PONTIFÍCIA UNIVERSIDADE CATÓLICA
DO RIO DE JANEIRO

Laura Morten Gustavson

Higher Education Institutions: a strategy towards sustainability and an evaluation scheme

Dissertação de Mestrado

Dissertation presented to the Programa de Pós-Graduação em Metrologia (Área de concentração: Metrologia para Qualidade e Inovação), PUC-Rio as partial fulfillment of the requirements for the degree of Mestre em Metrologia.

Advisor: Prof. Mauricio Nogueira Frota
Co-Advisor: Prof. Fabricio Casarejos Lopes Luiz

Rio de Janeiro
May 2016

Laura Morten Gustavson

Higher Education Institutions: a strategy towards sustainability and an evaluation scheme

Dissertation presented to the Programa de Pós-Graduação em Metrologia (Área de concentração: Metrologia para Qualidade e Inovação), PUC-Rio as partial fulfillment of the requirements for the degree of Mestre em Metrologia.

Prof. Mauricio Nogueira Frota
Advisor
Programa de Pós-Gradução em Metrologia – PUC-Rio

Prof. Fabricio Casarejos Lopes Luiz
Co-Advisor
NIMA – PUC-Rio

Prof. Luiz Felipe Guanaes Rego
Departamento de Geografia–PUC-Rio

Prof. Rodrigo Flora Calili
Programa de Pós-Gradução em Metrologia – PUC-Rio

Prof. Carlos Roberto Hall Barbosa
Programa de Pós-Gradução em Metrologia – PUC-Rio

Prof. Márcio da Silveira Carvalho
Coordenador Setorial do Centro Técnico Científico – PUC-Rio

Rio de Janeiro, May 6th, 2016

Laura Morten Gustavson

Laura Morten Gustavson completed her Bachelor's in Environmental Studies and Geology from Guilford College in Greensboro, North Carolina in the United States. Prior to completing her Master's she worked for five years in the Energy Industry as a Geologist and Business Development Manager for Schlumberger. This dissertation is part of her Master's degree in Strategic Management, Innovation and Sustainability within the Metrology program at Pontifical Catholic University of Rio de Janiero, Brazil. Her research focuses on analysis of sustainability actions, strategies and assessment frameworks in Institutional Environments.

Bibliographic data

Acknowledgements

PUC-Rio - Certificação Digital Nº 1422392/CA

Abstract

Gustavson, Laura Morten; Frota, Mauricio Nogueira (Advisor); Luiz, Fabricio Casarejos Lopes (Co-advisor). **Higher Education Institutions: a strategy towards sustainability and an evaluation scheme**. Rio de Janeiro, 2016. 121p. Dissertação de Mestrado – Programa de Pós-Graduação em Metrologia (Área de concentração: Metrologia para Qualidade e Inovação), Pontifícia Universidade Católica do Rio de Janeiro.

The objective of this work is to propose a set of sustainability actions and an evaluation scheme as a strategy to guide Higher Education Institutions (HEIs) in their efforts to become more sustainable. Structured into four dimensions (Administrative, Social & Cultural, Academic, and Operational) a set of forty strategic sustainability actions are created (ten per dimension), reflecting state-of-the-art international recommendations for best practices in sustainability. Based on the institutional fulfillment of these actions, three sustainability indices are proposed as a metric for evaluating aspects related to the commitment, coherency and difficulty of execution of the proposed actions. The motivation for this work is to provide a systematic approach of implementation, evaluation and monitoring of sustainability actions, globally accessible to all HEIs, particularly given the demonstrated bias in the existing metrics favoring HEIs in developed economies. The research methodology is structured based on three pillars: (i) documentary and bibliographical research in sustainability (concepts, principles, guidelines, best practices); (ii) review of metrics and sustainability indicators and (iii) validation of the proposed tool through its application to a select group of 21 HEIs recognized for their academic and sustainability excellence. The results reveal a "Good" degree of commitment (CI = 0.73) for the 21 HEIs studied, indicating the proposed evaluation scheme is effective in the identification and analysis of institutional commitment and performance of HEIs implementing sustainability initiatives.

Keywords

Resumo

Gustavson, Laura Morten; Frota, Mauricio Nogueira (Orientador); Luiz, Fabricio Casarejos Lopes (Co-orientador). **Instituições de ensino superior: estratégia para a sustentabilidade e metodologia de avaliação**. Rio de Janeiro, 2016. 121p. Dissertação de Mestrado – Programa de Pós-Graduação em Metrologia (Área de concentração: Metrologia para Qualidade e Inovação), Pontifícia Universidade Católica do Rio de Janeiro.

Este trabalho tem por objetivo propor um conjunto de ações em sustentabilidade e uma ferramenta de avaliação e monitoramento como estratégia de pavimentar o árido processo para que uma dada instituição possa ser reconhecida como sustentável. Para avaliar o grau de performance institucional das IESs, propõe-se um modelo analítico para o ambiente organizacional de uma IES em 4 dimensões: Administrativa, Sociocultural, Acadêmica e Operacional. Para cada dimensão, e à luz de um conjunto de 40 ações em sustentabilidade construídas para refletir o estado-da-arte das recomendações internacionalmente consensadas, três índices de sustentabilidade são propostos (índice de comprometimento, coerência e dificuldade na implementação das ações propostas). A motivação consiste em prover uma metodologia sistemática de implementação e avaliação de ações em sustentabilidade para IESs, contribuindo para que estas instituições possam alcançar seus objetivos em favor do desenvolvimento sustentável. A metodologia da pesquisa estruturou-se em três pilares: (i) pesquisa documental e bibliográfica em sustentabilidade; (ii) análise crítica de métricas e indicadores de sustentabilidade e (iii) validação da ferramenta aplicada a um grupo seleto de 21 IESs norte americanas de excelência internacionalmente reconhecida. Os resultados indicaram um grau de comprometimento "Bom" (IC= 0.73) para essas IESs. Dentre as conclusões, a ferramenta de avaliação e monitoramento proposta mostrou-se eficaz para a identificação e análise do comprometimento e performance institucional de IESs no processo de implementação de ações de sustentabilidade. Em nível global, a ferramenta proposta não deve ser entendida como um fim em si mesma, mas como um instrumento-guia para o aperfeiçoamento contínuo.

Palavras-chave

Metrologia; Instituições de Ensino Superior; Desenvolvimento Sustentável; Índices de sustentabilidade, Métricas de avaliação, Ações em Sustentabilidade.

Table of Contents

List of Figures

List of Tables

Abbreviations & Acronyms

A.A.	Associate of Arts Degree
AASHE	Association for the Advancement of Sustainability in Higher Education
AISHE	Assessment Instrument for Sustainability in Higher Education
AUA	Alternative University Appraisal
AUSJAL	Asociacion do Universidades Confiada a la Compania de Jesus en America Latina
B.A.	Bachelor of Art Degree
B.S.	Bachelor of Science Degree
CSAF	Campus Sustainability Assessment Framework
DDT	dichlorodiphenyltrichloroethane
ESD	Education for Sustainable Development
HESD	Higher Education for Sustainable Development
GASU	Graphical Assessment of Sustainability in Universities
GDP	Gross Domestic Product
GRI	Global Reporting Initiative
HEI	Higher Education Institution
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
LiFE	Learning in Future Environments
NACUBO	National Association of College and University Business Officers
NGO	Non-Governmental Organization
NIMA	Nucleo Interdisciplinar de Meio Ambiente
NWF	National Wildlife Federation

PUC-Rio	Pontifical Catholic University of Rio de Janeiro
SAI	Social Accountability International
SEI	Sustainable Endowments Institute
STARS	Sustainability Tracking, Assessment and Rating System
STAUNCH	Sustainability Tool for Auditing University Curricula Holistically
UI	Universtas Indonesia
ULSF	Association of University Leaders for a Sustainable Future
UN	United Nations
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
U.S.	United States
WCED	World Commission on Environment and Development

1
Introduction

With the increased pressure placed by the growing population and consumption patterns of humans, the role of Sustainable Development progressively plays a critical role in the preservation of human livelihood and continued prosperity. The recent history of sustainable development began in 1972 when the Stockholm Declaration on the Human Environment was published as an outcome of the United Nations (UN) Conference on the Human Environment, held in Stockholm, Sweden in the same year. In the declaration, existing concepts of environmental preservation are expanded to consider the importance of the human dimension in the environmentalist movement (UN, 1972). This was the first international conference and declaration to identify and emphasize the connection between environmental issues and human ones.

The term Sustainable Development is first seen in the 1980 report entitled "World Conservation Strategy: living resource conservation for sustainable development (IUCN, 1980). The discourse was refined and clarified with the 1987 report published by the World Commission on Environment and Development (WCED) entitled Our Common Future. The WCED was established in 1983 and chaired by Norwegian Gro Bruntland at the urgent request of the General Assembly of the United Nations. The document, often referred to as the Brundtland Report, after the chair of WCED, has the following expressed purpose:

> To propose long-term environmental strategies for achieving sustainable development to recommend ways concern for the environment may be translated into greater co-operation among developing countries and between countries at different stages of economical and social development and lead to the achievement of common and mutually supportive objectives that take account of the interrelationships between people, resources, environment, and development..." (UN, 1987, p.6).

The Brundtland Report presents the following definition for Sustainable Development: "Sustainable Development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs." (UN, 1987, p.37). Two key concepts are also defined: "the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given;" and "the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs" (UN, 1987, p.37). The report contains problem characterizations and calls to action for sustainable development issues including poverty, economy, population, food security, species and ecosystems, energy, urban growth, management of the commons, peace, security, development, and policy (UN, 1987). Due to its comprehensive nature, and inclusion of extensive consultation with a wide variety of stakeholders (achieved through public hearings held at strategic locations dispersed throughout the world in the years leading up to its publication) (UN, 1987), the Brundtland Report stands today as the most widely used and thoroughly described definition of sustainable development and sustainability.

With the definition and framework for Sustainable Development laid out in the 1987 Brundtland Report, The United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil in 1992, is also considered a milestone in the discourse development of sustainable development. Agenda 21 was published as a result of this conference, which is a document that appeals for a global partnership for sustainable development, calling for "a balanced and integrated approach to environment and development questions" (Agenda 21, 1992, p.3). It lays out a series of issues affecting sustainable development and identifies program areas to address them. Designed to be dynamic programs, they are "described in terms of the basis for action, objectives, activities and means of implementations" (Agenda 21, 1992, p.3).

The contents of Agenda 21 were revisited twenty years later at the Rio+20 United Nations Conference on Sustainable Development also held in Rio de Janeiro, Brazil, where the Rio+20 Treaty on Higher Education was signed. Known as the "People's Sustainability Treaty on Higher Education," it is a collaborative effort of twenty-five

higher education agencies, associations and student groups from all over the world. Those that signed the treaty did so because they are:

> Seeking pathways and possibilities for progressing sustainability in higher education. They are committing to contribute towards societies that are fair, participatory, future facing and peaceful and able to restore the integrity of Earth's ecological systems, as well as promote human development in an equitable and inclusive manner (Rio+20, 2012, p.2).

To fully frame the Sustainability discourse, it must be contextualized within the challenges and threats presented by climate change. Given that sustainable development relies on the existence of a habitable earth, and given that the planet is experiencing such dynamic changes as a result of climate change, it is critical to have a strong foundational understanding of climate change and to address the two issues in parallel.

Existing evidence demonstrates the current warming of the global climate system at unprecedented levels. Global atmospheric and oceanic temperatures have increased, amounts of snow and ice have lessened and sea levels have risen (IPCC, 2014).

> Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. The period from 1983 to 2012 was *likely* the warmest 30-year period of the last 1400 years in the Northern Hemisphere, where such an assessment is possible (IPCC, 2014, p.3).

From 1971 to 2010 the upper 75 m of the ocean (the part nearest to the surface is where the ocean warming is largest) increased in temperature by 0.11 °C per decade. Almost worldwide, glaciers are continuing to shrink. From 1992 to 2011, ice sheets over Greenland and Antarctic have been losing mass, with the period 2002 to 2011 likely at a higher rate (IPCC, 2014). During the period from 1901 to 2010, global mean sea level rose 0.19 m, representing a larger mean rate than during the two previous millennia (IPCC, 2014).

Since the pre-industrial era, human-induced greenhouse gas emissions have increased as a result population and economic growth. Atmospheric concentrations of greenhouse gas emissions are higher than ever today (Figure 1), with concentrations of carbon dioxide, methane, and nitrous oxide higher than in the past 800,000 years (IPCC, 2014). This anthropogenic change is extremely likely to be the "dominant cause of the observed warming since the mid-20th century" (IPCC, 2014, p.4).
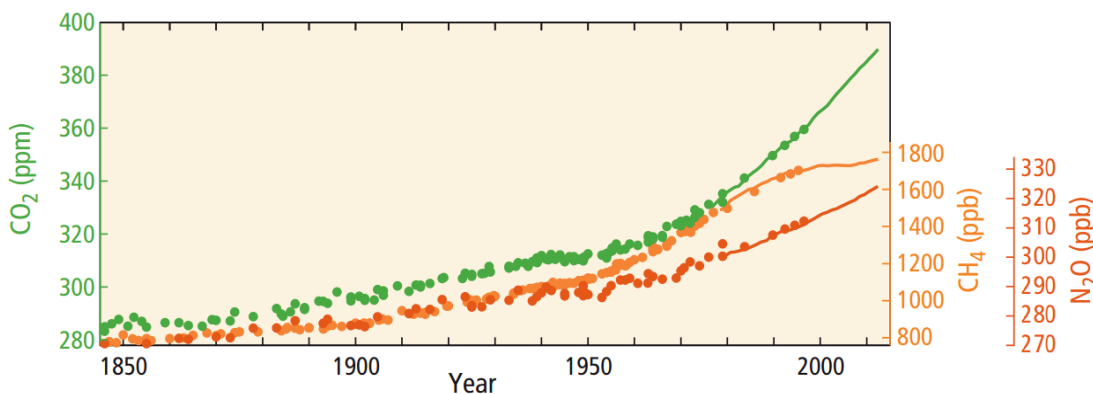
Figure 1. Globally averaged greenhouse gas concentrations
Source: *IPCC 5th Assessment Report, 2014*

The impacts of changes in climate are widespread, felt on all continents and oceans and clearly effect both human and natural systems. Water resources are being altered in quality and quantity based on the changes in precipitation and snow and ice melt, resulting in wider changes to hydrological systems and cycles (IPCC, 2014). "Many terrestrial, freshwater, and marine species have shifted their geographic ranges, seasonal activities, migration patterns, abundances, and species interactions in response to ongoing climate change" (IPCC, 2014, p.6). Biodiversity has decreased significantly, with conservative estimates placing it at 100 times higher than the background rate. So much that we are currently entering the sixth mass extinction in the Earth's history (Ceballos et al., 2015). The United Nations has called attention to this issue as well, naming the years from 2011 to 2020 as the United Nations Decade on Biodiversity (Convention on Biological Diversity, 2011). Overall crop yields have been negatively impacted as a result of climate change. Ocean acidification is having a significant effect on marine organisms and has been at least partially attributed to

human influence (IPCC, 2014). These examples and others indicate a strong sensitivity to climate changes for human and natural systems.

Given these current changes in climate and the associated impacts, it is important to establish a set of boundaries within which we must stay should we wish to maintain the required conditions for human development. Rockstöm et al. (2009) and Steffan et al. (2015) define and update, respectively, a framework to delineate a safe operating space for humanity based on planetary boundaries. Based on identified thresholds, nine planetary boundaries are defined including climate change; novel entities, stratospheric ozone depletion; atmospheric aerosol loading; ocean acidification; biochemical flows (phosphorous and nitrogen); freshwater use; land-system change; biosphere integrity (functional diversity and genetic diversity) (Steffan et al., 2015). Figure 2 illustrates each of the planetary boundaries and the current status.
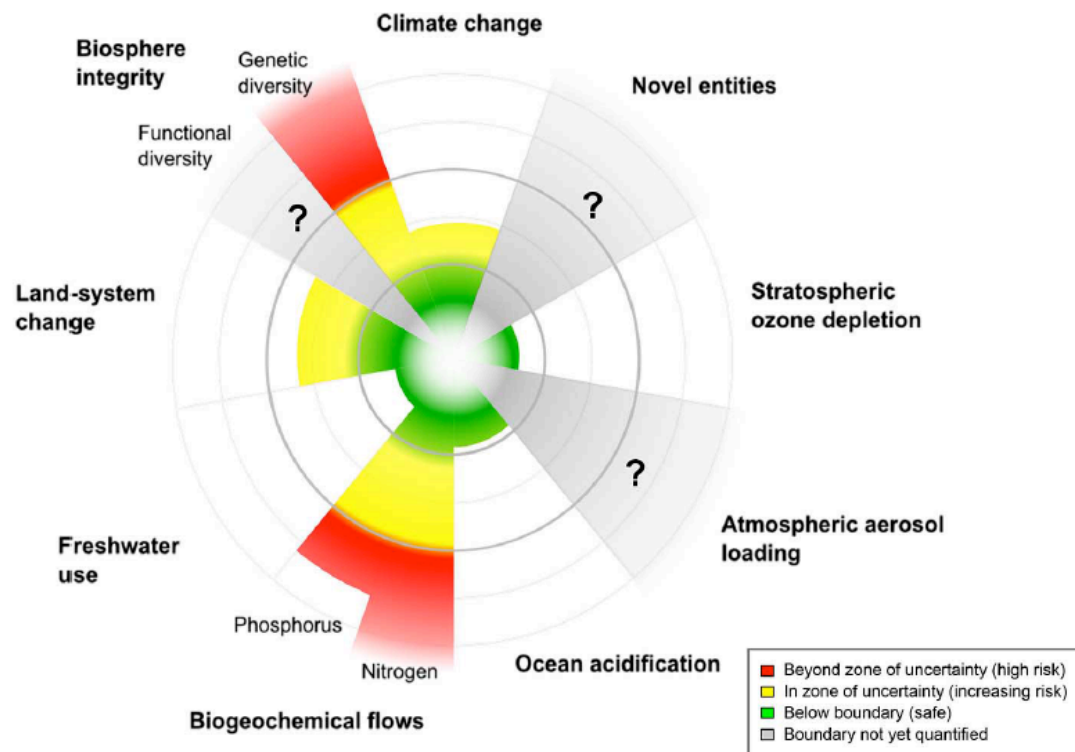
Figure 2. The planetary boundaries and their current status, updated in 2015
Source: *Steffan et al, 2015*.

These boundaries define the envelope we must stay within to maintain a "Holocene-like state" (Steffan et al., 2011) on earth, which is the only geological period we know to contain the conditions necessary for human life. In order to ensure that the climatic conditions on earth are conducive to further human development, it is crucial that we remain within these boundaries else we risk entering a climatic state which would be hostile toward the ability of humans to continue living and developing lifestyles along the paths which we have already developed. As Raworth (2012) points out:

> The value of adopting this planetary boundary approach for understanding sustainability is significant. It provides a global perspective of how close humanity is to over-stressing the Earth-systems on which all people depend for their fundamental well-being and development.

This concept of planetary boundaries is combined with social boundaries to create what is called the doughnut economy (Raworth, 2012). The Doughnut Economy superimposes social boundaries with the ecological ceilings given by Rockström et al. (2009) and Steffan et al. (2015) to define the safe and just operating space for humanity. Figure 3 below illustrates the eleven social human rights precepts (as described in internationally recognized reports) with the nine planetary boundaries described by Rockström et al. 2009. The inner boundary represents the social foundation, or dimensions of human deprivation. The outer boundary is the critical natural thresholds, or planetary boundaries as set forth by Rockström et al. and Steffan et al., and the band between them – the doughnut – represents the safe and just operating space for humanity. The significance of this theory is paramount, because environmental stress directly affects access to basic and fundamental human rights. This framework opens three specific angles: it provides an integrated vision, a refocusing of economic priorities and highlights the need for metrics beyond GDP (gross domestic product) (Raworth, 2012).
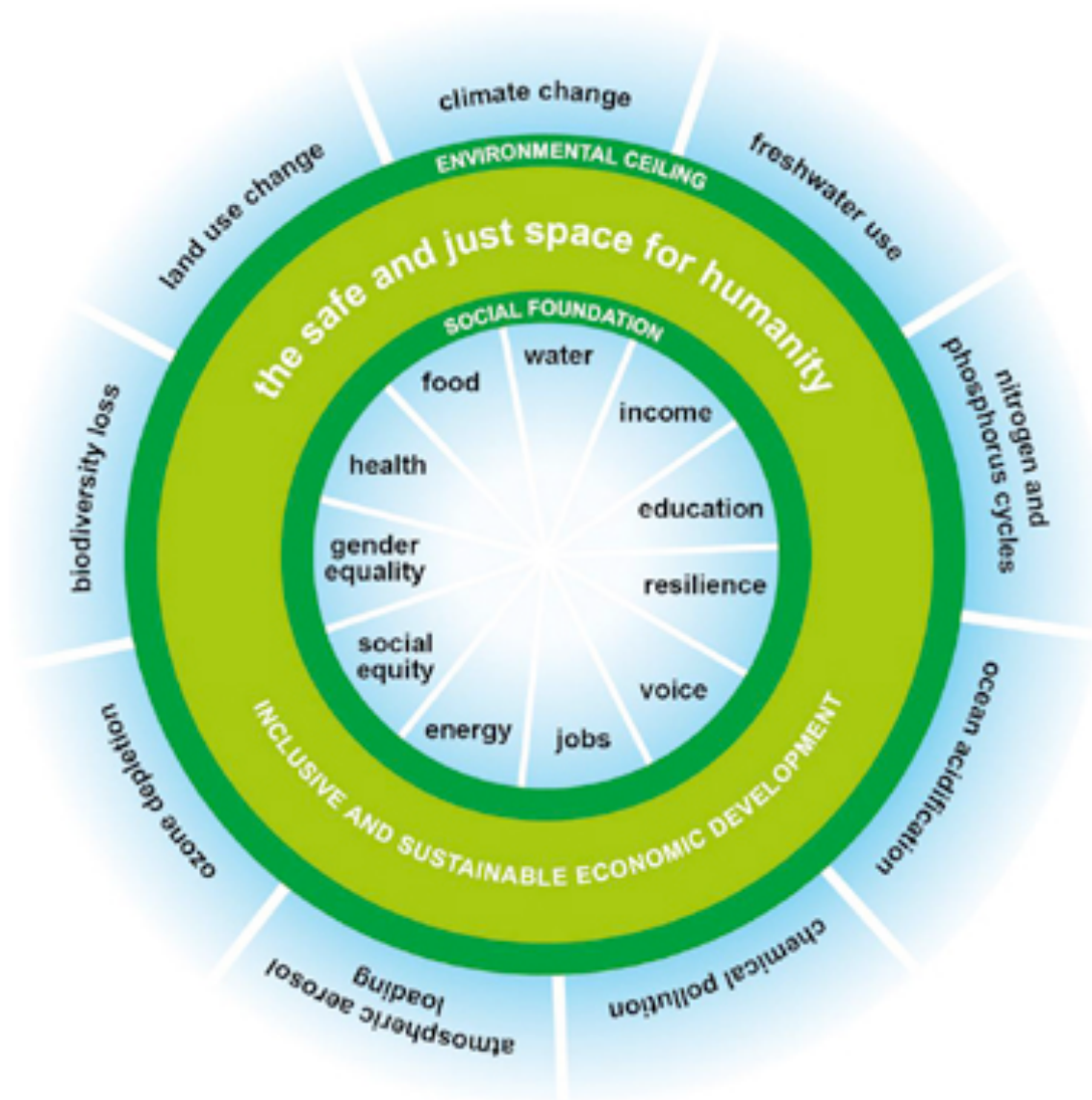
Figure 3. The Doughnut Economy framework
Source: Raworth, 2012.

