes
department, cross-agency work groups		
Organize deep, wide and powerful transition teams – no single individual can transform an organization into a sustainable enterprise <ul style="list-style-type: none"> <li>- Teams can be: cross-functional, facility, product development, continuous improvement, innovation or learning teams, or monitoring and evaluation groups</li> <li>- Teams need: clear goals, clarity over rules, a home that bridges many department and functions and avoid “silo” problem, clarity over roles</li> </ul> Be facing a serious crisis or threat that cannot be addressed from the top-down OR the bottom-up	Doppelt, 2003	
Have “sustainability-centered” or “generative learning” organizational structures that are flat, flexible, dynamic, process-oriented, and rely on informal, knowledge-based, idea-driven, decision-making processes Create team structures that empower employees	Stead & Stead, 2004	
Implement decentralized organizational structure to generate new ideas Use hierarchical organizational structure to implement innovations Balance the tension between maintaining enough organizational stability to retain functionality and developing momentum for change Create organizational subsystems to support change effort (do not rely on individual leaders)	Osborne & Brown, 2005	
Have internal slack to accommodate extra activities associated with implementing sustainability	Stubbs & Cocklin, 2008	

**Appendix C**  
**Interview Protocol and Consent Form**

## Interview Protocol

1. Review the purpose of the study and the participant's rights. Have participant read and sign the consent form. This can be done via email prior to the site visit as part of the scheduling process. Address any questions they may have about the study.
2. Explain that interviews will be recorded both by hand (note taking) and through audio recording. Begin the recorder.
3. Gather background information on the participant.

### Interview Subject Characteristics

Functional Area:	
Job Description:	
Years at this organization:	
Training/Career Background:	
Role in Sustainability Implementation:	

4. Present participant with the "code sheet" to guide their responses. Encourage them to comment on their responses – this is just as important as the scores they assign.  
Code sheet for participants is simple Likert Scale.

0	1	2	3	4	5
I don't know	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree

5. For the next set of questions, please indicate the extent to which you agree with the statements.

### Organizational Characteristics

Statement	Score	Comments and Examples
This organization has a strictly defined hierarchy for decision-making with major decisions made by senior staff.		
My position has a few general guidelines, but I have a high level of autonomy for getting the work done.		
I typically interact with people within my discipline or functional area and rarely work across disciplines or functions.		
There are strictly defined roles and responsibilities governing my workplace.		

## Sustainability Success Rate

NOTE: Statements used will depend on the sustainability goal/functional area that the participant represents. All participants will be asked to comment on the last question.

Statement	Score	Comments and examples
We have been successful in reaching our sustainability goals in the area of water conservation and water quality.		
We have been successful in reaching our sustainability goals in the area of solid waste reduction.		
We have been successful in reaching our sustainability goals in the area of energy use reduction and alternative energy use.		
We have been successful in reaching our sustainability goals in the area of sustainable acquisition, or green procurement.		
The core mission of our organization has not adopted sustainability goals and objectives yet. Sustainability is primarily a facilities operations and/or environmental program.		

## Sustainability Success Factors

### 1. Orientation to the External Environment

Statement	Score	Comments and examples
<p>This organization has outward focus. Examples:</p> <ul style="list-style-type: none"> <li>4) Participation in conferences, workshops, professional societies specifically oriented on promoting sustainability principles and practices</li> <li>5) Sharing of information on its internal sustainability metrics</li> <li>6) Participation in external work groups (focused on sustainability solutions)</li> </ul>		
Our sustainability effort is motivated by external drivers/context		
This organization seeks outside partners for support of sustainability effort, to include financial support		
This organization lobbies for supportive external regulations, policies, guidance, etc., including from higher headquarters (parent organization)		
This organization seeks to influence suppliers and customers toward sustainable practices		

## 2. Supportive Leadership and Culture

Statement	Score	Comments and examples
<p>This organization has leaders that are knowledgeable about sustainability.</p> <p>Examples:</p> <ol style="list-style-type: none"> <li>1) Make a compelling case for the need for change</li> <li>2) Have a long-term perspective</li> </ol>		
<p>Our leaders aggressively support the incorporation of the concept into the entire organization's operations</p> <p>Examples:</p> <ol style="list-style-type: none"> <li>1) Participation in visioning and strategic planning workshops</li> <li>2) Constant communication of the vision and goals within all levels of the organization and with external stakeholders</li> </ol>		
<p>This organization has leaders that support a culture of innovation</p> <p>Examples:</p> <ol style="list-style-type: none"> <li>3) Institute reward and recognition programs</li> <li>4) Share power, share credit, and consider new ideas</li> </ol>		
<p>This organization has a culture that supports and rewards innovation</p> <p>Examples:</p> <ol style="list-style-type: none"> <li>3) Ongoing training programs in sustainability</li> <li>4) Support of information sharing regarding sustainability</li> <li>5) Award programs</li> </ol>		
<p>This organization has a clearly articulated vision of sustainability which it tirelessly communicates</p>		