Given the demonstrated ability for humans to alter the planet, the naming of a newly incepted geologic epoch, the Anthropocene, has been proposed. It is characterized by the human-induced alteration of the earth's geophysical processes. The Holocene, (officially the current epoch) with its characteristic stable climate conducive to human existence has been the only epoch or "environmental envelope" (Steffan et al., 2011) in the history of the earth with the required conditions to support human life and the contemporary society within which we currently live.

The Anthropocene is an important distinction because it marks a turning point where the global human imprint has a measurable and identifiable impact on the earth's geophysical forces. While humans have had local and regional impacts on the earth since early in the Holocene (the geologic time period starting 10,000 years ago and marked by the beginning of agriculture) it was not until the 1800s when the impact became identifiable at a global level (Steffan et al., 2011).

The concept, distinction and recognition of the Anthropocene are important as they differentiate our epoch based on human induced changes. It demonstrates the significant geological and geophysical changes that have occurred as a result of human behavior and classifies them accordingly in time and space at a global level.

1.1
Sustainability and sustainable development in institutional settings: higher education institutions

Organizational and Institutional initiatives and actions play a crucial role in the achievement of sustainable development and a sustainable future. While individual actions are important in the move to more sustainable lifestyles, there is no substitute for collective and organized actions (Boer, 2013, 136). Institutional actions towards sustainable development can be seen in various locales throughout society. Examples exist from businesses, NGOs, political parties, and corporations that demonstrate various levels of commitment towards initiatives that promote sustainable development. One important aspect of implementation, successful transitions, and fundamental actions in sustainability and sustainable development is Education. (UN, 1972; UNESCO, 1975; UN, 1987; Agenda 21, 1992; UNESCO, 1998; The Earth Charter, 2000).

To affect any sort of change or change management towards sustainable development, education is at the core of any solution or implementation. Whether this is formal or non-formal, within a higher education institution (HEI), school, or large corporate environment, education is essential to significant and lasting behavioral changes. With the growing awareness of the need for sustainable development, education has been identified as one of the important factors to move towards a more

sustainable future. In recognition of this, the United Nations named the years from 2005 to 2014 as the Decade for Education for Sustainable development (UN, 2002b).

Given this, one population of particular interest for examining sustainability and sustainable development actions are Higher Education Institutions. HEIs are organizations with a unique opportunity to facilitate learning and spread knowledge – they are the breeding grounds for ideas and conceptions of the future. By their very nature, they are environments where innovation, creativity, and learning thrive, often mimicking an individual, and more alternative subset of society. HEIs have greater freedom to initiate more holistic and creative initiatives and actions, and unique opportunities for change to travel from the bottom up and the top down, which is often absent from a more conventional business setting. As such, they are uniquely positioned to embody innovative implementations of sustainability, as well as imagine and create new ones (Cortese, 2003; Leal Filho, 2011; Lozano, 2006a; Roorda, 2013; UNESCO, 2001).

Higher Education Institutions have been charged with integrating sustainability into their curriculums, environments, and overall campus lifestyles. In 1992, at the United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil, Agenda 21 was published as an outcome of the event and included a specific section, Chapter 36, entitled "Promoting Education, Public Awareness and Training." Program areas include reorienting education towards sustainable development, increasing public awareness and promoting training (Agenda 21, 1992 p.320). In the years following, additional international declarations called for the same sort of awareness and integration of sustainability and sustainable development into HEIs, including the World Declaration on Higher Ed for the 21st Century and Framework for Priority Action for Change and Development in Higher Ed (UNESCO, 1998); The Lunenburg Declaration on Higher Education for Sustainable Development (UNESCO, 2001); The Graz Declaration on Committing Universities to Sustainable Development (Uni Graz, 2005); and The Rio+20 Treaty on Higher Education (UN, 2012).

In the United States, HEIs have a strong reputation for academic rigor and integrity, as well as providing unique lifestyle experiences for students. With over 21 million students attending degree-granting institutions in 2012 in the United States (U.S. Department of Education, 2013), the impact of actions towards Sustainable Development in HEIs in the United States is significant. Many colleges and universities are residential, and many provide activities, engagement, and cultural enrichments that reach far beyond the classroom. As such, five different dimensions of a university system are typically identified: education, research, university operations, external community, and assessment and reporting. (Disterheft et al., 2013). "Campus sustainability, commonly understood in a broad sense that includes the physical, educational, and institutional dimensions, is a growing study field, as proven by the increasing number of articles in academic journals…" (Disterheft et al., 2013 p.5).

As a country and culture the United States plays a particularly important role in the ability of the global community to engage in effective sustainable development solutions. Its size, consumption patterns, cultural influences to lifestyle and value trends globally, and output of technology and innovation all influence the ability of cultural shifts to occur that will enable or impede sustainable development actions. The average ecological footprint of someone from the U.S. is significant, and is largely invisible to the individual (Cortese, 2003). Given these factors, HEIs in the United States are an interesting subset to examine actions towards Sustainability and Sustainable Development and how they are measured through the use of metrics.

1.2
Problem characterization

Given the importance of sustainable development to the future, the unique role it that is played by Higher Education Institutions and the demonstrated bias of existing metrics to favor developed economies, there is a need to create a re-imagined scheme of realization for sustainability evaluation and analysis in HEIs. This scheme should guide institutions throughout the entirety of the implementation process and provide effective indices to manage and evaluate progress on an on-going basis. Higher

Education Institutions in the United States are analyzed using this scheme to evaluate the degree to which their actions are aligned with sustainability principles. To achieve this, the following questions are considered:

- What are the fundamental concepts and actions called for by the global governing bodies for sustainability and sustainable development?
- How can these concepts and actions be synthesized and condensed so that they can be applied to recommendations for HEIs?
- What type of evaluation system is required that can reflect these actions for sustainable development in HEIs to assist both in the guiding of the implementation process of sustainability actions and the ongoing evaluation process?
- What types of metrics and indices are required to analyze and measure the degree of commitment, difficulty and performance of HEIs throughout the implementation process of sustainability actions?
- How can this assessment scheme and indices be validated to ensure that they are appropriately suited for HEIs?

1.3
General objective

The general objective is to provide a framework for helping HEIs achieve sustainability goals based on a structured agenda of strategic sustainability actions, an accompanying set of four indices contributing to the permanent institutional improvement process and to propose a multi-dimensional scheme for assessing their institutional performance throughout the entirety of the implementation process.

1.4
Specific objectives

The questions posed in the problem characterization section provide the basis for the creation of critical actions, an organizational method, assessment schemes, and indices to evaluate sustainability actions in Higher Education Institutions. The specific aims are as follows:

- Identify the fundamental actions called for by the global governing bodies for sustainability and sustainable development.

- Synthesize these concepts and actions into a set of critical actions so that they can be applied to recommendations for HEIs.
- Create an evaluation system that can reflect these actions for sustainable development in universities to assist both in the guiding of the implantation process of sustainability actions and the ongoing evaluation process.
- Create metrics and indices to analyze and measure the degree of commitment, difficulty and performance of HEIs throughout the implementation process of sustainability actions.
- Validate this assessment scheme and indices to ensure that they are appropriately suited towards HEIs.

1.5
Methodology

This work was developed based on a three pillar methodology: (i) analysis of a comprehensive set of internationally agreed-upon recommendations from international organizations engaged in sustainability, (ii) examination of well-established evaluation methodologies and metrics used to assess commitment to sustainability of HEIs and (iii) assessment of the best practices in managing sustainability actions adopted by U.S. higher education institutions.

1.5.1
Analysis of guidelines and International recommendations

Institutional actions and initiatives towards sustainability and sustainable development are analyzed with Higher Education Institutions being the primary population examined. Sustainability metrics and measurement tools currently in use will be utilized to isolate and identify a subset of the HEIs in the United States that are considered the highest performers for their sustainability actions. Through the lens of the international definitions and ideas presented by the collective group of documents, a set of sustainability actions will be created to summarize the key elements and points. HEIs will be evaluated based on their adherence to performing these actions. These analyses and examinations are carried out through the creation of a multi-dimensional scheme which synthesizes these ideas as well as a group of indices to evaluate them.

Bibliographic and documentary research was conducted initially to identify how sustainability is defined by the international community and what the specific calls to actions are, particularly as they relate to HEIs. This included a review of documentation beginning with the publication of the Stockholm Declaration on the Human in Environment in 1972 and ending with the Encyclical published by Pope Francis in 2015. Overall, 24 international declarations, agreements, charters and event proceedings were reviewed. Thorough research was conducted in order to ensure a compressive list of applicable documents including cross checking, cross referencing and bibliographic exploration. Table 1 provides the complete list of documents reviewed, the year they were published, location, the level or focus of the document, and if applicable, the event associated with their publication or release. The different types of documents include International Declarations, Charters, Reports, Commitments and Treaties that include topics of sustainability and in many cases, with a focus on education. This is the complete list of documents based on which the critical actions were conceived.

Table 1. International declarations, charters, reports, commitments and treaties that include topics of sustainability and education

Year	Title	Level or Focus	Location	Associated Event
1972	The Stockholm Declaration On The Human Environment	Society	Stockholm, Sweden	The United Nations Conference on the Human Environment
1975	The Belgrade Charter	Education	Belgrade, Yugoslavia	UNESCO-UNEP International workshop on Environmental Education at Belgrade
1977	Tbilisi Declaration	Education	Tbilisi, Georgia	UNESCO-UNEP Intergovernmental Conference on Environmental Education
1987	Our Common Future (The Brundtland Report)	Society		Published by the UN World Commission on Environment and Development
1990	The Talloires Declaration	Higher Education	Talloires, France	
1991	Halifax Declaration	Higher Education	Halifax, Canada	Creating a Common Future: University Action for Sustainable Development
1992	Agenda 21	Society	Rio de Janeiro, Brazil	Earth Summit – UN Conference on Environment and Development
1993	The Swansea Declaration	Higher Education	Swansea, Wales	Association of Commonwealth Universities' Fifteenth Quinquennial Conference
1993	The Kyoto Declaration	Higher Education	Kyoto, Japan	International Association of Universities Ninth Round Table
1994	CRE Copernicus Charter	Higher Education	Geneva, Switzerland	Conference of European Rectors (CRE)
1997	Declaration of Thessaloniki	Education	Thessaloniki, Greece	UNESCO International Conference: "Environment and Society: Education and Public Awareness for Sustainability"
1998	World Declaration on Higher Ed for the 21st Century and Framework for Priority Action for Change and Development in Higher Ed	Higher Education	Paris, France	UNESCO World Conference on Higher Education
2000	Millennium Declaration, Millennium Development Goals	Society	New York	Millennium Summit of the United Nations

Year	Title		Location	Associated Event
2000	Earth Charter	Society	The Hague, Netherlands	
2001	The Lunenburg Declaration on Higher Education for Sustainable Development	Higher Education	Lünenburg, Germany	International COPERNICUS Conference: Higher Education for Sustainability – Towards the World Summit on Sustainable Development (Rio+10)
2002	Ubuntu Declaration	Society	Johannesburg, South Africa	World Summit on Sustainable Development
2005	The Graz Declaration on Committing Universities to Sustainable Development	Higher Education	Graz, Austria	"Committing Universities to Sustainable Development"
2006	American College and University Presidents' Climate Commitment (started 2006)	Higher Education		
2007	Lucerne Declaration on Geographical Education for Sustainable Development	Education	Lucerne, Switzerland	Lucerne Symposium
2009	Abuja Declaration	Higher Education	Abuja, Nigeria	12th General Conference of the Association of African Universities
2009	Bonn Declaration	Education	Bonn, Germany	UNESCO World Conference on Education for Sustainable Development
2009	Turin Declaration	Higher Education	Turin, Italy	G8 University Summit
2012	Rio+20 Treaty on Higher Education	Society	Rio de Janeiro, Brazil	Rio+20 United Nations Conference on Sustainable Development
2015	Encyclical Letter of the Holy Father on Care for Our Common Home	Society	The Vatican	

As these international documents will be used as the lens through which to evaluate the actions of universities, there was a need to create a specific method to do this. Given the combined length of all documents and the breadth of material and ideas presented by the assemblage of them, a method or tool that would serve as an inclusive representation of the key concepts and ideas was required. As such, each of the 24 documents were analyzed and synthesized into a set of critical actions designed to concisely reflect the key points of all documents. These critical actions were created to serve as a representative list of specific actions the international community calls for in terms of sustainability and sustainable development as it relates to Education, particularly HEIs. In order to evaluate the efficacy of the total and holistic implementation of sustainability, a series of indicators are created.

To enable and guide HEIs in the implementation of a holistic view of sustainable development, an institutional scheme was established, providing a framework based on international references largely reviewed in the first phase of the research. The scheme, acknowledging four dimensions of analysis, was conceived in line with a holistic view of sustainable development and in full alignment with recommendations given by international organizations acutely involved in sustainability.

Aiming to create awareness within HEIs, the proposed approach was formulated to meet the needs and calls to action from prominent international events, charters, declarations and publications on sustainable development. Thematic similarities, ideological commonalities, trends and patterns in concepts, unique perspectives, and overall agreed upon recommendations emerging from the literature were identified and processed to substantiate this study; synthesizing decades' worth of work and progress in sustainable development. The conceptual guidelines adopted for the development of the institutional scheme proposed include:

- **Systemic vision:** considers each key topic in the context of local specificities of the reality of HEIs, as part of an integrated system capable of ensuring the fulfillment of responsibilities by the agents involved in the process.
- **Dynamic method:** transcend the boundaries of the local reality by including the dynamics of the external (surrounding community, employees, spaces of operations) and internal (academic) environment.
- **Adaptability:** the model allows for the continuous incorporation of new actions and adjustments to ensure that assessing commitment to sustainability includes the most

comprehensive and up to date spectrum of activities, thereby meeting whatever specific additional requirements prove to be necessary for other applications.

- **Qualitative and quantitative analysis:** the score definitions of the assessment scheme proposed are adaptable, so that the assessment scheme aligns to fit the needs of the specific subject.
- **Orientation strategy:** the assessment of sustainability is based on a vision of short (monthly), average (annual) and medium- to long-term (5, 10 and 15 years) cycles.

1.5.2
Evaluation methodologies and metrics used to assess HEIs

Based on bibliographic and documentary research, all existing metrics that measure sustainability in Higher Education Institutions (initially worldwide) were identified. Over thirty different metrics were identified including ratings, rankings, frameworks, checklists, databases, assessment systems, appraisals, models, guidelines and plans. Often they fall into two clear categories: externally publicized and internal assessment tools. Given the number of metrics and the variations in quality and focus of their measurement methodologies, there was a need to establish a set of criteria to identify a subset of metrics. This subset of metrics serves as a filter to all HEIs in the United States to isolate a representative subset of the most sustainable HEIs to be further examined and analyzed. The following criteria were established to isolate applicable metrics to this research:

- Applicability in the USA
- Consecrate reputation
- Comprehensiveness (e.g. total number of participants, number and breadth indicators)
- Availability and transparency of information about the tools, indicators and methodologies applied;

Applicability in the United States requires that the metric was either developed specifically for the United States, or that it can easily be applied to the United States. It does not necessarily mean that metric had to have been used in the United States; although this was the case. One of six of the metrics, the GreenMetric (UI, 2016) was designed as an international metric, and was established in Indonesia. The remaining 5 metrics were established specifically for the United States and/or North America.

The Consecrate reputation criterion is met based on how widely the metric is either used or implemented, and how many times it has been cited. Comprehensiveness deals with both how widely the metric is either used or implemented and how thorough the metric categories are. The availability criterion requires that the metrics clearly define and publish their specific and detailed methodology, as well as their results, which also serves as an indicator of transparency. This is important not only because it enables analysis of the metrics, but also because transparency is oft considered an important element of sustainability.

Based on these criteria, 6 different metrics were identified: US News & World Report Best College Rankings (US News & World Report, 2014); Sustainability Tracking, Assessment and Reporting System (STARS) (AASHE, 2016); The College Sustainability Report Card (SEI, 2011); Sierra Club Cool Schools 2014 (Sierra Club, 2014); Princeton Review's 2015 Green Rating Honor Roll (Princeton Review, 2014); UI GreenMetric World University Ranking 2013 (UI, 2016). Of these six, five pertain to sustainability, and one additional one – US News & World Report Best College Rankings – was added as a standard metric used in the United States to evaluate the overall academic quality of the institution. The metrics used and analyzed are displayed below in Table 2, along with associated characteristics including the format, sponsoring organization, the number of HEIs that are included by the metric, the number of countries represented by the metric, and the form of participation.

Table 2. The Metrics used and associated information

Metric	Format	Sponsoring Organization	# of HEIs	# of Countries	Participation
The College Sustainability Report Card	Rating (Grade)	Sustainable Endowments Institute (SEI)	322	2	Closed
Green College Honor Roll – Princeton Review	Rating	Princeton Review	379	2	Closed
GreenMetric	Ranking	University of Indonesia	407	65	Open
Sierra Club 2014 Cool School rankings	Ranking	Sierra Club	173	1	Closed
STARS – Sustainability Tracking, Assessment & Rating System	Rating	Association for the Advancement of Sustainability in Higher Education (AASHE)	755	24	Open
US News & World Report Best College Rankings	Ranking	US News & World Reports	375	1	Closed

1.5.3
Best practices in sustainability adopted by U.S. HEIs

In order to apply the assessment scheme and indices, a select group of Higher Education Institutions (HEIs) in the United States was chosen. The United States was chosen as a case study for this research for a number of specific reasons. First, the sustainability rating systems that are most widely used provide transparency and thoroughness such that the required data for study was readily accessible. Additionally, because the Universities in the U.S. often are well-funded, they typically do not have a high index of technological or financial difficulty. This becomes particularly important when applying the indices created to the subset of HEIs within the United States.

Given the large number of higher education institutions in the United States, nearly 3,000 4 year colleges in 2011 to 2012 (U.S. Department of Education, 2015) a sample of HEIs was selected to enable deeper analysis. The six metrics identified to focus on sustainability or academic quality (Table 2) were used to construct the sample set of HEIs. An HEI was selected for the sample based on their performance in all six metrics – they must be ranked or present in 4 or more of the six metrics in order to be included in the sample. Based on these criteria, twenty-one HEIs were present in at least four out of the six metrics. The HEI must offer four-year undergraduate degrees to be considered. Universities administering only two year degrees, for example community colleges, were not considered in the sample. Table 3 lists the HEIs and their representation in each of the metrics.

Table 3. Sample HEIs and their representation in each metric

	Colleges & Universities	Colleges US News & WR	STARS	Green Metric 2013 Ranking	Green Report Card 2011	Sierra Club 2014 Cool Schools	Princeton Review 2015 Green Rating Honor Roll	TOTAL
1	Georgia Institute of Technology	x	x	x	x	x	x	**6**
2	Cornell University	x	x		x	x	x	**5**
3	Dickinson University (College)	x	x		x	x	x	**5**
4	Stanford University	x	x		x	x	x	**5**
5	University of North Carolina, Chapel Hill	x	x	x	x	x		**5**
6	University of Washington	x	x	x	x		x	**5**
7	Middlebury College	x	x		x	x		**4**
8	University of South Florida	x	x	x		x		**4**
9	American University	x	x			x	x	**4**
10	Loyola University Chicago	x	x		x	x		**4**
11	Oberlin College	x	x		x	x		**4**
12	University of California - Davis	x	x	x	x			**4**
13	University of California, San Diego	x	x		x	x		**4**
14	University of California - Irvine	x	x			x	x	**4**
15	University of California- Santa Barbara	x	x			x	x	**4**
16	University of Maryland, College Park	x	x		x	x		**4**
17	University of Massachusetts Amherst	x	x	x			x	**4**
18	Colorado State University	x	x			x	x	**4**
19	Harvard University	x			x	x	x	**4**
20	University of New Hampshire	x	x		x		x	**4**
21	University of Vermont	x	x		x		x	**4**

Documentation and publications were analyzed to identify best practices and gaps as compared to the critical actions. Research was conducted via publically available resources including University and College websites, strategic reports, mission statements, annual reports, sustainability reports, designated sustainability websites – which many universities have developed – as well as the publicized responses to the metrics. Of particular thoroughness, the information available through STARS provided standardized and complete survey responses from all participating Institutions.