## 3. Effective Internal Management Systems

Statement	Score	Comments and Examples
<p>This organization has measurement and accounting procedures that reflect sustainability metrics</p>		
<p>This organization uses sustainability metrics to provide constant feedback about the change efforts to all levels of the organization</p>		
<p>This organization designs and implements employee performance appraisal systems that incorporate sustainability criteria and reward sustainability contributions</p>		

#### 4. Supportive Internal Structure

Statement	Score	Comments and examples
This organization has addressed the need to enhance interaction and integration amongst its functional units Examples: 7) adjust organizational structure to one that is more “organic” (flat and team-based) 8) formally implements and supports cross-functional teams		
This organization has devoted resources to sustainability implementation consistently over time		

6. The final section is open-ended for any additional comments you have about the challenges faced in implementing the sustainability goals at your organization including your thoughts on how to address these going forward.

## **CONSENT DOCUMENT FOR ENROLLING ADULT PARTICIPANTS IN A RESEARCH STUDY**

Georgia Institute of Technology

Project Title: Implementing Sustainability in Large Public Organizations

Investigator: Elizabeth Keysar

Protocol and Consent Title: Consent Form v2

***You are being asked to be a volunteer in a research study.***

### **Purpose:**

The purpose of this study is to evaluate how large, public organizations overcome challenges to implementing sustainability programs. Three large organizations will be case studies and approximately ten people from each organization will be interviewed.

### **Exclusion/Inclusion Criteria:**

Participants in this study must have a role in implementing sustainability goals for their organization.

### **Procedures:**

You were identified for this study through the sustainability point of contact at your organization and also by the sustainability goals of the organization that deal with energy, water, acquisition and/or waste. This research consists of a one-on-one interview that will follow a standard question protocol and will be audio-recorded. It will be conducted at your work place during normal work hours. All interview comments will be kept anonymous with results reported in summary form. There will be a single interview with you with the possibility of follow-up by email or telephone. The researcher will take notes during the interview. You may choose to not answer a given question, and you stop at any time and for any reason. Audio recordings will be kept as digital files for one year after the dissertation is approved; after this time period they will be deleted. Interview notes will also be destroyed after the one year time period.

### **Risks or Discomforts:**

There are no known or anticipated risks or discomforts associated with participation in this study.

### **Benefits:**

You are not likely to benefit from joining this study. I hope what I learn will help advance sustainability in other large organizations like yours.

### **Compensation to You:**

There is no compensation for participation.

### **Confidentiality:**

The following procedures will be followed to keep your personal information confidential in this study: To protect your privacy, your interview comments will be kept under a code number rather than by name. Your name and any other fact that might point to you will not appear



when results of this study are presented or published. Your privacy will be protected to the extent allowed by law. To make sure that this research is being carried out in the proper way, the Georgia Institute of Technology IRB may review study records.

**Costs to You:**

There are no costs to you, other than your time, for being in this study.

**In Case of Harm:**

If you are harmed as a result of being in this study, please contact Principal Investigator, Michael Elliott, Ph.D., at telephone (404) 894-9841. Neither the Principal Investigator nor Georgia Institute of Technology has made provision for payment of costs associated with any harm resulting from participation in this study.

**Participant Rights:**

- Your participation in this study is voluntary. You do not have to be in this study if you don't want to be.
- You have the right to change your mind and leave the study at any time without giving any reason and without penalty.
- Any new information that may make you change your mind about being in this study will be given to you.
- You will be given a copy of this consent form to keep.
- You do not waive any of your legal rights by signing this consent form.

**Questions about the Study:**

If you have any questions about the study, you may contact Dr. Michael Elliot at telephone (404) 894-9841 or michael.elliott@coa.gatech.edu.

**Questions about Your Rights as a Research Participant:**

If you have any questions about your rights as a research participant, you may contact

Ms. Melanie Clark, Georgia Institute of Technology  
Office of Research Compliance, at (404) 894-6942.

If you sign below, it means that you have read (or have had read to you) the information given in this consent form, and you would like to be a volunteer in this study.

---

Participant Name (printed)

---

Participant Signature

---

Date

---

Signature of Person Obtaining Consent

---

Date

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