1.6
Dissertation structure

Chapter 2 focuses on the key concepts of sustainability, sustainable development and the manner in which these topics exist within the institutional setting of Higher Education Institutions. It presents how and why we define these terms, and the related concepts and topics that help to frame the discussion. These include topics such as poverty, inter-generational equality, adaptation and mitigation, climate change, and corporate sustainability strategies. Sustainable Development in Higher Education Institutions is further examined, including current trends and areas of focus, indicators, current measurement and evaluation methods and an overview of the metrics and assessment tools analyzed. Chapter 3 focuses on the cultural context for sustainability, sustainable development and Higher Education in the United States. This includes an overview of sustainability and sustainable development in the United States, the relevant political structures that influence Sustainable Development and Higher Education, and overview of the higher education system in the United States. Chapter 4 presents the results, including the organizational design, critical actions created, assessment scheme, metrics and indices, and a presentation of the discussion of the results. Chapter 5 applies the assessment scheme and indices to the selected sample of HEIs in the United States to validate the methodologies presented as well as a discussion of these results. Chapter 6 presents the conclusions, final considerations and recommendations.

2
Sustainability in higher education institutions

2.1
Sustainability and sustainable development

To understand sustainability is to understand the history that laid the foundation for the ideals and philosophies that define the term. Religious doctrine, world and historical events, social and political movements, environmental realities, and related theories all play roles in the development and shaping of what we today call sustainability. To capture the full breadth and complexity of the term sustainability, reviewing these various influential historical aspects is essential.

Religion and spirituality have influenced the philosophical foundations on which humans conduct themselves, how life is conceptualized land particularly how we view the natural world. Of particular interest and perhaps greatest overall influence on the human psyche was the shift from Paganism to Christianity. This is particularly pronounced in the way that we interact with and view nature. Paganism was dominated by celebration and veneration of nature, such that the natural world and all of its elements were intrinsically considered sacred. Pagans believed that contained within each natural constituent, whether it be living or nonliving, was a guardian spirit, or genius loci. Centaurs, mermaids, and fauns were used to represent these guardian spirits – creatures very unlike man. This Animism created intrinsic, spiritual value in all things, without one thing being valued more than another, particularly without placing man above other creatures or elements of the natural world.   All things had their own spirituality that was not considered to be of more or less value than the spirit of man (White, 1967). Animism can be observed in other belief systems as well, including Hinduism, traditional African religions, and oral traditions of the Native Americans (Kline, 2011, 14).

By contrast, with Christianity there is an inherent dualism between man and nature that does not exist in Paganism. Man is not considered a part of nature, but instead God's own unique creation (White, 1967). Furthermore, the language used in the Christian texts clearly places humans above nature, as though its existence is purely to be of service to the needs of man: "be fruitful, and multiply, and replenish the earth and subdue it. And have dominion over the fish of the sea, and over the flow of the air, and over every living thing that moveth upon the earth" (Book of Genesis, The Holy Bible).

Moreover, Christianity does not use Animism. Many consider Saints be the Christian embodiment of spirituality most similar to Pagan Animism. However, a distinct difference exists: Christian Saints are not contained *within* an object, they preside *over* them. Moreover, Christian Saints are all human (White, 1967).

While our modern philosophical foundations are deeply rooted in religious history and a dominant Christian ethos, religion and spirituality are issues that are rarely discussed in the context of sustainability. While the concept of environmental ethics is something that often is discussed, spirituality and religion are often absent from the discourse. Perhaps if a spiritual approach of animism was adopted in humans' relationship with the environment, the challenges associated with climate change and sustainability would not be confronted by society today.

2.2
Corporate sustainability

Corporate sustainability, and the related terms corporate social responsibility, and in some cases, even sustainable development, are terms used to represent the evolving corporate management paradigm and are considered an "alternative to the traditional growth model and profit maximization model" (Wilson, 2003). Specifically, Corporate sustainability is understood as "a company's delivery of long-term value in financial, environmental, social and ethical terms" (UN, 2015, p.17). The basis of these ideals is indicated by the literature to be sourced from four well established concepts: sustainable development, corporate social responsibility, stakeholder theory, and corporate accountability theory. The UN (2014) outlines five defining

features of corporate sustainability: principled business, strengthening society, leadership commitment, reporting progress, and local action. While corporate sustainability it allows for companies to maintain focus on growth and profitability, it also prioritizes the ideals laid out by sustainable development.

Corporate social responsibility is the "premise that corporate managers have an ethical obligation to consider and address the needs of society, not just to act solely in the interests of the shareholders of their own self-interest" (Wilson, 2003). In some ways, corporate social responsibility can be considered a debate – not as matter of whether there is an obligation on the part of companies to keep the needs of society in mind, but rather to what extent this should be implemented. As a concept, corporate social responsibility has been around much longer than sustainable development, and draws on the following theories: social contract theory, social justice theory, rights theory, and deontological theory (Wilson, 2003).

Stakeholder theory defines a stakeholder as "any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984). Some consider this definition to be too broad, noting that this could essentially include everyone when global topics such as climate change or cultural changes are considered. As such, the qualifying criteria for a stakeholder is hotly debated (Wilson, 2003). For this reason, stakeholders are often divided into two distinct categories: primary stakeholders, which are considered crucial to the existence of the organization (e.g. employees, clients, suppliers) and secondary stakeholders, which are not directly implicated in organizational transactions (e.g. general public, NGOs, interest groups, media) (Sprengel and Busch, 2011). The more stakeholders, the more difficult it is to manage their needs, priorities, and demands. While it is generally accepted that stakeholders tend to universally want economic stability, environmental protection and social justice, the issue becomes a matter of priorities (Wilson 2003).

Accountability is defined as "the legal or ethical responsibility to provide an account or reckoning of the actions for which one is held responsible" (Wilson 2003). "Accountability differs from responsibility in that accountability deals with the

reconciling, justification, explanation and reporting of actions, whereas responsibility refers to one's duty to act in a certain way" (Wilson 2003). At a corporate level, accountability relations are focused between company (or corporate management) and shareholders. It is based on the fiduciary model, "which is in turn based on agency theory and agency law, wherein corporate management is the 'agent' and the shareholders the 'principal'" (Wilson 2003).

However, accountability should not be limited to relations between corporations and shareholders, as they regularly enter into contracts – explicit and non-explicit – as a matter of everyday business with a wide variety of stakeholders. These other stakeholders should not be left out of the equation, but rather their goals and priorities should be considered within corporate accountability.

All of these institutional considerations – corporate sustainability, stakeholder theory, and accountability – while rooted in business practices are important considerations for sustainability practices within HEIs as well. They dictate much of the institutional drivers and organizational implementations which have direct impacts on how sustainability is implemented and acted upon.

There are many perceived barriers and sacrifices associated with implementing sustainability into the business sector, often dissuading companies from taking the steps required to truly integrate sustainable development practices into their business. Typical examples include erosion of competitiveness, addition of costs without an immediate financial benefit, inability of suppliers to implement sustainable practices and provide transparency of doing so, disadvantage when compared to developing countries that may not be subject to the same pressures or standards, and new equipment and process modification to adapt to sustainable development standards (Nidumolu et al., 2009). As a result of this, many companies are inclined to isolate these issues under the umbrella of corporate social responsibility, which separates them from business objectives (Nidumolu et al., 2009).

Despite these perceived barriers, and the fact that they often times have proven to be untrue, there are also many benefits that have been demonstrated by the integration of Sustainable Development practices into the business model. These include cost

reductions (through the reduction of inputs used), the benefits of being an early adopter which often includes additional time for research and development to stay ahead of the curve providing a competitive advantage, as well as opportunity for organizational and technological innovations which have a direct impact on bottom line and top line returns (Nidumolu et al., 2009). Additionally, for businesses that take into account the environmental demands of their clients, the net result is an overall improvement of organizational performance, attainment of competitive advantage, and an increase in the innovative capabilities of the business (Junquera et al., 2012).

For enterprises that have decided to undergo the transition to sustainable business, Nidumolu et al. (2009) have characterized their successful progression into five different stages: viewing compliance as an opportunity; making value chains sustainable; designing sustainable products and services; developing new business models; and creating next-practice platforms. Each stage presents a unique challenge, required competencies, and opportunities for innovation (Nidumolu et al., 2009).

One common trend in business is the substitution of eco-efficiency practices with the term sustainability (Dyllick and Hockerts, 2002). While some of this miscommunication may be due to the fact that there is no common or clear definition for sustainability, this by no means should exclude businesses from adhering to the definitions, policies, and recommendations given for sustainable development. Despite this, however, most firms have rooted their sustainability efforts in eco-efficiency initiatives. Similar trends can be observed in the HEI setting, where the term 'sustainability' is largely used to represent efforts that are heavily or exclusively based on actions towards eco-efficiency.

2.3
Sustainability in formal education

Formal education has long been acknowledged as playing a critical role in sustainable development. And many international declarations, charters, agreements and events, have been written to this effect. Regarding the link between Sustainable Development and higher education in particular, many different terms have been established on the

topic, including Education for Sustainable Development (ESD), Higher Education for Sustainable Development (HESD) (Ceulemans et al., 2015), and Sustainable development for higher Education. With this plethora of terms, however, arises some ambiguity in the definitions, distinctions between them, and the circumstances under which they should be applied or used. As a result, one might argue that it is better to discuss the issue as 'Sustainable Development in Higher Education' as presented by Boer (2013).

Higher Education Institutions (HEIs) are organizations with a unique opportunity to facilitate learning and spread knowledge – they are the breeding grounds for ideas and conceptions of the future. As such, they plan a crucial societal role as change-makers and incubators for creativity and innovation (Lozano, 2006b; Cortese, 2003).

As is so aptly put by Razak et al.

> The understanding that a university's full benefits can only be obtained when the university and society are organically linked together is increasingly commonplace. In other words, the needs of the society must be at the center of a university's activities, and the university must be willing to undergo flexible adjustments in order to accommodate society's changing needs (Razak et al, 2013, 141).

With the International Decade for Education for Sustainable Development being named from 2005 to 2014 (UN, 2002b), over the past decade, many HEIs – both inside of the United States, as well as out – have demonstrated a growing commitment to implementing sustainability initiatives (Lozano, 2011). In turn, the measurement of these sustainability actions has seen significant growth over the past decade as well. Many Higher Education Institutions are seeking metrics that measure sustainability and reflect its intrinsically interdisciplinary reality.

Sustainability in Higher Education Institutions has become an important issue in our time. The link between effective and lasting implementations of sustainability and education is clearly established and documented. In order to effectively evaluate institutional actions of sustainability within higher education institutions, sustainability metrics must be clearly understood.

2.4
Standardization applicable to sustainability

There are a wide variety of different standards that are relevant to sustainable development. Often they have not been explicitly developed for sustainable development in the holistic sense of the concept, but rather were developed to address a certain aspect which is covered under the umbrella sustainable development.

One of the largest and most widely known and used governing body for standardization is the International Organization for Standardization (ISO). As an independent, non-governmental organization, it has a membership of 162 national standards bodies. ISO's portfolio includes over 19,000 International Standards and related documents that have been published for a wide variety of industries, including agriculture, healthcare, technology, and food safety. Their standards are developed based on a demonstrated market requirement, as identified by experts from the industrial, technical and business sectors. These sector experts are instrumental in the process of drafting standards as well as implementing them. Additional relevant knowledge is often gathered from representatives of government agencies, academia, testing laboratories, consumer associations, international governmental and non-governmental organizations, where appropriate (ISO, 2010).

Regarding Sustainable Development and Sustainability, ISO has two particularly relevant families of standards: ISO 26000 and ISO 14000. **ISO 26000** deals with guidance on social responsibility. It names the following principles of social responsibility: accountability, transparency, ethical behavior, respect for stakeholder interest, respect for the rule of law, respect for international norms and behavior, and respect for human rights (ISO, 2014). Also published by ISO, the International Standard **ISO 14000** is the standard for environmental management (ISO, 2004).

Social Accountability International (SAI) publishes another often utilized standard, **SA 8000** (SAI, 2014). Focused on worker rights, workplace conditions and effective management system, this certification is achievable through an auditable, third-party verification. It is a voluntary standard based on the UN Declaration of Human Rights, conventions of the ILO, international human rights norms and national labor laws.

With a wide scope of application, this standard can be used for every type of organization, regardless of size, geographic location or industry sector. There are eight elements of this standard, including: child labor, forced or compulsory labor, health and safety, freedom of association and right to collective bargaining, discrimination, disciplinary practices, working hours, remuneration, and management system (SAI, 2014).

2.5
Sustainability reporting

Sustainability reporting is one way that organizations are demonstrating their investment, commitment and concern for their sustainability actions. As a voluntary activity, it has the following two accepted general purposes:

- "Assess the current state of an organization's economic, environmental and social dimensions" (Lozano, 2011)
- Communicate a company's efforts and sustainability progress to their stakeholders." (Lozano, 2011)

Other factors such as goal-setting assistance, benchmarking, performance measurement, and change management are additional driving forces. Furthermore, Sustainability reports communicate disclosure of impacts on the environment, society and the economy, where impacts can be positive or negative (GRI, 2013).

Given the large number of organizations engaged in sustainability reporting, a need arose to have some sort of standardization of reporting. A number of different guidelines exist for sustainability reporting, the most widely used of them include the Social Accountability 8000 Standard (SAI, 2014), the ISO 14000 Series, and the GRI Sustainability Guidelines (GRI, 2013).

The GRI Sustainability Guidelines, which are arguably the most widely used, are presented in two parts: The Sustainability Reporting Guidelines – Reporting principles and standard disclosure and the Implementation Manual. They were developed:

> Through a global multi-stakeholder process involving representatives from business, labor, civil society, and financial markets, as well as auditors and experts in various fields; and in close dialogue with regulators and governmental agencies in several

countries. The Guidelines are developed in alignment with internationally recognized reporting related documents, which are referenced throughout the Guidelines" (GRI, 2013).

Sustainability reporting has been gaining importance in both non-profit and for-profit organizations. However, the Higher Education sector is lagging in their implementation of sustainability reporting, as compared to the corporate sector (Ceulemans et al., 2015; Lozano, 2011). While there is a great deal to be learned from corporate implementations of sustainability reporting, there is also a clear indication of the need to contextualize the sustainability reporting process to the specificities of HEIs (Ceulemans et al., 2015).

Sustainability reporting can serve important roles specifically in HEIs in a variety of different ways. These include: communication opportunities with the various stakeholders (e.g. prospective and current students and parents, alumni, academics, faculty, staff, government departments, funding bodies, and any extended community), benchmarking against other HEIs carrying out Sustainability Reporting, and as a tool to facilitate the internal management of sustainability performance (Ceulemans et al, 2015; Lozano, 2011).

2.6
Metrics and assessments in sustainability

Given the breadth of considerations encompassed by sustainability, there are a wide variety of different types of assessments, each providing its own unique insight, typically for a specific set of stakeholders. Within this, indicators play in important role in contributing to the assessment methodologies.

A wide variety of metrics and assessments exist within the Higher Education community to measure and assess sustainability. Sustainability assessment can be categorized into three distinct approaches: accounts, narrative assessment, and indicator-based (Dalal-Clayton and Bass, 2002). Any given sustainability assessment may utilize only one approach or it may combine approaches (Lozano, 2006a). Here, indicators are defined as a "measurable part of the system." Definitions for the three approaches, provided by Lozano (2006a) are as follows:

1. *Accounts*: "these are constructions of raw data that are then converted to a common unit: monetary, area or energy"
2. *Narrative Assessments*: "these combine text, maps, graphics and tabular data. Narrative assessments might use indicators but they are not a cornerstone"
3. *Indicator-based*: "these may include text, maps, graphics, and tabular data, like the narrative assessment, but they are organized around indicators"

It is also worth considering two additional distinctions: *internal assessments* and *externally publicized assessments*. Where internal assessments results are shared only within the institutions, and external assessments are completed with the intention of having results made publically available. As a result of these different distinctions, the impact on the assessment characteristics is significant.

With the external tools, the results are public, so participation becomes an issue of status, advertising, and competition. Inherently, there is a drive to perform better than the other participants, and to alter behaviors to achieve this. This requires that the institution makes changes that are both recognized and prioritized by the metric. If some action, policy, or initiative is not included in the metric they participate in, it will not be prioritized, and likely not acted on by the institution. For the purpose of this research, the metrics analyzed are all externally published.

Alternatively, the internal assessment tools are designed to be more of a self-evaluation framework. A wide variety of different tools have been created and written about. Some of the more widely known include: GASU (Graphical Assessment of Sustainability in Universities) (Lozano, 2006a); STAUNCH (Sustainability Tool for Auditing University Curricula) (Lozano and Peattie, 2011), ESD (Education for Sustainability) Checklist, Campus Sustainability Assessment Framework (CSAF) (Cole, 2003), and LiFE (Learning in Future Environments). Many of these methods involve stakeholders from a wide cross-section on the Institution, often times requiring them to come together and engage in meaningful discourse and conversation about sustainability as part of the assessment. Given that this method when used, does not provide for a public outcome, it is difficult to measure the frequency that this style of method is used versus an externally publicized assessment.

2.8
Metrics and sustainability tools to assess higher education institutions

There are a wide variety of different metrics currently being used in various locales across the globe to assess commitment of higher education institutions to sustainability principles. Much analysis has been done on various aspects of these different evaluation methodologies that have been designed specifically for HEIs (Gomez et al., 2015; Lauder et al., 2015; Lozano, 2006a).

2.8.1
Description of well-established metrics

Table 4 provides a comprehensive, international list of many of the different metrics created specifically for measuring sustainability or some aspect of it within higher education institutions. This list includes historical metrics as well as those currently in use. As a comprehensive list, criteria for inclusion of this list is it aims to represent all of the metrics present in the literature.

Table 4. List of all of the common metrics that are used globally

Metrics with Externally Published Results	Internal Assessment Tools
The College Sustainability Report Card	Campus Sustainability Assessment Framework (CSAF)
Green College Honor Roll – Princeton Review	Unit-Based Sustainability Assessment Tool (USAT)
GreenMetric Ranking	CRUE
Sierra Club 2014 Cool Schools rankings	AISHE 2.0 (Assessment Instrument for Sustainability in Higher Education)
50 Colleges Committed to Saving the Planet	Sustainability Assessment Questionnaire (ULSF)
Change Maker Campus	Tree Model (Roorda)
Beyond Grey Pinstripes	RESFIA+D The Graduate Profile
The Princeton Review's Top Green Business Schools	STAUNCH (Sustainability Tool for Assessing University's Curricula Holistically)
Teaching Sustainability: 100 Colleges doing 'Green' Right	GRI Sustainability Guidelines (Global Reporting Initiative)
People and Planet University League	ESD checklist
STARS - Sustainability Tracking, Assessment & Rating System	Sustainable Campus Assessment System
NWF's Campus Report Card (2008)	GASU (Graphical Assessment of Sustainability in Universities)
NWF's State of Campus Environment Report (2001)	AUA - Alternative University Appraisal
Second Nature's Climate Leadership Awards	The Green Plan
	LiFE (Learning in Future Environments)

More recently, approaches and tools have been specifically designed to assess the adherence of HEIs to the precepts of sustainability. Table 5 synopsizes the most relevant conceptual frameworks, selected according to the following criteria: (i) applicability to higher education institutions, (ii) availability and transparency with regards to methods and reporting (where applicable) and (iii) actively functioning within the last ten years. The most relevant metrics, and those utilized for this study, are described in detail in the text below.

Table 5. Conceptual frameworks for Higher Education Institutions

Conceptual frameworks	Formulated and/or cited by
An integrated approach to achieving campus sustainability: assessment of the current campus environmental management practices	Alshuwaikhat and Abubakar, 2008
An alternative university sustainability rating framework with a structured criteria tree	Shi and Lai, 2013
A tool for a graphical assessment of sustainability in universities (GASU)	Gomez et al., 2015 Lauder et al., 2015 Lozano, 2006a
Adaptable model for assessing sustainability in higher education	Gomez et al., 2015
Alternative University Appraisal (AUA)	Razak et al., 2013
Assessing Responsibility in Sustainable Education (ARISE)	Boer, 2013 Lauder et al., 2015
Assessment Instrument for Sustainability in Higher Education (AISHE 2.0)	Lauder et al., 2015 Lozano, 2006a Roorda et al., 2009
Assessment of University Sustainability Policies as facilitators for the development of the International Campus of Excellence program	CADEP, 2010 Gomez et al., 2015
Campus Sustainability Assessment Framework (CSAF)	Cole, 2003 Lozano, 2006a
Earth Charter (EC) Assess	AtKisson et al, 2008 Raazak et al., 2013
My Environmental Education Evaluation Resource Assistant (MEERA)	Boer, 2013
Campus Environment 2008: A National Report Card on Sustainability in Higher Education	Cole, 2003 Lozano, 2006a NWF, 2008
People and Planet University League	People and Planet, 2014
Sustainability Assessment Methodology (SAM)	Koshy et al., 2013 Lauder et al., 2015
Sustainability Tool for Assessing University's Curricula Holistically - STAUNCH [RTM]	Gomez et al., 2015 Lauder et al., 2015 Lozano and Peattie, 2011
Sustainability Tracking, Assessment and Rating System (STARS)	AASHE, 2016 Boer, 2013 Gomez et al., 2015 Lauder et al., 2015
The College Sustainability Report Card	Lukman et al., 2010 Raazak et al., 2013 SEI, 2011
The Sustainability Assessment Questionnaire (SAQ)	Gomez et al., 2015 Shriberg, 2002a ULSF, 2009
Three dimensional university ranking (TUR)	Gomez et al., 2015 ukman et al., 2010
UI GreenMetric World University Ranking	UI, 2016 Gomez et al, 2015 Lauder et al., 2015
Unit-Based Sustainability Assessment Tool (USAT)	Gomez et al., 2015 Togo and Lotz-Sisitka, 2009

One of the most widely used metrics for measuring Sustainability in HEIs is the **Sustainability Tracking, Assessment & Rating System (STARS).** Developed by the Association for the Advancement of Sustainability in Higher Education (AASHE) in 2010, it is a voluntary and self-reporting rating (framework) designed to help HEIs both measure and track their sustainability progress. Ratings are given based on number of points accrued in the following categories: academics, engagement, operations, planning and administration. Additionally, a limited number of innovation points can be achieved for actions that fall outside of the existing 4 criteria. Possible ratings given are bronze, silver, gold, or platinum, all of which are considered positive ratings. Ratings rely on self-reporting and surveys are completed as self-assessments. To ensure accuracy, the President of the institution must sign off on the survey, which is an effort to not only obtain support from higher levels within the organizational structure of the institution, but also to promote accuracy and accountability. Detailed and complete survey responses are filled out and submitted using the online STARS reporting tool website and are publically available to all. Surveys results are valid for three years, after which the institution must complete an updated survey in order to carry the rating. There is a cost associated with the STARS rating process, which ranges from $900 to $1400 yearly. Currently, there are 723 institutions who are participating in the STARS reporting process (AASHE, 2014).

STARS aims to encourage participation in their ratings across a diverse group of HEIs, which is reflected in the structuring of the framework. Credits include an applicability criterion, given that not all credits apply to all institutions. Additionally, some of the credits "do not include detailed specifications but are instead flexible or open" (AASHE, 2016).

The **GreenMetric** is a "world university ranking for universities to assess and compare campus sustainability efforts" (UI, 2015) created by the University of Indonesia in 2010 with results being published every year since. It is a weighted ranking with the following stated objectives:

> It is open to global participation; it is accessible to HEIs in both the developed and developing world; it should contribute to academic discourse on sustainability in education and the greening of campuses; it should encourage university-led social change with regard to sustainability goals (UI, 2015).

It ranks Universities based on survey responses to six different assessment categories: setting and infrastructure; energy and climate change; waste; water; transportation; education. There are 361 Universities participating in the 2015 rankings, representing 61 countries, including the United States. Results are self-reported and the ranking is visible on their website. Individual survey responses from the institutions are not published. The ranking is free to participants and open to HEIs around the world (UI, 2015). The original iteration of the survey (in its first year) did not include education as an indicator; however, this category was added in subsequent versions (Lauder et al., 2015).

Development of the metric was influenced by existing models, including various "rankings, ratings, scorecards, and competitive grading systems both of university performance and also sustainability" (Lauder et al., 2015). The Holcim Awards, GREENSHIP (rating system developed by the Green Building Council of Indonesia), STARS, The College Sustainability Report card are all specifically noted as influential models to the establishment of GreenMetric WUR's ranking design team (Lauder et al., 2015).

The **College Sustainability Report Card** (also known as the Green Report Card) is sponsored by the Sustainable Endowments Initiative (SEI). It started in 2007, but was discontinued in 2012 at the request of the donor's fund supporting it that the monies be diverted to a different sustainability cause known as the 'billion-dollar green challenge.' Assessment is performed based on nine equally weighed categories including Administration; Climate Change & Energy; Food and recycling; Green Building; Student Involvement; Transportation; Endowment Transparency; Investment Priorities; Shareholder Engagement. All schools receiving a grade of A- or higher are recognized. Data are collected using a series of surveys, one for each of the following categories: campus operations; dining services; endowment investment practices; student activities (SEI, 2011).

The HEIs included in the report card evaluation are based solely on their endowment, based on the results from a 2007 NACUBO study on endowment. The HEIs included represent the top 95% of endowments for all HEIs surveyed (SEI, 2011).

The **Sierra Club 2014 Cool Schools** is produced by the Sierra Club. Founded in 1892 by John Muir, The Sierra Club is the oldest grassroots environmental organization in the United States (Sierra Club, 2015a). Their ranking is open to "all four-year, degree granting undergraduate colleges and universities in the United States" (Sierra Club, 2015b). Participation is voluntary, free and utilizes an online survey, officially called the Campus Sustainability Collector. Scored categories reported include the following: co-curricular, energy, investments, food, innovation, academics/research, planning, purchasing, transit, waste, water. The total possible points attainable are 1000. In 2014, 173 responses were received from qualified Colleges and Universities. Total scores as well as scores for each individual category are published publicly for all 173 Colleges and Universities on their website and in an edition of their monthly magazine, the Sierra Magazine. The top ten schools are profiled and each given a special highlight on the website (Sierra Club, 2015b).

The survey used, the Campus Sustainability Collector, is a collaborative effort to streamline the survey process for multiple organizations including: The Sierra Club, AASHE, SEI, and the Princeton Review. This collaboration was done to reduce the amount of time that HEIs spend completing multiple surveys to evaluate sustainability (Sierra Club, 2015b).

According to the published methodology section:

> The resultant Cool Schools ranking is an index that provides fair, comparative information about the most important elements of campus sustainability. Its results suggest that while many universities are making admirable progress, no school has yet attained complete sustainability. The top-rated university in 2014 scored 813.51 (out of a possible 1,000 points)" (Sierra Club, 2015b).

This statement implies a belief that their ranking is a flawless indication of sustainability. However, no ranking is perfect, and the Sierra Club Cool Schools are no exception. Furthermore, the following statement is provided: "…our ranking aims to act as a guide for prospective students who seek a way to compare colleges based on the schools' commitment to environmentalism" (Sierra Club, 2015a). While environmentalism is an important aspect of sustainability, the two concepts are not the same and cannot be used interchangeably. This is a reflection of what appears to be a common misconception in the United States – that sustainability is primarily an

issue of environmentalism. Particularly among the Environmental organizations, it seems that while they have adopted the sustainability terminology, the words do not adhere to the true meaning of sustainability – one that is much more complex and interdisciplinary than solely environmentalism.

The **Princeton Review's 2015 Green Rating Honor Roll** is a publication released yearly by the Princeton Review, which is a "leading test preparation, tutoring, and college admission services company" (Princeton Review, 2014). Ratings are given based on voluntary survey responses to the Campus Sustainability Data Collector. The rating is designed to provide a:

> Comprehensive measure of a school's performance as an environmentally aware and prepared institution. Specifically, it includes: i) whether students have a campus quality of life that is both healthy and sustainable, ii) how well a school is preparing students for employment in the clean-energy economy of the 21st century as well as for citizenship in a world now defined by environmental concerns and opportunities and iii) how environmentally responsible a school's policies are" (Princeton Review, 2014).

Participation in the ratings is free, and eligible four year institutions are invited to apply. In 2014, 861 colleges and universities submitted data for the rating. Ratings are given based on a scale between 60-99 and all those earning a score of 83 points or higher are published in their annual report "Guide to Green Colleges." In 2014, 861 colleges and universities submitted data for the rating and 347 schools achieved a grade of 83 or higher and are included in the publication. The majority of the schools are in the United States, with five in Canada and one in Egypt. Many schools received a perfect score of 99 points. These schools are named to the Green Rating Honor Roll.

The **US News and World Report Best College Rankings** is a yearly publication that has become the primary ranking used in the United States for academic quality of HEIs, having done their first rankings for HEIs in 1983. Based on the Carnegie classification system, they use a series of indicators to establish the rankings, including:

> Assessment by administrators at peer institutions, retention of students, faculty resources, student selectivity, financial resources, alumni giving, graduation rate

performance and, for National Universities and National Liberal Arts Colleges only, high school counselor ratings of colleges. (US News and World Report, 2015a).

They report a variety of statistics for each college or university, including: acceptance rate, average freshman retention rate, 6-year graduation rate, classes with fewer than 20 students, SAT/ACT $25^{th} – 75^{th}$ percentile.

All six of these metrics were used to establish the list of universities examined, but they were also analyzed and examined in comparison to the critical actions as a means to evaluate their adherence to the international calls for sustainability actions in Universities.

2.8.2
Addressing the biases

Many existing metrics have historically had a significant emphasis on single threads of sustainability, particularly the environmental aspect (Derrick, 2013; Disterheft et al., 2013). This reductionist approach undermines the intentionality and holism of sustainability and presents a specific need for a more balanced, interconnected and robust methodology that coherently incorporates multiple aspects of sustainability. Furthermore, the strong emphasis on energy efficiency for many of the existing metrics is indicative of the environment in which they were created – primarily developed countries where large amounts of energy are consumed per person. However, in less developed countries, where the energy consumption is lower, it is less relevant to have such a strong emphasis on energy efficiency since it does not have the same sort of overall impact (Lauder, et al., 2015). Alternatively, it could also be argued that since they may move towards larger consumption patterns per person, it may be beneficial to build conservationist habits early. Lauder et al. argues that due to the lower energy consumption in conjunction with the other more relevant issues, for example, deforestation, that these pertinent and local issues ought to be included in the metric to bring greater awareness to the issues (Lauder, et al., 2015).

Razak et al (2013) argue that many of the metrics are Eurocentric, and that given this bias, the resultant outcome and rankings do not accurately represent a true, global

reality. Gomez et al (p. 2, 2015) also suggest that many of the existing and most widely used metrics do not have a feasible application to institutions in developing countries, as many of these institutions do not have the required resources or structures to complete such comprehensive assessments. Given this, there continues to be a clear call, especially from institutions in developing countries, for a restructuring of criteria and models to allow for a more inclusive and less biased assessment system (Razak et al, 2013; Gomez et al, 2015). This euro-centric nature can also be observed in the various declarations, charters and initiatives (Table 1.) where the vast majority of the documents were created in European countries.

3
Brief considerations in sustainability and higher education in the U.S.

Given that the representative sample used for this research is based on HEIs from the United States, it is prudent to establish some cultural context for Sustainability, Sustainable Development, and Higher Education in the United States, as well as the overarching cultural factors influencing them. This includes the current state of Sustainability and Sustainable Development in the United States and influencing factors such as the history of the environmental movement in the United States, the role of innovation and technology, and the relevant political structures in the United States. The Higher Education system in the United States will be described, particularly highlighting the specific characteristics that make it unique among other educational systems throughout the world as well as aspects that impact the implementation of sustainable development practices.

3.1
Aspects of the environmental movement

The development and evolution of the environmental movement laid much of the foundation and discourse for how sustainability is defined today. Of particular interest is the environmental movement in the U.S, as it has had a lasting impact on the environmental movement globally. Not only is the U.S. Environmental movement relevant to the global sustainability discourse, but it is also of importance because it greatly impacts the current understanding and conceptualization of Sustainability in the United States. This is of particular note because it directly impacts the sustainability actions of Higher Education Institutions and businesses in the U.S. and the metrics used to evaluate them.

Many cite the beginning of the modern environmental movement in the U.S. as the publication of Rachel Carson's book Silent Spring in 1962 (Kline, 2011). Carson, a former researcher for the Fish and Wildlife service, identified the catastrophic effects on fish, birds, and waterways associated with using the synthetic insecticide DDT (dichlorodiphenyltrichloroethane). DDT had been widely implemented as a solution to control insect infestations without advance investigation as to its effect. She writes:

> I contend, furthermore, that we have allowed these chemicals to be used with little or no advance investigation of their effect on soil, water, wildlife and man himself. Future generations are unlikely to condone our lack of prudent concern for the integrity of the natural world that supports all life (Carson, 1962, p.13).

The public reaction to her book was significant, it incited a conversation about the issues she raised and started a movement for increased controls of pollution. This also contributed to the growing public concern and awareness of the connection between human health and ecological health (Kline, 2011, 84).

In the following years, environmental issues become increasingly important to the American people. "A plethora of popular magazines, technical journals, organizational newsletters, and books devoted to environmental issues appeared" (Kline, 2011, p.87). Many ecological disaster during the 1960s also contributed: The Santa Barbara Oil spill, the Cuyahoga River in Ohio catching fire due to exceedingly high levels of pollution, children in Los Angeles being asked to remain inside due to air pollution concerns, and eleven tons of salmon being seized in Wisconsin and Minnesota due to excessive concentrations of DDT (Kline, 2011). In 1969, the first image from space was taken by the Apollo 8 crew, allowing humans to see their planet in its entirety from a distance for the first time. As a testament to the power of the grassroots organization of this growing environmental movement, on April 22, 1970, the first Earth Day was held, with some 20 million Americans participating (Kline, 2011).

In the following years, the movement grew and matured. Known as "The Green Decade" the 1970s saw a tremendous surge in environmental legislation as a response to the public's concern over the environmental disasters of the 1960s. With this,

however, came a growing concern that Environmentalists were too concerned with "narrow ecological concerns" rather than broader human needs. As a result, the following decade, the 1980s, marked a time of transition as the environmental movement lost momentum. "The energy crisis of the mid-1970s and the Reagan revolution of the 1980s demonstrated that environmental issues, though important, were subordinate in the public mind to material living standards and economic security" (Kline, 2011, p.113).

In the 1990s, the environmental movement suffered from public apathy as the economy and human issues were prioritized. The environmentalists were portrayed by conservatives as "eco-terrorists" with fanatical views placing nature before humans. However, at a similar time, by the early 1990s, the Environmental movement became more of a global issue, particularly with the Earth Summit in Rio de Janeiro in 1992 (Kline, 2011).

On September 11, 2001, focuses shifted completely. Prior to this, politicians, academics, and other commentators had been predicting that the 2000s would be the "century of the environment" however after the twin towers in New York City were struck by terrorists, national security (real and perceived) became the paramount concern. This, in conjunction with economic issues presented by the recession became the issues of focus, with Environmental and Sustainability issues losing support (Kline, 2011)

Throughout its history, the Environmental Movement has been somewhat of a debate, with Environmentalists always pushing for more conservation, more perseveration, and the opponents insisting that conservation at the level called for by the environmentalist is both unnecessary and detrimental to the progress of humans (Kline, 2011, 14).

3.2
Role of innovation & technology in sustainability

The achievements and potential of innovation and technology play a prominent role in the ideology in the United States. With a strong history in technology production and innovation, there is an underlying mentality that technology will always serve as

a safety net for our problems or challenges. It is perceived to be capable of solving today's problems and tomorrow's unforeseen problems so that we effectively do not need to be overly concerned with factors impeding success. While technology and innovation have played instrumental roles in human development over time, there is extreme danger in viewing their potential as the ultimate solution to the challenges of climate change and sustainable development (Klein, 2014). This over-emphasis creates a false sense of security, which many Americans lean on all too often in their framing of the issues of climate change and sustainable development.

3.3
Relevant Political structures and systems

The system of government in the United States is rather unique, and given that government plays such a significant role in so many different aspects of a society, it is important to discuss the relevant aspects and nuances of this system and how they implicate or impede the integration and inclusion of sustainable development into the national society and cultural fabric of the United States, as well as their influence on other global societies.

As the absolute law of the land, the constitution of the United States is the prime mechanism for government. Officially adopted in 1789, it is the oldest written constitution still in use today (U.S. Department of State, 2013). Its primary objectives, as stated in its preamble are as follows: "We the People of the United States, in order to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America" (U.S. Constitution, 1789). Its simplicity and flexibility have over time allowed for it to be the central governing pillar of the United States without major adaptations or amendments. There have been 27 amendments in total, with the majority of these occurring in the years immediately following its establishment, and the first 10 being name the "Bill of Rights" (U.S. Department of State, 2013).

In addition to the U.S. Constitution, the legislative branch, the executive branch and judicial branch all play important roles in the U.S. political system as well. The legislative branch of the federal government consists of two chambers of Congress: the U.S. Senate and the U.S. House of representatives. For Legislation to pass, it must be approved by both houses before being presented to the President to be signed into law. The executive branch consists of the president and vice-president, elected every four years, with a maximum of two terms allowed. The judicial branch is made up of a system of courts of various levels throughout the United States and headed by the Supreme Court. A number of landmark cases ruled on by the Supreme Court have punctuated the history of the United States and heavily impacted the social fabric of its people (U.S. Department of State, 2013).

One such case is Citizens United vs. Federal Election Commission (2010). The result of this case was the ruling by the Supreme Court that it is unconstitutional to place restrictions on corporations and unions spending their own money on political advertisements (U.S. Department of State, 2013). As a result, there has been a tremendous influx of private donations made to political campaigns, which has in many ways enabled private interests to play a prominent role in the overall outcomes of elections for politicians and their favoring of policies benefiting these private interests. In essence we see that with the ability to spend vast amounts of money on political campaigns, it enables ideologies of those with large amounts of money to be reflected in national, and to a lesser extent, international policies.

A recent study done by Gilens and Page (2014) looked at various theories of American politics, finding that in the United States "…the majority does *not* rule-at least not in the casual sense of actually determining policy outcomes" (Gilens and Page, 2014). Furthermore, they went on to say that:

> Despite seemingly strong empirical support in previous studies for theories of majoritarian democracy, our analyses suggest that majorities of the American public actually have little influence over the policies our governments adopts. American do enjoy many features central to democratic governance, such as regular elections, freedom of speech and association, and a wide-spread (if still contested) franchise (Gilens and Page, 2014).

Although the term oligarchy is not used, the study cites "economic elite domination" as a major influencer and also states that "if policymaking is dominated by powerful business organizations and a small number of affluent Americans, then America's claims to being a democratic society are seriously threatened (Gilens and Page, 2014).

One unique feature of the U.S. is the multiplicity of its government. Due to the nature of its founding, where disparate states came together to create a unified republic, many of those states wanted to retain their local jurisdictive oversight. As a result, while certain issues are left to be governed at the federal level (typically issues requiring the strength of a centralized government, such a foreign relation, defense and currency regulation), many other issues are determined at much more of a local level, utilizing local jurisdictions for decisions on issues such as education, sanitation business, and transportation (U.S. Department of State, 2013).

Another important aspect to consider when framing the cultural landscape in the United States is its long and strong history of capitalism. This has a direct influence on the over-consumptive behaviors of Americans, the significant role played by businesses, the attitude of entitlement that so often accompanies wealth or economic gain, and the tendency to put economic prosperity above other forms of well-being. All of these influences are directly at odds with the ethos prescribed by sustainable development ideals.

A variety of different policies and incentives exist that influence Sustainable Development practices in the United States. This includes issues such as subsidies for the oil and gas industry, subsidies for the agricultural industry, subsidies for the pharmaceutical industry, and tax incentives for clean energy usage.

Worldwide fossil fuel subsidies are significant, with over $548 billion provided in 2013 (International Energy Agency, 2015a). According to the International Energy Agency, "Fossil-fuel subsidies were around $490 billion in 2014, but would have been $610 billion without reforms that have been enacted since 2009. Recent changes prove that fossil-fuel subsidy reform is possible: low oil prices give net importers the room to reform, and reinforce the need for exporters to do so" (International Energy

Agency, 2015b). When considering the topic of subsidies, it is important to understand the complexity associated with the definition of a subsidy, and that depending on how it is defined, these values may shift significantly.

Tax incentives for clean energy in the United States can be observed in various places, both at the federal and state levels. One of the more prominent programs is the federally-funded residential renewable energy tax credits. For existing homes and new construction, a 30% rebate of cost with no upper limit may be applied to geothermal heat pumps, small wind turbines (residential) and solar energy systems. Both principle residences and second homes apply, however rentals are not eligible. The credit expires December 31, 2016 (Energystar, 2014). Additionally, many states provide similar incentives which may be applied in an additive manner.

3.4
Aspects of the Education System

The education system in the United States is large, diverse and highly decentralized. Though the system has evolved over the years, much of its diversity and decentralization is comes from the separatist nature of the founding of the country and the individual states. The U.S. Constitution requires separation between church and state, so no public institution has any religious affiliation. Education is funded by the federal, state, and local governments. Often secondary schools are funded by municipal property taxes, meaning that the more affluent towns tend to have more funding for schools. Free, public, Secondary Education is provided for all citizens, with books and transportation, in most cases, provided (U.S. Department of Education, 2005). Higher Education, however, even at the public institutions, must be paid for by each student, including tuition, fees and books.

As there are quite a few specificities in the naming conventions used within the educational system in the United States, it is prudent to clarify the terminologies used when describing the different stages of progression through the Education System. Figure 4 presents the educational structure in the United States, including naming conventions, typical milestones, and associated average timing (age, grade).
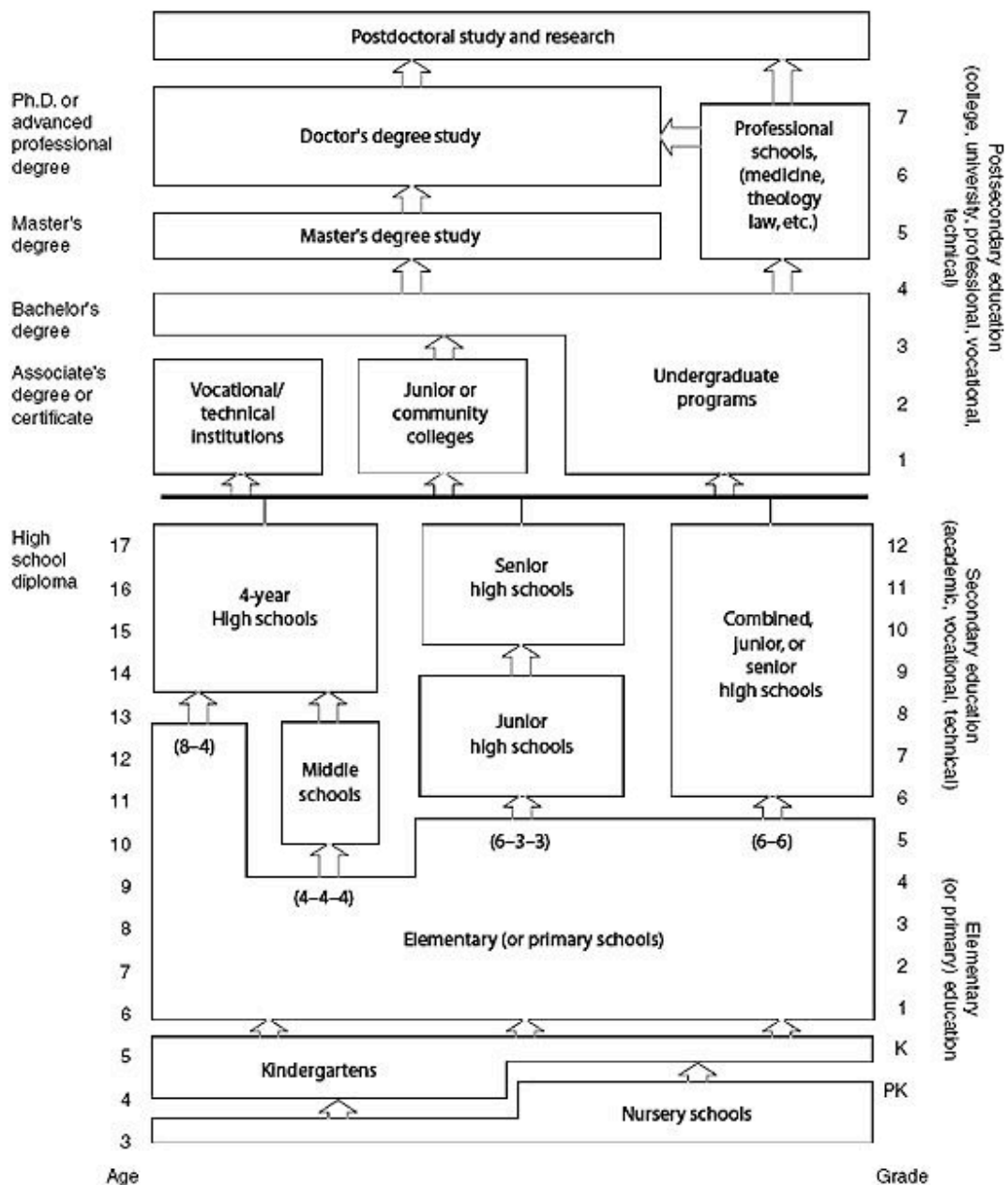
NOTE: Adult education programs, while not separately delineated above, may provide instruction at the elementary, secondary, or postsecondary education level. Chart reflects typical patterns of progression rather than all possible variations.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Annual Reports Program.

Figure 4. The Structure of education in the United States
Source: U.S. Department of Education, 2013.

Education, and Higher Education in particular, is deeply rooted in the history of the United States. It began in North America on October 28, 1636, when funds were appropriated for the first educational institution founded by the Puritans, Harvard

College (Geiger, 2015). The original curriculum for Harvard was established to deliver a liberal education in the arts. Despite orthodoxy of the Puritans, the arts were believed to be critical to the culture of educated men (Geiger, 2015). Education was largely literary, with science only being lightly touched upon, and mathematics restricted to arithmetic and geometry.

3.4.1
Institutional profiles of higher education institutions

Higher Education Institutions in the U.S. offer post-secondary education and can be broken down into various categories based on different characteristics. Institutions may be public, non-profit and for-profit institutions. They may be either a College (2-year or 4-year) or a University (4-years or more). A college may be a two-year college, or a four-year college, both of which offer post-secondary education degrees. Many of the two year institutions have the distinction of 'community college' and typically offer an Associate's Degree (A.A.). As for the four year colleges, they are often considered 'liberal arts colleges' and typically offer degrees such as a 'Bachelor of Art' (B.A.) or 'Bachelor of Science' (B.S.). Universities are typically four year institutions that offer either a B.S. or B.A. degree to undergraduates, but also offer graduate programs as well. To give an idea of the quantity of each of these different institutions in the United States, Table 6, below, presents this information.

Table 6. U.S. Higher Education at a glance

Number of Institutions	Total
Number of Higher Education Institutions	4,724
Number of 4 year colleges and universities	3,039
Number of 2 year colleges	1,685
Number of Public Higher Education Institutions	1,625
Number of Private Higher Education Institutions	3,099
Number of Private Non-Profit Higher Education Institutions	1,675
Number of Private For-Profit Higher Education Institutions	1,424

Source: *U.S. Department of Education, 2013.*

3.4.2
The student population

In the fall of 2015, an estimated 20.2 million students attended American colleges and Universities. This represents an increase of 8.7 million students since fall of 2000 (U.S. Department of Education, 2014) relative to the 318.9 million people in the United States. Approximately 7.0 million students will attend 2-year institutions and 13.2 million will attend 4-year institutions in the fall of 2015. Of these, about 17.3 million students are expected to enroll in undergraduate programs and around 3.0 million to enroll in post-baccalaureate programs (U.S. Department of Education, 2014). Table 7 provides a breakdown of the student population in Higher Education in the United States.

Table 7. Student population in U.S. Higher Education at a glance

Number of students	Total
Number of students enrolled in Higher Education Institutions	23,055
Number of students enrolled in 4-year Institutions	11,065
Number of students enrolled in 2-year and less-than-2-year* Institutions	11,990
Number of Post baccalaureate students enrolled	3,682
Percentage of 18- to 24-year-olds enrolled in degree-granting institutions	39.9

Source: *U.S. Department of Education, 2013.*
* Also includes students attending more than one institution.

Among the higher education institutions, there are some clear trends in enrollment. Characteristics such as gender and race provide an interesting and telling exposition on the equality of access to higher education. Women represent a higher percentage of college and university students than men, with 11.5 and 8.8 million students, respectively. While there are an increasing number of minorities attending higher education institutions, the numbers still remain very low for Hispanic and Black students. Between 2000 and 2013, the percentage of black students rose from 11.7 to 14.7 percent and from 9.9 to 15.8 percent for Hispanic students (U.S. Department of Education, 2014). This is particularly relevant given that inequality has a detrimental effect on economic growth (Persson and Tabellin, 1993) and that racial equality, and equality in general, are fundamental precepts of sustainability.

To provide some information on the trends in focus of areas of study for students in HEIs in the United States, Figure 5 displays the degrees conferred from degree-granting institution in selected fields of study. By far the most prominent and popular field is business, with social sciences and history, and health professions and related programs a far second and third, respectively. This indicates that not only should business be an area of focus for sustainable development curriculum, but also demonstrates a wider societal trend in the United States that places a particularly high value on business skill sets.
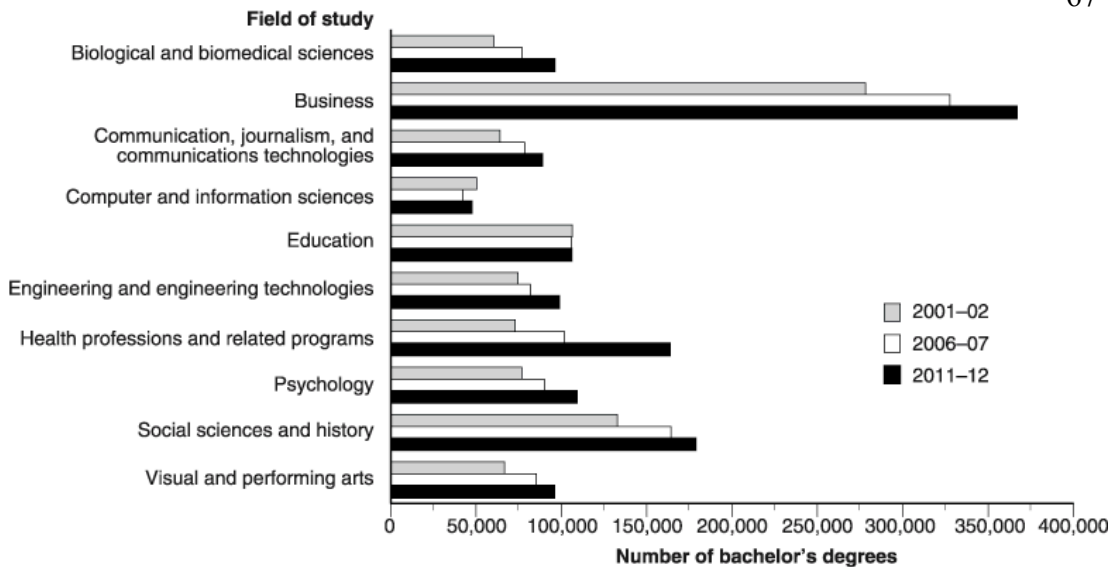
Figure 5. Bachelor's degrees conferred by degree-granting institutions in selected fields of study
Source: *U.S. Department of Education, 2013.*

3.4.3
Financial profile

Higher Education Institutions in the United States have some interesting and noteworthy financial structures that heavily influence the wider structure of Education, and Higher Education in particular, in the United States. Two factors of note, particularly for their influence on sustainable development are: the endowment structure which serves as the predominant funding source for the traditional, non-profit and public HEIs, and the significant, and often debilitating cost associated with attending any Higher Education Institution – including those that are considered public and are federally funded.

Endowments of higher education institutions are a distinctly unique feature of Higher education in the United States. An aggregation of disparate funds, typically donated to the University or College, and each often specified how it is to be used within the institution, the goal is that the principle amount of the fund will never be used, but only the earnings resulting from investments of the principle (American Council on Education, 2014).

In recent years, endowment has become an area of focus for climate change and sustainability activist groups. In 2012, the non-profit group, 350.org, launched a fossil fuel divestment campaign. Fossil Free is the online platform, set up by 350.org, to

lead the charge of fossil fuel divestment (350.org, 2016). There has been a strong push among these groups, which are often student driven, for their institutions to divest all their endowment investments in the fossil fuel industry. Historically, divestment campaigns have been perceived as successful, such as those aimed at the Tobacco industry in the 1980s and the South African support of Apartheid, also in the 1980s (Ansar et al., 2013).

In the United States, the total endowment in 2012 was $425 Billion. The 120 Institutions with the highest endowments accounted for $316 Billion, which represents nearly seventy-five percent of the national total (U.S. Department of Education, 2013). The institutions with the highest endowment, in order, are: Harvard University ($36.4 billion) Yale University ($23.8 billion), Stanford University ($21.4 billion), Princeton University ($20.5 billion), and Massachusetts Institute of Technology ($12.4 billion) (U.S. News and World Report, 2015b). Despite, however, the large endowments of some institutions, and the focus that is often given to them, the majority of HEIs only have small endowments, or none at all (American Council on Education, 2014).

One distinguishing factor of HEIs in the United States is the cost associated with attending one. Tuition and other associated costs are high, which means that most students do not have the economic capital to pay costs outright, and will take on significant loans to cover the difference.

> For the 2013–14 academic year, the average annual price for undergraduate tuition, fees, room, and board was $15,640 at public institutions, $40,614 at private nonprofit institutions, and $23,135 at private for-profit institutions. Charges for tuition and required fees averaged $6,122 at public institutions, $29,648 at private nonprofit institutions, and $13,787 at private for-profit institutions (U.S. Department of Education, 2014).

Table 8 provides a breakdown of tuition costs, fees, and room and board, by institution type.

Table 8. Tuition and fees for Higher Education Institutions in the United States

Endowments	Total (US$)
Total Endowment	$425 billion
Median annual undergraduate tuition – Public	$6,122
Median annual undergraduate tuition – Private, non-profit	$29,648
Median annual undergraduate tuition – Private, for-profit	$13,787
Median annual undergraduate tuition, fees, room & board –Public	$15,640
Median annual undergraduate tuition, fees, room & board –Private, non-profit	$40,614
Median annual undergraduate tuition, fees, room & board –Private, for-profit	$23,135

* Also includes students attending more than one institution
Source: U.S. Department of Education, 2014

One consequence of these high tuition and associated costs is the accrual of debt among college students and graduates. In recent years, from 2000 to 2014, the total amount of federal student debt quadrupled to more $1.1 Trillion. In this same time frame, the number of student loan borrowers has more than doubled, and the default rates for recent student loan borrowers are higher than they have been in twenty years (Looney and Yannelis, 2015). In 2014, of all college and university seniors who graduated from public and non-profit institutions, 69% of them did so with student loan debt (The Institute for College Access and Success, 2015). Today, it estimated that the total amount of student debt in the United States is over $1.3Trillion. The long-term impact and burden of severe debt experienced by many students the United States, along with the growing number of loans and defaults, have all contributed to what is now commonly referred to as the student loan crisis (Looney and Yannelis, 2015). Table 9 displays the trends in borrowing and the profiles of borrowers.

Table 9. Student borrowing in the United States and profiles of student borrowers

Loan Debt in US	Total
Total Student Loan Debt in the United States	$1.3 trillion
Number of Student Loan Borrowers	42.7 million
Number of Borrowers – for profit	11.334 million
Number of Borrowers – 2-year	5.256 million
Number of Borrower – Non-selective	6.740 million
Number of Borrowers – Somewhat selective	9.438 million
Number of Borrowers – Selective	7.582 million
Number of Borrowers – Graduate Only	2.381 million
Median federal loan debt – Total	$19,647
Median federal loan debt – for-profit	$14,255
Median federal loan debt – 2-year	$11,701
Median federal loan debt – Non-selective	$21,229
Median federal loan debt – Somewhat selective	$25,886
Median federal loan debt – Selective	$26,491
Median federal loan debt – Graduate Only	$45,890

Source: Looney and Yannelis, 2015

Some rather alarming trends exist within the student loan crisis, particularly in the pattern of student loan borrowers. Recent studies have shown that the majority of the significant increase in student debt comes from 'non-traditional' borrowers, meaning students at for-profit institutions, and to a lesser extent, at two-year institutions, for which historically there were fewer students, and were not significant borrowers, respectively. This surge in 'non-traditional' borrowers began with the economic recession in 2009 and has continued to the present. With poor labor markets as a result of the recession, many people chose to go back to school, and in doing so accrued significant amounts of debt. These non-traditional borrowers are considered to be much more vulnerable and high-risk that the traditional borrowers. Traditional borrowers from four year institutions have a higher graduation percentage and better job prospects after graduation overall. Non-traditional borrowers, however, come from lower-income families, live in poorer neighborhoods, tend to be older when they first enroll, and are more likely to be first-generation borrowers. They are less likely

to complete their programs and are more likely to experience poor labor markets when they leave (Looney and Yannelis, 2015). To demonstrate these differences, Figure 6 displays some of the characteristics of the different borrowers, illustrating the discrepancies between the borrower groups and the respective social implications.
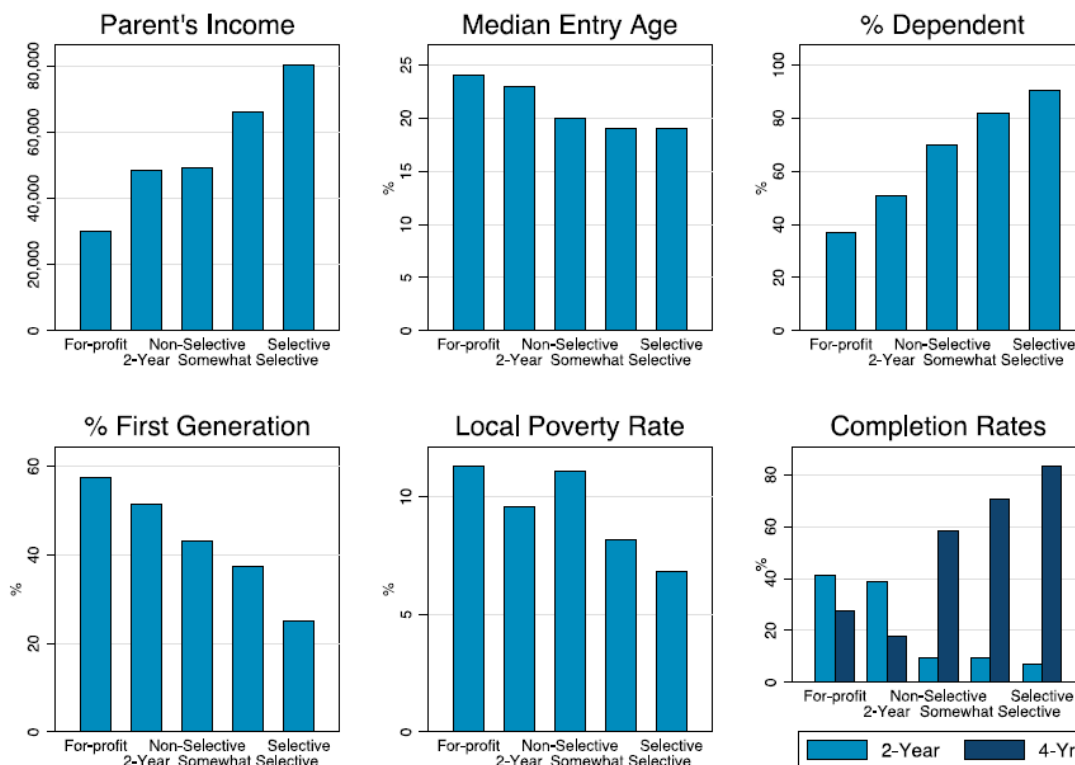
Figure 6. Characteristics of borrowers in 2011 by institution type
Source: Looney and Yannelis, 2015 (figures are based on 2011 data)

3.4.4
Trends in sustainability in higher education institutions

With a growing interest in Sustainability in Higher Education in the United States, a number of initiatives and trends have emerged that are aligned with sustainability principles and practices. One example of this is the Association for the Advancement of Sustainability in Higher Education (AASHE). As a registered 501(c)(3) non-profit their mission is to "inspire and catalyze higher education to lead the global sustainability transformation" (AASHE, 2016). First established in 2006, they fill a number of roles, including hosting the AASHE annual conference (North America's

largest sustainability conference), newsletters, a resource center, an awards program, and the overseeing and maintenance of the Sustainability Tracking, Assessment & Rating System (STARS). Today, there are over 1,000 AASHE members, consisting of HEIs, primary and secondary schools, businesses, governmental agencies, and non-profit organizations representing eighteen countries (AASHE, 2016).

Another trend has been the growing commitment of HEIs towards emissions reductions. This can be seen in many of the HEIs through their plans to achieve carbon neutrality in the coming decades, their commitment to greenhouse gas emission reporting, and also particularly in their commitment through signing on to the 'Climate Commitment,' (formerly known as the American College and University Presidents' Climate Commitment (ACUPCC)). This commitment initiative is hosted by the non-profit, Second Nature, which was founded in 1993 with the expressed mission "to proactively build a sustainable and positive global future through initiating bold commitments, scaling successful actions, and accelerating innovative solutions among leadership networks in higher education" (Second Nature, 2016). The Climate Commitment "Integrates a goal of carbon neutrality with climate resilience and provides a systems approach to mitigating and adapting to a changing climate. It is designed to blend these two critical components of climate leadership" (Second Nature, 2016). Recently, they also added the 'Resilience Commitment' and the 'Carbon Commitment.' The Resilience Commitment is "focused on climate adaptation-specific goals, was well as building community capacity to deal with a constantly changing climate and resulting extremes" and the Carbon Commitment is "focused on reducing the emissions of harmful greenhouse gases to zero and mitigating campuses' contribution to climate change" (Second Nature, 2016). Today, over 650 Colleges and Universities in all 50 states and the District of Columbia have signed on to the Climate Leadership network, demonstrating their commitment to climate leadership and responsibility (Second Nature, 2016).

Within Higher Education Institutions in the United States, a number of different sustainability best practices can be observed. Many of them center around eco-efficiency, however some of the more progressive ones also include a more holistic representation, namely including the social and cultural aspects of sustainability.

Some of these best practices include outreach campaigns, often consisting of various materials and publications, such as interactive campus maps, dashboards to measure energy and water consumption patterns; sustainable food purchasing and sourcing policies; waste diversion targets; support for and access to research in sustainability topics; Incentives for sustainable course development among faculty; support and incentive for more sustainable transportation options; and requiring a sustainability literacy assessment for HEI students.

4
HEIs: proposed actions towards sustainability and a performance assessment scheme

This section presents and explains a framework for helping Higher Education Institutions (HEIs) achieve sustainability goals based on an organizational guide and a structured agenda of strategic sustainability actions. These serve to assist intuitions with their initial and sustained implementations of sustainability practices, thereby contributing to their on-going improvement process. Additionally, a multi-dimensional scheme for assessing an HEI's institutional performance throughout the entirety of the implementation process is proposed. This includes a series of four indices (commitment, coherence, difficulty, and institutional performance) designed to present an evenly balanced analysis and assessment of sustainability actions in Higher Education Institutions.

4.1
Proposed framework for the HEI organizational environment

This section discusses the fundamentals of the analytical framework proposed for helping HEIs achieve sustainability goals and details a set of coherent actions on sustainability, formulated from international references. Contributing to the permanent improvement process toward sustainable development, the proposed multidimensional scheme for assessing the institutional performance of HEIs during the entirety of the implementation process of the proposed sustainability actions is discussed.

This proposed systematic framework, which promotes the management of strategic sustainability actions, is required given that the very challenges of sustainability are inherently systems problems and demand an integrated framework accordant with the challenge itself.

This analytical framework comprises the proposed four integrated dimensions of its organizational environment (administrative, social & cultural, academic, and operational), each addressing the strategic sustainability actions formulated to closely reflect principles internationally synthesized (Tables 11, 12, 13, 14).

While previous studies consider research and education as separate dimensions (Cortese, 2003; Lozano, 2006b; Lukman et al., 2010), more recently they are grouped together in the same dimension (Gomez et al., 2015). Although the research and education functions are both uniquely important, their conflation is crucial towards the adoption of a more scientific and all-encompassing vision of sustainability for HEIs.

Each dimension encompasses key topics fostering sustainability in the HEIs' organizational environment. For each dimension of analysis, Table 10 defines key topics and addresses the strategic sustainability actions formulated to closely reflect the sustainability principles and international references studied (synthesized in Tables 11-14).

Table 10. Key topics fostering sustainability in HEIs' organizational environment

Dimensions	Key topics	Formulated from
Administrative	Governance Transparency Planning Monitoring Reporting Assessment Affordability Investment innovation	UN, 1987 Ceulemans et al., 2015 Gomez et al., 2015 GRI, 2013 Shi and Lai, 2013 ISO, 2014 Lozano et al., 2013 Lozano, et al. 2015 Ramos et al., 2015 Turin Declaration, 2009 UN, 2012
Social & Cultural	Social equity Gender equality Awareness Engagement Altruism Wellbeing Outreach Accessibility Holistic thinking	Abuja Declaration, 2009 Alshuwaikhat and Abubakar, 2008 UN, 1987 Encyclical Letter Laudato Si', 2015 GRI, 2013 Lauder et al., 2015 Raworth, 2012 Talloires Declaration, 1990 Turin Declaration, 2009 UN, 2012 Viegas et al., 2016 Watson et al., 2013
Academic	Curriculum Research Interdisciplinary approach Intercultural dialogue Innovation & transferability Collaboration	Abuja Declaration, 2009 Dyer and Dyer, 2015 Gomez et al., 2015 Graz Declaration, 2005 Halifax Declaration, 1991 Shi and Lai, 2013 Kyoto Declaration, 1993 Lauder et al., 2015 Lozano et al., 2013 Lunenburg Declaration, 2001 Swansea Declaration, 1993 Talloires Declaration, 1990 Turin Declaration, 2009 Viegas et al., 2016
Operational	Water Energy Food Materials Waste Grounds & Biodiversity Climate change Resilience	AASHE, 2016-08-14 Alshuwaikhat and Abubakar, 2008 Dyer and Dyer, 2015 EEA, 2013 IPCC, 2014 Lauder et al, 2015 Raworth, 2012 Rockstrom et al, 2009 Seconde Nature, 2007 Shi and Lai, 2013 Steffen et al, 2015 Turin Declaration, 2009 UN, 2012 UNFCCC, 2015

Figure 7 presents the structure of the organizational environment of an HEI, emphasizing the interconnectivity between the elements (key topics) that compose it.
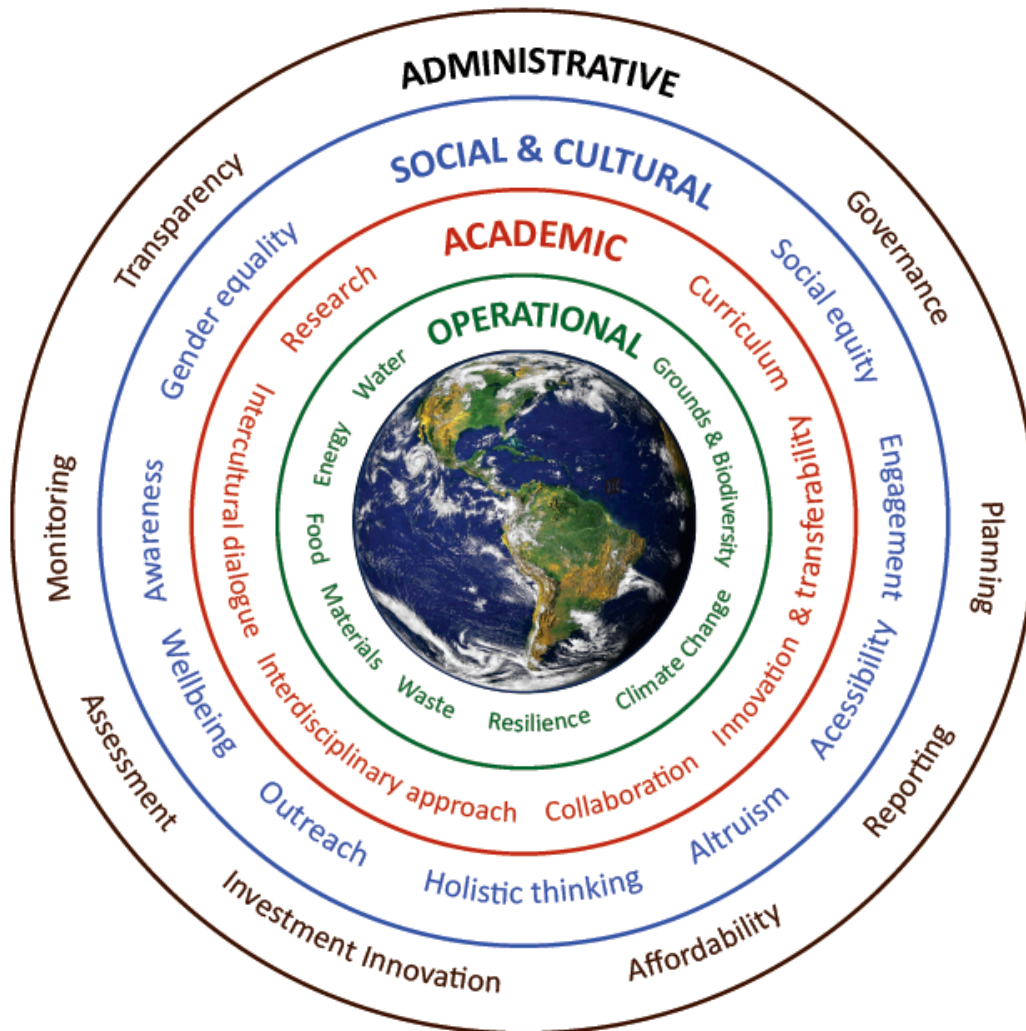
Figure 7. Analytical framework of the organizational environment of an HEI

Each dimension encompasses key topics of an HEI. The **administrative dimension** refers to the governance, transparency, planning, monitoring, reporting, assessment, affordability and investment innovation; the **social and cultural dimension** denotes more complex long-term issues related to key topics of holistic thinking, social equity, gender equality, awareness, altruism, accessibility, wellbeing, engagement and outreach; the **academic dimension** expresses key topics of curriculum, research,

interdisciplinary approach, intercultural dialogue, innovation & transferability and collaboration; while the **operational dimension** addresses key topics of water, energy, food, materials, waste, grounds & biodiversity, climate change and resilience. The core of the figure illustrating the Earth symbolically represents the interconnectivity between the four dimensions of the organizational environment of the HEI, the human society and the biosphere as a whole.

Actions in the *Administrative* dimension are crucial to providing the example and knowledge that fosters sustainability within an HEI, clarifying and incorporating the vision of sustainability, and establishing priorities to help guide investments and decision-making processes. The Administrative layer of the organization has the ability to establish an intent and commitment towards sustainability and to guide the organization's activities, planning, and goals to be increasingly aligned with sustainability principles. It is up to the decision makers of the HEI to establish a permanent dialogue between the different actors engaged, as well as an observant management of the sustainability actions. HEIs must seek innovative solutions for sustainability challenges and demonstrate leadership accordingly. This includes setting pertinent and salient examples of what sustainability means throughout the various levels and facets of the organization. HEIs must also report their current progress towards sustainability in order to communicate to stakeholders their efforts.

Actions under the *social and cultural* dimension reflect activities and mentalities that must permeate all aspects of campus life and the wider campus community. It is through awareness and engagement that new ideas are transmitted, and through creativity, inspiration and well-being that these ideas are realized and revolutionary changes are experienced. Investment in human resources is integral to the achievement of the balance between human capital, natural capital and financial capital. The campuses of higher education institutions can be understood as social spaces that allow integration and harmonization of diversity and plurality. Cultural diversity, traditional knowledge and spirituality must permeate throughout, so that the community as a whole may reach a deeper understanding of the global challenges of sustainability and of the cultural requirements to address them in tangible ways. Furthermore, intercultural dialogue enables open and respectful interactions between

individuals and groups with different cultural worldviews and. Campus life is a uniquely existential experience; capable of developing a deeper understanding of diverse cultural perspectives and practices, and fostering equality towards of the foundations of a just society.

Actions under the ***academic dimension*** promote a "culture of sustainability." HEIs must incorporate disciplines related to sustainable development across the curricula with a special focus on interdisciplinarity. It is a fundamental step in making sustainability an academic priority while advocating for the implementation of changes required to achieve the goals of sustainable development. The interdisciplinary approach also contributes to the process of breaking the logical and encyclopedic barriers inherent to thinking about the global challenges posed by sustainability. Concurrently, this approach promotes the systems thinking required for an accurate framing of the issues. The key topics of intercultural dialogue, innovation & transferability, and collaboration considered in this dimension underscore the important role of research and technology transfer to society as a whole as one of the main functions of HEIs.

Actions under the ***operational dimension*** encourage HEIs to minimize their consumption of water, energy and materials; minimize their waste production; and implement improvements in their operations (e.g. transportation, buildings, dinning services and purchasing). Decreasing the ecological, carbon and water footprints offers significant environmental benefits towards favorable civilizing conditions for future generations. Innovative practices and strategies to divert waste streams from landfills into repurposed outcomes promote comprehension of regenerative processes and minimization of consumption patterns. Through this reduction and minimization process, issues surrounding exploitive habits and consumption patterns are exposed, serving both as a reflective exercise about sustainability and stimulating further improvement towards reduction. HEIs must also invest in technological innovation and permaculture practices in order to accomplish the transition from exclusively consumer entities of natural resources to consumer and producer entities. Their operations should be inspiring examples of sustainability actions for a society moving towards the construction of an amalgam of knowledge that integrates the continued

development of human activities and the maintenance of the planetary systems in a resilient state.

The framework proposed aims to promote better conditions for managing sustainability actions within the organizational environment of an HEI. This is required given that the very challenges of sustainability are inherently systems problems and demand an integrated framework accordant with the challenge itself. Key topics proposed aim to systemically integrate sustainability actions into the routines of HEIs in order to provide learning and career value from the process of implementation.

4.2
Strategic actions towards sustainability

Given its multidimensional and complex nature, the pursuit of sustainability requires integrated and strategic actions, notably those capable of representing the full suite of dimensions of sustainable development (social, cultural, economic, and environmental). Many authors have studied strategic sustainability actions within the institutional and management environment (Kolk and Pinkse, 2005; Hoffman, 2006; 2007; Hoffman and Woody, 2008; Jeswani et al., 2008; Weinhofer and Hoffmann, 2010; Sprengel and Busch, 2011; Lee, 2012; Casarejos et al., 2014). Sustainability actions must be integrated and prioritized in an institutional setting as goals and execution plans intended to address the societal need for a transition to a resilient society.

In this context, **strategic sustainability actions** consist of *an integrated set of values, principles, targets and practices* towards meeting human rights and the maintenance of the Earth system in a hospitable resilient state*, which are directly and indirectly associated with the anthropogenic emission of GHG and the other physical planetary boundaries of the Earth.*

These actions include the reduction of GHG emissions; the re-evaluation of values, principles, policies and management protocols; the development of new conceptual structures and ways of thinking about products, services and markets; the reimagining of socio-economic norms; the adoption of new modes of productivity,

competitiveness and relationships; the diagnosis of risks and emerging opportunities; the formulation of conscious norms and policies; and the anticipation and adaptation to new realities to enable the future use of preventive and control measures (Casarejos et al., 2014).

Despite the undeniable progress by HEIs – indicating awareness and commitment from the academic and scientific community to the principles of sustainable development – the road ahead is still long and winding. To incorporate a "culture of sustainability" requires drastic changes of attitude and paradigm shifts. The proposition of a set of strategic actions reflecting the key topics of the international initiatives and evaluation methodologies offer a tool to contribute to the paving of this tumultuous path to be traveled. In light of international initiatives and best practices, this work proposes an agenda of strategic actions, structured in four dimensions, to pave the way for HEIs committed to move towards sustainability. These actions were conceived based on the following complementary criteria: (i) applicability to this particular nature of organization; i.e. an HEI; (ii) full alignment with the key topics associated with the analytical framework proposed and (iii) author's critical reflections on the international references studied. It also proposes a structured scheme to assess the institutional performance and the adherence to sustainability actions within the environments of committed HEIs. Tables 11, 12, 13, and 14 define, for each dimension of analysis, the strategic sustainability actions formulated from the international references studied

Table 11. Strategic sustainability actions proposed for the administrative dimension

n.	Proposed sustainability actions	Formulated from
	Incorporate the concepts, values and principles of sustainable development in the institutional vision, mission and goals in order to ensure the validity of a "sustainable" culture that permeates all areas of knowledge, departments and culture of the HEI.	• World Declaration on Higher Education for the Twenty-first Century (1998) • The future we want report (UN, 2012) • ISO 26000 (ISO, 2014)
	Ensure continuous updating, reviewing and critical analysis of concepts, values and principles of sustainable development based on the best science available.	• The Lunenburg Declaration (2001) • Ubuntu Declaration (2002)
	Prioritize the issues of sustainable development in the training and qualification programs of administrators, employees and other stakeholders of the HEI and incentivize integration into institutional programs and initiatives.	• Copernicus Charter (1994 • Lunenburg Declaration (2001) • Bonn Declaration (2009)
	Encourage and engage a wide diversity of stakeholders to maintain and strengthen the movement towards sustainable development.	• Shriberg (2002b) • Casarejos et al. (2014) • Sprengel and Busch (2011) • ISO 26000 (ISO, 2014)
	Establish programs and activities to encourage reflection on the values and principles of sustainable development utilizing a holistic, integrated and multidisciplinary approach.	• The Luneburg Declaration (2001) • The future we want report (UN, 2012) • Ubuntu Declaration (2002)
6	Guide the management systems (e.g. planning, monitoring, evaluation and reporting) to perform effective actions within local and global sustainability challenges. This should include the use of metrics and sustainability indicators to provide information relevant to decision making, planning, implementation and evaluation of strategies.	• The future we want report (UN, 2012) • Our common future (Bruntdland, 1987) • Razak et al. (2013) • Lozano et al. (2013)
7	Use tools, metrics and indices of sustainability that can provide relevant information for decision-making, implementation and evaluation of actions and to participate in assessment tools and metrics, particularly those representing the holism of sustainable development. Publish and disseminate an annual sustainability report.	• Ramos and Pires (2013) • Boer (2013) • Sustainability Reporting Guidelines (GRI, 2013) • Ceulemans et al. (2015)
8	Create financial mechanisms in order to facilitate investment in viable projects, actions and innovation technology aimed at sustainable development.	• Declaration of Thessaloniki (1997) • Turin Declaration (2009) • The future we want report (UN, 2012)
9	Establish targets of reduction and offsetting of GHG emissions and conduct and report emission inventories of GHG and other pollutant gases from HEI operations and associated activities.	• American College and University Presidents' Climate Commitment (2007) • STARS 2.1 (AASHE, 2016)
10	Engage community members in a transparent, democratic process that incorporates holistic sustainable practices and governs the rules of the HEI as well as pressing governments to ensure that education in general and higher education in particular, are covered with regulatory conditions that facilitate the promotion of sustainability.	• Halifax Declaration (1991) • The Earth Charter (2000) • ISO 26000 (ISO, 2014)

Table 12. Strategic sustainability actions proposed for the social and cultural dimension

n.	Proposed actions	Formulated from
1	Instill a holistic perspective of sustainability by incorporating values of peace, tolerance, respect, solidarity, pluralism, diversity, equity and justice for all, including racial equality, gender equality, inter-generational equality, rights of indigenous people and the poor infused in the culture of the HEI.	• Agenda 21 (UN, 1992) • The Earth Charter (2000) • Bonn Declaration (2009)
2	Engage the local, regional and global community through outreach activities with a dual purpose to promote the ideals of sustainable development and to understand and incorporate the needs of these populations into the institution's actions, ideals and culture.	• Razak et al. (2013) • ISO 26000 (ISO, 2014)
3	Contribute to the development of new and innovative socio-economic models consistent with the principles of sustainable development (e.g. poverty eradication, social equity, access to water, food, shelter and education, resiliency, respect for planetary boundaries).	• Agenda 21 (UN, 1992) • Raworth (2012) • ISO 26000 (ISO, 2014)
4	Encourage and support social equity, gender equality, racial equality, and cultural diversity.	• Agenda 21 (UN, 1992) • Our common future (UN, 1987) • ISO 26000 (ISO, 2014)
5	Implement creative practices aimed at elevating awareness of the spiritual, ethical and altruistic aspects of sustainable development.	• Abuja Declaration (2009) • Turin Declaration (2009)
6	Ensure the permanence of the topic sustainable development as part of the culture of the HEI by taking into account the dimension of time for the short, medium, and long-term aspects of planning, thus enhancing the living *campus* experience through programs, raising awareness, wellbeing, creativity, inspiration; education and engagement	• Frota and Casarejos (2013) • Rauch and Newman (2009)
7	Raise awareness of the relevance of evaluating risks related to unsustainability (*e.g.*: lack of natural resources, degradation of biodiversity and ecosystem services, climate change, poverty, social inequity), and discuss the threats to societies.	• Belgrade Charter (1975) • Swansea Declaration (1993)
8	Encourage the development of spiritual and ethical values for the sustainable development of societies, including the perspective of altruism, critical thinking and moral sustainability across generations, utilizing reflection and creativity as tools to achieve this.	• Encyclical Letter Laudato Si' of the Holy Father Francis on Care for Our Common Home (2015) • Lozano (2014)
9	Ensure favorable working and living conditions for employees and students.	• STARS 2.1 (AASHE, 2016) • Social Accountability 8000 International Standard (SAI, 2014) • ISO 26000 (ISO, 2014)
10	Support and consume local and community-based products and services.	• STARS 2.1 (AASHE, 2016) • ISO 26000 (ISO, 2014)

Table 13. Strategic sustainability actions proposed for the academic dimension

n.	Proposed actions	Formulated from
1	Ensure the inclusion of themes, issues and activities related to the challenges presented by sustainability in the foundations of teaching and learning, i.e. teaching philosophy, curriculum, research activities and services as well as the culture of the campus and the HEI.	• Lozano and Peattie (2011) • STARS 2.1 (2016) • GreenMetric (2015)
2	Prioritize sustainable development in the training and qualification programs for all educators and incentivize integration into curriculums and programs.	• Copernicus Charter (1994) • Lunenburg Declaration (2001) • Bonn Declaration (2009)
3	Ensure continuous curriculum updating and reviewing of concepts, values and principles of sustainable development based on the best science available.	• The Lunenburg Declaration (2001) • Ubuntu Declaration (2002)
4	Incorporate topics of sustainable development throughout the curriculum using an inter-, trans- and multidisciplinary approach.	• Halifax Declaration (1991) • Declaration of Thessaloniki (1997)
5	Perform inter-, trans- and multidisciplinary research focused on different topics in environmental sciences, climate change, sustainable development and permaculture.	• The Kyoto Declaration (1993) • Copernicus Charter (1994) • Spira et al. (2013) • Waas e al. (2010)
6	Encourage creativity for the development of research projects and activities aimed at sustainable development.	• Graz Declaration (2005) • Bonn Declaration (2009) • Mulder et al. (2103) • Lozano (2014)
7	Encourage the collaboration and international cooperation between HEIs and other societal institutions (research, governmental, non-governmental institutions and companies) in order to create lasting networks and to facilitate a propitious environment for innovation and knowledge transfer.	• The Halifax Declaration (1991) • Agenda 21 (1992) • Swansea Declaration (1993) • Kyoto Declaration (1993)
8	Provide internship and immersion activities in the area of sustainability as well as funding and support for students to innovate their own similar student-driven activities.	• STARS 2.1 (AASHE, 2016)
9	Create an inclusive and supportive environment for the incubation and growth of innovative ways to address the challenges of sustainable development.	• ISO 26000 (ISO, 2014)
10	Provide an equal opportunity for education for all, including formal, non-formal and informal education, particularly with regard to the topics of sustainability, regardless of race, gender, religion or socio-economic standing.	• Agenda 21 (1992) • Earth Charter (2000)

Table 14. Strategic sustainability actions proposed for the operational dimension

n.	Proposed actions	Formulated from
1	Perform good practices aimed at reducing GHG emissions and environmental impacts related to the activities of the HEI.	• American College and University Presidents' Climate Commitment (2007) • Karatzoglou, 2013
2	Maximize utilization of renewable energy and install renewable energy generation systems.	• The future we want (UN, 2012) • Greenmetric (UI, 2015) • UNFCCC (2015) • STARS 2.1 (AASHE, 2016)
3	Incorporate sustainable building requirements– including energy efficiency systems – in the revitalization, refurbishment and construction of new spaces and buildings on the campus of the HEI and provide a work environment with an intelligent design that maximizes the welfare of students, faculty and employees.	• GreenMetric (UI, 2015) • STARS 2.1 (AASHE, 2016) • American College and University Presidents' Climate Commitment (2007)
4	Encourage and support the use of alternative transport (student and employee commuter share model, public and sustainable transportation and bicycles).	• GreenMetric (UI, 2015) • STARS 2.1 (AASHE, 2016) • American College and University Presidents' Climate Commitment (2007)
5	Evaluate the climate change impacts on biodiversity on the campus and in the development of HEI activities.	• The future that we want (UN, 2012)
6	Expand the green area of the campus introducing native species of the local Biome, promoting outreach and awareness of such activities, and utilizing regenerative practices.	• GreenMetric (UI, 2015)
7	Quantify the total water consumption, or water footprint, on the campus of the HEI, and inform the community about these metrics and ways to improve the results.	• GreenMetric (UI, 2015) • STARS 2.1 (AASHE, 2016)
8	Measure, categorize and report the materials used and waste generated on the HEI campus (paper, chemicals, packaging, organic matter) with the goal of reducing these values, calling attention to any overly consumptive patterns of abuse, and diverting materials from landfills and incinerators thereby conserving resources through recycling, repurposing and composting.	• Talloires Declaration (1990) • GreenMetric (UI, 2015) • STARS 2.1 (AASHE, 2016)
9	Account for environmentally friendly and socially conscious materials (green products), from suppliers with practices, values and reputations recognized for sustainability.	• STARS 2.1 (AASHE, 2016) • ISO 26000 (ISO, 2014)
10	Use monitoring and improvements in this physical dimension as way to educate community members about impacts of materials use and the greater impact of use and over-consumption, including exposing as much of the supply chain as possible.	• STARS 2.1 (AASHE, 2016) • ISO 26000 (ISO, 2014)

4.3
Multidimensional scheme for assessing the institutional performance

The use of specific indices that reflect the different dimensions of sustainable development is strongly recommended to assess the degree of commitment and difficulties faced by HEIs while implementing the strategic sustainability actions proposed. Sustainability indices can expediently provide relevant information to stakeholders, stimulating them to overcome the challenges of sustainability and to provide key information for decision-making, planning, implementation and evaluation of sustainable development policies and targets. In organizational environments, managers make use of sustainability indices to evaluate and report the performance of their institutional actions. Similar attitudes and behaviors are expected from HEIs fully committed to the principles of sustainability.

An appropriate metric or scientific index usually contributes to measuring the different aspects of sustainability, providing guidance in decision-making concerning sustainable development. International assessment tools cited in this study stress the need for a permanent institutional effort aimed at incorporating the principles of sustainability in operations, production, communication and assessment in the managerial culture of the organization. At an organizational level, the use of sustainability indices to assess, monitor and report the performance of institutional actions are expected.

This section proposes a set of three indices to measure, for each of the considered dimensions (administrative, social and cultural, academic and physical), the degree of commitment and coherence with the implementation of the sustainability actions proposed (defined in Tables 11-14) and the technical and financial difficulties faced by the HEI throughout the implementation process. A fourth index allows for assessment of the overall institutional performance.

The **Commitment Index** (*CoI*), given in Equation 1, is a measure of the *degree of commitment* of the HEI with the effective implementation of the strategic sustainability actions.

$$CoI = \frac{1}{4N}\sum_{f=1}^{N}\left(\frac{1}{M_\alpha}\sum_{a=1}^{n}\alpha_a + \frac{1}{M_\beta}\sum_{b=1}^{m}\beta_b + \frac{1}{M_\gamma}\sum_{c=1}^{l}\gamma_c + \frac{1}{M_\delta}\sum_{d=1}^{l}\delta_d\right) \qquad Eq.1$$

Similarly, the **Coherence Index** (*ChI*), defined in Equation 2, which measures the ***degree of coherence***, is theorized as the homogeneous distribution of strategic sustainability actions implemented by the HEI. Globally, it weighs, for each dimension of analysis, the degree of commitment (measured by Equation 1) to the total number of sustainability actions performed by the assessed institution.

$$ChI = 1 - \frac{1}{2N.CoI}\left\{\left|N.CoI - \sum_{f=1}^{N}\left(\frac{1}{M_\alpha}\sum_{a=1}^{n}\alpha_{af}\right)\right|^2 + \left|N.CoI - \sum_{f=1}^{N}\left(\frac{1}{M_\beta}\sum_{b=1}^{m}\beta_{bf}\right)\right|^2\right.$$
$$\left. + \left|N.CoI - \sum_{f=1}^{N}\left(\frac{1}{M_\gamma}\sum_{c=1}^{l}\gamma_{cf}\right)\right|^2 + \left|N.CoI - \sum_{f=1}^{N}\left(\frac{1}{M_z}\sum_{d=1}^{l}\delta_{df}\right)\right|^2\right\}^{1/2} \qquad Eq.2$$

In Equations 1 and 2, the summation operators applied to the argument α_a, β_b, γ_c and δ_d denote, respectively for each dimension of the organization environment (administrative, social and cultural, academic, and physical), the score resulting from the sum of the total number of sustainability actions (listed in Tables 11-14) effectively implemented (by the HEI) for each dimension. To ensure practicability of the proposed Commitment Index, two scores are conveniently defined to scale the measure of the degree of commitment: score 0 (action not performed) and score 1 (action partially or fully performed). The parameters M_α, M_β, M_γ and M_δ denote, respective to the same dimensions of the organization environment, the maximum score assigned (ideal number of implemented actions defined in the assessment scheme). In order to balance their weight, each dimension encompasses the same number of sustainability actions (in this case, the ideal situation was defined as: $M_\alpha = M_\beta = M_\gamma = M_\delta = 10$).

The *ChI* (Equation 2) is particularly important to diagnose whether single dimensions of the proposed scheme are over emphasized against others. Its evaluation and monitoring is also crucial to coherent investment decisions and proactivity towards reaching a higher level of sustainability.

Following the same line of thought, the **Difficulty Index** (*DfI*), defined in Equation 3, expresses the ***degree of difficulty***, conjectured as the technical and financial components of the major difficulties experienced in the process of implementing actions towards sustainability.

$$DfI \quad \frac{1}{8N}\sum_{f=-}^{N}\left| \frac{1}{\theta_\alpha}\sum_{a=1}^{n}(T_{\alpha_a} \mid F_{\alpha_a}) \mid \frac{1}{\theta_{\beta}}\sum_{b=1}^{m}(T_{\beta_b} \mid F_{\beta_b}) \mid \frac{1}{\theta_\gamma}\sum_{c=1}^{i}(T_{\gamma_c} \mid F_{\gamma_c}) \right.$$
$$\left. \mid \frac{1}{\theta_{\delta}}\sum_{d=-}^{j}(T_{\delta_d} \mid F_{\delta_d}) \right|_f \qquad Eq.\ 3$$

In these equations, *N* is the total number of HEIs evaluated and *CoI*, *ChI* and *DfI* vary from a minimum value of zero to a maximum value of 1 (maximum degree of commitment, coherence and difficulty) and *a, b, c* and *d* are indices denoting the summation process (in this case: *n = m = i = j =10)*.

In Equation 3, which accounts for the attributed difficulties faced by the HEI along the implementation process of the sustainability actions, the summation operators applied to the arguments $(T_{\alpha_a} \mid F_{\alpha_a})$; $(T_{\beta_b} \mid F_{\beta_b})$; $(T_{\gamma_c} \mid F_{\gamma_c})$ *and* $(T_{\delta_d} \mid F_{\delta_d})$ total the technical (T)

and financial (F) difficulty associated with the implementation of each sustainability action proposed. Practicability of the Difficulty Index is also ensured by establishing five possible scores: score 0 (no difficulty); score 0.25 (low difficulty); score 0.5 (moderate difficulty); score 0.75 (high difficulty) and score 1.0 (very high difficulty). The result of each summation is then normalized with the parameters θ_α, θ_β, θ_γ *and* θ_δ, representing

the total number of sustainability actions in each dimension of the assessment scheme proposed (in this case, $\theta_\alpha = \theta_\beta = \theta_\gamma = \theta_\varepsilon = 10$).

The *degree of institutional performance* reached by an HEI in its process of implementing the proposed sustainability actions is then measured by a combination of the above three indices, yielding the **Institutional Performance Index** (*IPI)* given in Equation 4. Notice that this equation accounts for the fact that with a higher the degree of difficulty comes a lower effectiveness in the implementation process. The introduced factor of ½ aims to limit the maximum value of *IPI* to 1.

$$IPI = \frac{1}{2}(CoI + ChI - DfI) \qquad Eq.4$$

Even though Equations 1, 2, and 3 refer to a set of *N* HEIs, equation 4 will provide the background for assessing the institutional performance of a single institution, if *N* is set to 1 in equations 1, 2 and 3.

Figure 8 summarizes the structure of the assessment scheme conceived to assess performance throughout the implementation process of sustainability actions. The conceived assessment scheme acknowledges four integrated dimensions of the organizational environment of an HEI. It measures performance towards sustainability based on three linked indices: *Commitment Index*, *Coherence Index* and *Difficulty Index*.
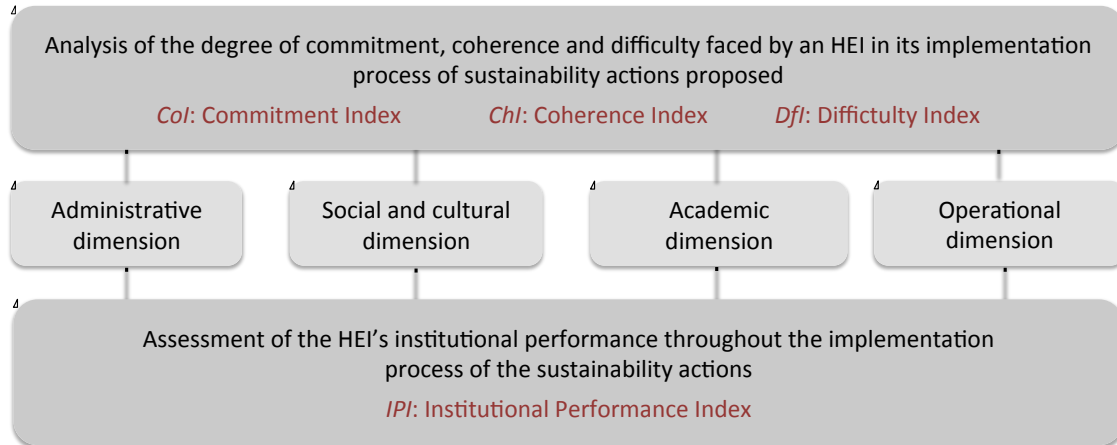
Figure 8. Structure of the multidimensional institutional assessment scheme

Acknowledging the administrative, social and cultural, academic and operational dimensions of the HEI's organization environment, the proposed scheme allows for the comparison of the *level of sustainability* reached by HEIs having different economic, technical, social and cultural backgrounds. This new vision may be helpful to understand why HEIs from advanced economies score higher than HEIs from developing and emerging economies when standard international evaluation methodologies are applied (e.g. UI Green Metric World University Ranking and STARS).

The proposed scheme provides a contextual framework for more detailed analyses at the level of a specific sustainability action. To illustrate its potentiality, one could plot in the tridimensional space formed by the three indices *CoI*, *DfI* and *IPI*, the total GHG

emissions attributed to the assessed HEI, whose intensity could be represented by the volumes of spheres proportional to the level of emissions.

The use of the proposed scheme requires an institutional action plan aligned with the organizational environment; the adequacy and alignment between the observed reality of the organizational environment with the key topics of each dimension; a systematic evaluation of the organizational learning process and the creation of effective and transparent mechanisms for reporting the results achieved.

4.4
Discussion of the proposed approach and recommendations

Sustainability indices can expediently provide relevant information to stakeholders, helping to overcome challenges posed by sustainability, while providing key information for decision-making, planning, implementation and evaluation of sustainable development policies and targets. Similar to the attitudes and behaviors practiced within advanced organizational environments already making use of sustainability indices to evaluate and report their institutional performance, HEIs are also expected to be fully committed to these undeniable principles of sustainability.

The international sustainability recommendations and initiatives (summarized in Table 1) and the evaluation frameworks (Table 4) have contributed for the incorporation of the fundamentals of sustainability in the HEIs' organizational procedures. It is the responsibility of HEIs to assess these initiatives and reflect on the impacts that may arise from the non-adherence to the fundamental principles of sustainable development, as well as any associated causes that may result from ignoring these values. More specifically, it is up to the HEI to assess the degree of achievement and commitment to sustainability principles and actions in their organizational and institutional contexts.

Although commitment to sustainability is often reported in advanced economies, very little is known about HEIs in developing and emerging economies. This seems to be true despite the fact that they have a significant and growing impact on the generation and dissemination of knowledge towards a global resilient society. It is critical that all nations assume their rights and duty to assimilate a holistic embodiment of sustainable development principles into their HEIs. Many peer-reviewed papers have been published

reporting studies related to sustainability in HEIs. However, most of the ideas and discussions fail to present a holistic and humanistic conceptualization of sustainability.

Through their structure and content, the adoption of the assessment scheme can provide valuable guidelines and insights into essential attributes of sustainability in HEIs, leading to better conditions for managing sustainability within their organizational environment. Nevertheless, it does not substitute the effort to achieve a most holistic thinking and complete knowledge of sustainability within the HEI. The research was developed to be comprehensive and to cover a large number of issues, fundamental principles and concepts related to sustainability in HEIs. However, it may be difficult to have suitable alliance for all topics and challenges posed by the implementation process of sustainability actions.

As with any approach, the analytical framework, the specific set of strategic sustainability actions and the assessment scheme proposed are limited to the constraints of the basic assumptions considered. Given the dynamic nature inherently associated with the dictums of sustainable development, the flexibility and adaptability of the proposed scheme, in addition to its capabilities, presents a scalable solution. Clear benefits and suitable improvements will be perceived with the experience and maturation of the approach proposed, which includes the definitions of its domain of applicability and usage. The analytical framework and the set of sustainability actions proposed can be properly adapted to acknowledge different economic, technical, social and cultural backgrounds, thereby meeting any specific additional requirements that may be necessary for other applications.

As with any physical measurements, which are always uncertain, measurement of sustainability actions adds a complication factor that arises from the subjectivity, social and cultural nature of the measurand. Moreover, the intricacy that is inherent to the concepts associated with sustainability actions does not lead to a straightforward definition as occurs with a physical quantity incontestably defined through fundamental laws of nature. The absence of studies reported in the specialized literature certainly reflects clear evidence of the complexity associated with such non-orthodox concepts of measurements. Additionally, no paper was found that have deeply examined the

relationship between specific characteristics of the HEIs (such as the size, nature, type of faculties, economic, and social and cultural contexts) and its ability or difficulty to implement sustainability actions.

5
Sustainability actions of higher education institutions in the US

This Chapter consists of the application of the assessment scheme proposed in Ch. 4 to the sample of 21 U.S. Higher Education Institutions (Colleges and Universities); an analysis of the degree of commitment to the implementation of the sustainability actions proposed and a multivariate analysis of the results related to the commitment index calculated.

5.1
Commitment to the strategic sustainability actions

In order to evaluate the sustainability actions of the U.S. Higher Education Institutions, a sample of Colleges and Universities were chosen, representing the HEIs that best exemplify sustainability practices and principles today. As detailed in the methodology in Section 1.5, these HEIs were selected based on their performance in 6 existing metrics (US News & World Report Best College Rankings; Sustainability Tracking, Assessment and Reporting System (STARS); The College Sustainability Report Card; Sierra Club Cool Schools 2014; Princeton Review's 2015 Green Rating Honor Roll; UI GreenMetric World University Ranking 2013).

The sample consists of 21 Higher Education Institutions in the United States. As presented in section 1.1 and 1.5, The United States is specifically targeted for its high quality of educational offerings, infrastructure, economic success, the strong financial backing of its Higher Education Institutions, recognition amongst existing ranking systems, and the accolades received globally for efforts towards creating sustainable Universities and Colleges. Given these conditions, the U.S. is an important case study as it presents a low level of technical and financial difficulty, which will be important in the application of the indices presented in section 4.3. The U.S. provides all of the theoretical

conditions required for some of the most successful implementations of sustainability actions within HEIs worldwide, making it ideal for detailed analysis and examination.

In order to evaluate these institutions, and their commitment using the assessment scheme (as described in Chapter 4) there was a need to first score them according to their compliance with the proposed actions (see Tables 11 – 14; section 4.2). To do this, a number of different sources were utilized in order to access data which could indicate whether or not a specific action was being performed. These included the data publicized in the following sources:

- AASHE's Sustainability Tracking, Assessment and Reporting System (STARS),
- Mission Statements,
- Vision Statements,
- Strategic Goals,
- Strategic Plans,
- HEI Website,
- HEI Sustainability Website.

The ultimate goal was to obtain information about whether or not an HEI was performing each of the forty actions. Credit was given for meeting any element of the action. Tables 15 – 18 present the results of fulfillment for each of the 21 Colleges and Universities in each of the respective actions. There is one table for each dimension: administrative, social and cultural, academic, and physical. Each HEI is scored according to its ability to meet each of the actions, with an 'x' representing fulfillment of the action and an 'o' representing an unfulfilled action. The results of this will act as a validation for the assessment scheme proposed as well as a source for a more in-depth discussion on the trends, achievements, and areas for improvement in sustainability actions in Higher Education globally.

Table 15. Commitment to sustainability actions proposed for the administrative dimension for each sample HEI

n.	Proposed actions	Georgia Institute of Technology	Stanford University	Cornell University	U. of Washington, Seattle	U. of North Carolina, Chapel Hill	Dickinson College	Harvard University	U. of California – Davis	Middlebury College	U. of California, San Diego	Oberlin College	American University	U. of California – Irvine	U. of Maryland, College Park	Loyola University Chicago	U. of South Florida	U. of Vermont	U. of California – Santa Barbara	Colorado State University	U. of Massachusetts, Amherst	U. of New Hampshire
1	Incorporate the concepts, values and principles of sustainable development in the institutional vision, mission and goals in order to ensure the validity of a "sustainable" culture that permeates all areas of knowledge, departments and culture of the HEI.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	Ensure continuous updating, reviewing and critical analysis of concepts, values and principles of sustainable development based on the best science available.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
3	Prioritize the issues of sustainable development in the training and qualification programs of administrators, employees and other stakeholders of the HEI and incentivize integration into institutional programs and initiatives.	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	x	x	x	x	x	o
4	Encourage and engage a wide diversity of stakeholders to maintain and strengthen the movement towards sustainable development.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	x	o	x	x	x
5	Establish programs and activities to encourage reflection on the values and principles of sustainable development utilizing a holistic, integrated and multidisciplinary approach.	o	o	o	o	o	o	o	o	o	x	o	x	o	o	o	o	x	o	o	o	o
6	Guide the management systems (e.g. planning, monitoring, evaluation and reporting) to perform effective actions within local and global sustainability challenges. This should include the use of metrics and sustainability indicators to provide information relevant to decision making, planning, implementation and evaluation of strategies.	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	x	o	x	x	x	x
7	Use tools, metrics and indices of sustainability that can provide relevant information for decision-making, implementation and evaluation of actions and to participate in assessment tools and metrics, particularly those representing the holism of sustainable development. Publish and disseminate an annual sustainability report.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
8	Create financial mechanisms in order to facilitate investment in viable projects, actions and innovation technology aimed at sustainable development.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
9	Establish targets of reduction and offsetting of GHG emissions and conduct and report emission inventories of GHG and other pollutant gases from HEI operations and associated activities.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	x	x
10	Engage community members in a transparent, democratic process that incorporates holistic sustainable practices and governs the rules of the HEI as well as pressing governments to ensure that education in general and higher education in particular, are covered with regulatory conditions that facilitate the promotion of sustainability.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 16. Commitment to sustainability actions proposed for the social and cultural dimension for each HEI.

n.	Proposed actions	Georgia Institute of Technology	Stanford University	Cornell University	U. of Washington, Seattle	U. of North Carolina, Chapel Hill	Dickinson College	Harvard University	U. of California – Davis	Middlebury College	U. of California, San Diego	Oberlin College	American University	U. of California – Irvine	U. of Maryland, College Park	Loyola University Chicago	U. of South Florida	U. of Vermont	U. of California – Santa Barbara	Colorado State University	U. of Massachusetts, Amherst	U. of New Hampshire
1	Instill a holistic perspective of sustainability by incorporating values of peace, tolerance, respect, solidarity, pluralism, diversity, equity and justice for all, including racial equality, gender equality, inter-generational equality, rights of indigenous people and the poor infused in the culture of the HEI.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	Engage the local, regional and global community through outreach activities with a dual purpose to promote the ideals of sustainable development and to understand and incorporate the needs of these populations into the institution's actions, ideals and culture.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	Contribute to the development of new and innovative socio-economic models consistent with the principles of sustainable development (e.g. poverty eradication, social equity, access to water, food, shelter and education, resiliency, respect for planetary boundaries).	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	x	o	o	o
4	Encourage and support social equity, gender equality, racial equality, and cultural diversity.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5	Implement creative practices aimed at elevating awareness of the spiritual, ethical and altruistic aspects of sustainable development.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	x	o	o	o	o	o
6	Ensure the permanence of the topic sustainable development as part of the culture of the HEI by taking into account the dimension of time for the short, medium, and long-term aspects of planning, thus enhancing the living *campus* experience through programs, raising awareness, wellbeing, creativity, inspiration; education and engagement	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7	Raise awareness of the relevance of evaluating risks related to unsustainability (*e.g.*: lack of natural resources, degradation of biodiversity and ecosystem services, climate change, poverty, social inequity), and discuss the threats to societies.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
8	Encourage the development of spiritual and ethical values for the sustainable development of societies, including the perspective of altruism, critical thinking and moral sustainability across generations, utilizing reflection and creativity as tools to achieve this.	o	o	x	o	x	o	o	x	x	x	o	x	x	o	x	o	x	o	x	o	o
9	Ensure favorable working and living conditions for employees and students.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	Support and consume local and community-based products and services.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 17. Commitment to sustainability actions proposed for the academic dimension for each HEI.

n.	Proposed actions	Georgia Institute of Technology	Stanford University	Cornell University	U. of Washington, Seattle	U. of North Carolina, Chapel Hill	Dickinson College	Harvard University	U. of California – Davis	Middlebury College	U. of California, San Diego	Oberlin College	American University	U. of California – Irvine	U. of Maryland, College Park	Loyola University Chicago	U. of South Florida	U. of Vermont	U. of California – Santa Barbara	Colorado State University	U. of Massachusetts, Amherst	U. of New Hampshire
1	Ensure the inclusion of themes, issues and activities related to the challenges presented by sustainability in the foundations of teaching and learning, i.e. teaching philosophy, curriculum, research activities and services as well as the culture of the campus and the HEI.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	Prioritize sustainable development in the training and qualification programs for all educators and incentivize integration into curriculums and programs.	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	x	x	x	x	x	x
3	Ensure continuous curriculum updating and reviewing of concepts, values and principles of sustainable development based on the best science available.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
4	Incorporate topics of sustainable development throughout the curriculum using an inter-, trans- and multidisciplinary approach.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5	Perform inter-, trans- and multidisciplinary research focused on different topics in environmental sciences, climate change, sustainable development and permaculture.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6	Encourage creativity for the development of research projects and activities aimed at sustainable development.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
7	Encourage the collaboration and international cooperation between HEIs and other societal institutions (research, governmental, non-governmental institutions and busine) in order to create lasting networks and to facilitate a propitious environment for innovation and knowledge transfer.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
8	Provide internship and immersion activities in the area of sustainability as well as funding and support for students to innovate their own similar student-driven activities.	x	x	x	x	x	x	x	x	x	x	o	x	x	x	x	x	x	x	x	x	x
9	Create an inclusive and supportive environment for the incubation and growth of innovative ways to address the challenges of sustainable development.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	x	o	x	x	x
10	Provide an equal opportunity for education for all, including formal, non-formal and informal education, particularly with regard to the topics of sustainability, regardless of race, gender, religion or socio-economic standing.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Table 18. Commitment to sustainability actions proposed for the physical dimension for each HEI.

n.	Proposed actions	Georgia Institute of Technology	Stanford University	Cornell University	U. of Washington, Seattle	U. of North Carolina, Chapel Hill	Dickinson College	Harvard University	U. of California – Davis	Middlebury College	U. of California, San Diego	Oberlin College	American University	U. of California – Irvine	U. of Maryland , College Park	Loyola University Chicago	U. of South Florida	U. of Vermont	U. of California-Santa Barbara	Colorado State University	U. of Massachusetts, Amherst	U. of New Hampshire
1	Perform good practices aimed at reducing GHG emissions and environmental impacts related to the activities of the HEI.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2	Maximize utilization of renewable energy and install renewable energy generation systems.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3	Incorporate sustainable building requirements in the revitalization, refurbishment and construction of new spaces and buildings on the campus of the HEI and provide a work environment with an intelligent design that maximizes the welfare of students, faculty and employees.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	Encourage and support the use of alternative transport (student and employee commuter share model, public and sustainable transportation and bicycles).	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5	Evaluate the climate change impacts on biodiversity on the campus and in the development of HEI activities.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
6	Expand the green area of the campus introducing native species of the local Biome, promoting outreach and awareness of such activities, and utilizing regenerative practices.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o	x	x	x	x	o	x
7	Quantify the total water consumption, or water footprint, on the campus of the HEI, and inform the community about these metrics and ways to improve the results.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
8	Measure, categorize and report the materials used and waste generated on the HEI campus (paper, chemicals, packaging, organic matter) with the goal of reducing these values, calling attention to any overly consumptive patterns of abuse, and diverting materials from landfills and incinerators thereby conserving resources through recycling, repurposing and composting.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
9	Account for environmentally friendly and socially conscious materials (green products), from suppliers with practices, values and reputations recognized for sustainability.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	Use monitoring and improvements in this physical dimension as way to educate community members about impacts of materials use and the greater impact of use and over-consumption, including exposing as much of the supply chain as possible.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

5.2
Commitment analysis

The commitment within the physical and academic dimension is consistently strong, with 90% achievement of the actions in the Physical dimension and 79% achievement in the Physical dimension. In the other two dimensions – administrative and social & cultural – the results were mixed. Some of the actions were consistently achieved by all HEIs, some were consistently missed by all HEIs, and some demonstrated a mixed performance. After the academic and physical dimension, the administrative dimension had 69% achievement, while the social & cultural dimension had 56% achievement. Table 19, below provides the percentage of fulfillment (commitment index) of each of these actions by dimension.

Table 19. Percentage of action fulfillment by dimension

Institutional Dimensions	Commitment Index
Physical	90%
Academic	79%
Administrative	69%
Social & Cultural	56%

In considering action fulfillment by dimension, the prioritization of specific types of actions and initiatives are demonstrated. In the United States, these results indicate that the strongest focus of actions toward sustainability is in the physical and academic dimensions, respectively. This is consistent with broader trends in the U.S., where the term sustainability is often interchanged with environmentalism or eco-efficiency.

Conversely, the lack of commitment in the social & cultural dimension indicates a lack of comprehension of a wider and more holistic interpretation of sustainability principles, which is also consistent with the frequently narrow view of sustainability trending towards environmental sustainability, often omitting the social and cultural aspects that are inherent to the sustainability discourse.

PUC-Rio - Certificação Digital Nº 1422392/CA

5.2.1
Analysis of the Physical Dimension

With the highest percentage of fulfillment (90%), in the Physical dimension, nine out of ten actions were achieved by all HEIs, reiterating and validating their strong commitment to eco-efficiency and environmental aspects of sustainability. Much of this may stem from the historical strength of the environmental movement, as discussed in section 3.1.1, which has in more recent years widened and expanded into what is today considered sustainability in the U.S.

Furthermore, this trending focus towards environmentalism and eco-efficiency is also reflected in the demonstrated trends observed in corporate sustainability – a holistic concept such as sustainability being constrained and broken down to its meager parts that can be easily digested by commonplace and traditional thinking that focuses on economic prosperity with little regard for much else.

Another interesting facet of the results in the physical dimension is the source utilized to determine the level of action fulfillment. Actions 1-4 and 6-10 were all determined by the information provided by the STARS rating (except for Harvard University, which does not participate in the STARS rating). These actions mapped easily to credit points provided through STARS, indicating a strong representation of physical aspects of sustainability within the metric and a thorough and holistic understanding of its constituent parts. Due to the important role that metrics play in guiding and leading intuitional actions, this further indicates the dominant trend and focus on environmental issues when considering the topic of sustainability in the United States.

5.2.2
Analysis of the Academic Dimension

The Academic dimension has the second highest commitment to sustainability, with 79% action fulfillment, indicating a strong commitment to the principles and concepts around sustainability manifested in academia.

Nine out of ten of the actions were either achieved by all of the HEIs or the majority of the HEIs, with only one action not being achieved by any of the HEIs. This strong

showing in the fulfillment of the academic actions, indicates a level of commitment to sustainability actions academically, however it may also be more indicative of a commitment to academic excellence alone. If the latter is true, however, this would also suggest some level of synthesis of sustainability issues into mainstream academia, such that if an HEI is to execute academic excellence then it is crucial that sustainability topics are included as well.

Action 3 (Ensure continuous curriculum updating and reviewing of concepts, values and principles of sustainable development based on the best science available) was not achieved by any of the HEIs. This concept is consistently included in the normative references, indicating its proven importance to sustainability actions. As such, it remains rather surprising that this particular point is absent from, not just some, but all of the HEIs, particularly given that it can be observed as an included call to action for many of the various normative references analyzed.

In a field such as sustainability that is relatively new, constantly evolving due to its intrinsically dynamic nature, and inherently complex and interdisciplinary nature, an updated curriculum is of the utmost importance when teaching the topics of sustainability as they are highly susceptible to significant changes from semester to semester, and year to year as new research and approaches are being introduced into the field. While this may be the case in many different fields of science, it is of particular importance to sustainability and climate change in particular as the pending stakes are so high and the issues are ever-changing, rendering it important that the college and university curricula reflect the most up to date science on the issues.

5.2.3
Analysis of the Administrative Dimension

The third highest commitment to sustainability is the administrative dimension with 69% action fulfillment. Consistent achievement was obtained by all HEIs in action 1, 3, 4, 7, 8, 9, 10, pertaining to issues of: vision, mission and goals; prioritization of sustainability in training and qualification programs; stakeholder engagement; financial mechanisms to facilitate projects, actions and technology; GHG reductions targets; engaging the

community in a transparent, democratic process; respectively. There was mixed fulfillment for actions 5, 6, (establishment of activities to encourage reflection on sustainability principles, guiding management systems to perform actions aligned with sustainability) and there was zero fulfillment for action 2 (updating the concepts, values and principles of sustainable development based on the best science available).

Besides action 2, which had zero fulfillment, action 5 (Establish programs and activities to encourage reflection on the values and principles of sustainable development utilizing a holistic, integrated and multidisciplinary approach) had the least amount of fulfillment. This demonstrates a lack of commitment towards a deeper and more holistic interpretation of sustainability, one which requires the reflection and critical thinking towards these complex issues. Overall, the Administrative dimension indicates some promising results regarding vision, mission, training and qualification programs, stakeholder engagement, and democratic process.

5.2.4
Analysis of the Social & Cultural Dimension

The lowest level of commitment to sustainability is observed in the social & cultural dimension with 56% action fulfillment. Five of the actions were consistently achieved by all HEIs: Actions 2, 4, 6, 9, and 10, pertaining to issues of community outreach, support for social equity, permanence, working and living conditions for employees and students, and supporting local and community-based products and services, respectively. Action 7, relating to raising awareness of relevance of evaluating risks related to unsustainability, respectively, was not achieved by any HEI.

That the social & cultural dimension has the lowest level of fulfillment by the HEIs is consistent with observed trends in sustainability in the United States, and in some cases globally, where the sustainability movement tends to be dominated by environmental and eco-efficiency initiatives. These initiatives can be easily utilized to demonstrate a value added or a value saved, while many of the social and cultural issues related to sustainability are more difficult to quantify, characterize, understand and implement.

The University of California, San Diego was the only University to fulfill action 3 (Contribute to the development of new and innovative socio-economic models consistent with the principles of sustainable development (e.g. poverty eradication, social equity, access to water, food, shelter and education, resiliency, respect for planetary boundaries)). One of their 5 goals is "Supporting and promoting just and sustainable forms of economic development, shared prosperity, and social and cultural enrichment regionally and globally."

Action 5 (Implement creative practices aimed at elevating awareness of the spiritual, ethical and altruistic aspects of sustainable development) is fulfilled only by Loyola University of Chicago, a Catholic University founded by the Jesuits and the only religiously- affiliated HEI in the sample. With its focus on spirituality and ethics, the role of religion in fulfilling the actions, and more broadly in the fulfillment of sustainable development worldwide, particularly with regard to social and cultural issues renders it of specific importance. Additionally, with the positions taken by the current Pope on climate change and sustainability, and particularly with his release of "Care for Our Common Home" in 2015, it indicates a strong link between the role that religion has to play in in sustainable development.

5.3
Global Analysis

In order to further understand the significance of the commitment of HEIs according to the actions, and to identify any trends, characteristics of the HEIs must also be considered. Table 20 presents all 21 Colleges and Universities of the sample and includes some interesting and relevant characteristics for each of them.

Table 20. Selected US HEIs Institutions

Colleges & Universities	In-State Tuition	Out-of-State Tuition	Room & Board	Tuition, Room & Board	Endowment	Total Enrollment	School Type	Year founded	Acceptance Rate
Georgia Institute of Technology	10,650	29,954		29,954	1,608,247,917	21,557	public	1885	54.9%
Cornell University		45,359	13,678	59,037	4,946,953,425	21,424	private	1865	16.6%
Dickinson College		46,094	11,568	57,662	325,683,702	2,386	private	1783	40.2%
Stanford University		43,245	13,166	56,411	17,035,804,000	18,217	private	1885	6.6%
U. of North Carolina, Chapel Hill	8,340	30,122	10,008	40,130	2,157,237,483	29,278	public	1789	27.6%
U. of Washington	12,383	29,938	9,969	39,907	2,248,770,369	42,568	public	1861	59.1%
American University		40,649	14,180	54,829	466,000,000	12,904	private	1893	44.2%
Colorado State University	9,313	25,166	10,776	35,942	237,940,852	30,647	public	1870	74.7%
Harvard University		42,292	14,115	56,407	30,745,534,000	19,726	private	1636	6.1%
Loyola University Chicago		35,503	12,900	48,403	405,955,000	15,720	private	1870	81.2%
Middlebury College		45,314	12,156	57,470	879,690,000	2,516	private	1800	17.2%
Oberlin College		46,870	12,604	59,474	708,238,026	2,944	private	1833	31.3%
U. of California - Davis	13,896	36,774	13,961	50,735	881,697,000	32,354	public	1905	45.7%
U. of California, San Diego	13,234	35,112	11,924	47,036	715,921,000	28,294	public	1960	37.8%
U. of California—Irvine	14,688	37,566	12,073	49,639	417,924,000	27,479	public	1965	42.4%
U. of California—Santa Barbara	13,746	36,624	13,805	50,429	304,942,000	21,927	public	1909	44.0%
U. of Maryland, College Park	9,162	28,348	10,280	38,628	411,792,815	37,197	public	1856	46.8%
U. of Massachusetts Amherst	13,258	27,974	11,166	39,140	230,617,220	28,236	public	1863	62.6%
U. of New Hampshire	16,496	29,216	10,056	39,272	217,974,405	15,301	public	1866	77.9%
U. of South Florida	6,410	17,325	9,250	26,575	312,899,380	40,111	public	1956	43.2%
U. of Vermont	15,718	36,646	10,402	47,048	308,198,000	13,097	public	1791	76.7%

In considering the sample, 8 out of 21 (~38%) are private colleges or universities. Compared to the national statistics, as presented in section 3.3.1, there is a much greater representation of public institutions in the sample than the national statistics indicate (1,625 public institutions and 3,099 private institutions). Even when the for-profit institutions are removed from consideration, the numbers indicate about a 50 – 50 split, with 1,625 public institutions and 1,675 private non-profit institutions.

The cost of tuition is an interesting point to consider as well. Within the sample, the median annual undergraduate tuition for public universities is $13,234, while the national median annual undergraduate tuition at public universities is almost half that amount, at $6,122. For private universities, the sample median annual undergraduate tuition is $44,280, while the national median for annual undergraduate tuition at a private institution is $29,648, which is noticeably less than the values in the sample. This indicates that the universities and colleges comprising the sample have access to greater funds through tuition than their national counterparts

Regarding endowment, the sum of all of the endowments of the 21 HEIs in the sample is more than $65.5 billion. With the amount of total national endowment at $425 billion, this sample represents over 15% of the total endowment nationally. Given that there are 4,724 HEIs nationally, the sample of 21 HEIs is 0.4% of the total number of HEIs nationally. This percentage of endowment representation indicates a level of financial capital that far exceeds what most HEIs in the U.S. have access to. This suggests a positive relationship between the amount of HEI funds available and the institution's ability to implement sustainability strategies and actions.

Of the sample of 21 HEIs, four of them are part of the University of California System: UC Davis, UC San Diego, UC Irvine, and UC Santa Barbara, representing more than 19% of the sample. This high representation of HEIs from the University of California system suggests a level of innovation and forward thinking present in the upper level of the University of California system, as well as at a state level. Furthermore, these Universities are some of the newest HEIs in the sample as well, which may indicate an agility and innovative tendency associated with younger HEIs

that enables them to adopt principles and actions consistent with Sustainability and Sustainable development.

One important consideration when analyzing these results is that the data being considered are what the HEI claims to be doing. Given that there is no official or transparent source to evaluate the validity of their statements and claim, the chance exists that there may be any varying level of discrepancy between what any one HEI is claiming to do, and what they are actually doing. However, this should not undermine the value of these results, particularly given that intent contributes to actions and that by including these topics relating to sustainability in mission statements, value statements, vision and goals set a specific tone and encourage the alignment through actions.

Overall, the results indicate a strong commitment of HEIs towards upholding sustainability in the physical and academic dimensions. Moderate commitment to the administrative dimension was observed, and the lowest level of commitment was in the social and cultural dimension. This suggests a clear commitment to environmental and eco-efficiency issues, but a lack of comprehension of the deeper and more holistic elements of sustainability that are required for any complete implementation of the sustainability practices and principles.

6
Conclusions and recommendations

This chapter presents and discusses the main findings of this research and recommendations for future developments associated with this instigating theme.

6.1
Conclusions

In line with the originally formulated objectives —to provide a framework for helping higher education institutions (HEIs) achieve sustainability goals— the work fully achieved its purpose, as a structured agenda was developed to guide HEIs in their challenging process of implementing strategic sustainability actions. The sustainability actions proposed can be considered robust as they strongly synthesize fundamental global concepts of sustainability and recommendations dictated by international organizations committed to the principles of sustainable development, including their guidelines and best practices.

Regarding the first specific objectives conveyed —i.e. to identify and synthesize internationally agreed concepts into a set of critical actions and to create an evaluation scheme— the work also succeeded in systematizing and defining a minimum set of concepts and tools (basic toolkit) aimed at formulating an institutional strategy to ensure the commitment and progress that an HEI should pursue to create a "sustainable" institution in accordance with sustainability principles synthesized internationally.

Furthermore, given the dynamic nature of sustainable development issues, the flexibility and adaptability of the proposed scheme, in addition to its capabilities, presents a scalable solution which is an important factor in its usage and application

over time. Therefore, this framework has been constructed with adaptation in mind, as an appropriate and effective means for the implementation of strategic sustainability actions.

Development of this work has confirmed that the pursuit for a model of education towards favorable conditions for the future generations is a continuous learning process that must to be grounded in anthropocentric ethics favoring the harmonization and integration of humans with the biosphere and sustainable development principles. As an ethical imperative, tackling the global challenges of sustainability requires a complex way of thinking in conjunction with innovative and inclusive strategies where humanistic values such as equality, current and future altruism, and spirituality build a deeper and lasting relationship between the HEI community and these challenges. HEIs should support the generation and dissemination of knowledge that accounts for the multidimensionality, wealth and interconnectivity of planetary systems. This ensures that the next generations of leaders will appreciate the complexity and dynamism of Gaia (the biosphere) and protect the notion of future altruism for the betterment of generations to come.

Although some knowledge of the commitment to sustainability of HEIs in advanced economies are described in the literature, very little is known about HEIs in developing and emerging economies despite the fact that they have a significant and growing impact on the generation and dissemination of knowledge towards a global resilient society. It is critical that all countries assume their rights and duty to assimilate a holistic embodiment of sustainable development principles into their HEIs.

The concepts, model design, strategic actions, metrics and indices proposed and methodically discussed in this study aim to contribute to the development and improvement of the strategies and activities of HEIs towards their commitment to sustainability. At a global level, the assessment scheme proposed should not be understood as an end to itself. Therefore, it should not replace the prudent reflection of needs associated with any decision-making process or learning process, which is

intrinsic to the performance assessment processes of actions aligned with sustainability.

Finally, the assessment scheme and indices conceived were efficaciously validated as it produced thought-provoking results when applied to assess commitment to the fundamentals of sustainability of 21 higher education institutions in U.S., chosen for their top positions as sustainable institutions in U.S.

6.2
Recommendation for future work

Considering the broad scope of application and the inherent complexities associated with the multidimensional assessment methodology proposed, it is recommended to evaluate the outcome of its application in different socio-economic and cultural realities to better understand specifics of the proposed tool and to promote further improvement. Furthermore, this scheme will be applied to various HEIs within the *Asociacion do Universidades Confiada a la Compania de Jesus en America Latina* (AUSJAL) in South America as part of continuing research through PUC-Rio's NIMA and an associated PHD student in sustainability

7
Bibliography

350.ORG, 2016. **Fossil Free**. Retrieved 6 May, 2016 from: http://gofossilfree.org/about-fossil-free/

AASHE. 2014. **The Sustainability Tracking, Assessment & Rating System (STARS).** Retrieved 10 September, 2015 from: https://stars.aashe.org/

AASHE, 2016. **STARS Technical Manual version 2.1.** Retrieved 3rd February, 2016, from: https://stars.aashe.org/pages/about/technical-manual.html.

AGENDA 21. **Document of the United Nations Conference on Environment & Development**, United Nations. New York. 1992.

ALSHUWAIKHAT H. M., ABUBAKAR I., 2008. **An integrated approach to achieving campus sustainability: assessment of the current campus environmental management practices.** Journal of Cleaner Production 16, 1777-1785.

AMERICAN COUNCIL ON EDUCATION, 2014. **Understanding college and university endowments**. Retrieved February 26, 2016 from https://www.acenet.edu/news-room/Documents/Understanding-Endowments-White-Paper.pdf

ANSAR, A., CALDECOTT, B., TILBURY, J., 2013. **Stranded assets and the fossil fuel divestment campaign: what does divestment mean for the valuation of fossil fuel assets? Stranded Assets Programme, Smith School of Enterprise and the Environment, University of** Oxford. October 2013. Retreived February 26, 2016 from http://www.smithschool.ox.ac.uk/research-programmes/stranded-assets/SAP-divestment-report-final.pdf

ASSOCIATION OF AFRICAN UNIVERSITIES, 2009. **Abuja Declaration on Sustainable Development in Africa: The Role of Higher Education**.
Retrieved November 23, 2015 from:
http://www.aau.org/sites/default/files/esb/abuja_declaration_on_sustainable_development.pdf.

ATKISSON, A., STUCKER, D., WENER, L., 2008. **EC-Access: The earth charter ethics-based assessment tool. Version 5.** Published by Earth Charter International Secretariat, San Jose, Costa Rica, 1-31.

BOER, P., 2013. **Assessing sustainability and social responsibility in higher education assessment frameworks explained**. In: Caeiro, S., Filho, W.L., Jabbour, C., Azeiteiro, U.M. (Eds.), Sustainability Assessment tools in Higher Education Institutions: mapping trends and good practices around the world. Springer, Heidelberg and New York. p.121 – 137

CADEP, 2010. **Evaluación de las políticas universitarias de sostenibilidad como facilitadoras para el desarrollo de los campus de excelencia internacional**. Retrieved May 30, 2016 from http://www.crue.org/Documentos%20compartidos/Estudios%20e%20Informes/22.IN FORME_EVALUACION_COMPLETO.pdf

CASAREJOS, F., FROTA M. N., LOPES, G., SILVA V. V., PARTICELLI F., 2014. **Commitment to Emissions Restrictions of Major Consumers of Electricity in Brazil.** Sustainability 6, 6377-6399.

CARSON, R. **Silent spring**. Houghton Mifflin Company, New York, New York. 1962.

CALDER, W., CLUGSTON, R.M., 2003**. International efforts to promote higher education for sustainable development.** Planning for Higher Education 31, 30-44.

CEBALLOS, G., EHRLICH, P. R., BARNOSKY, A. D., GARCIA, A., PRINGLE, R. M., PALMER, T. M., 2015. **Accelerating modern human-induced species losses: entering the sixth mass extinction.** Science Advances. 19 June 2015

CEULEMANS, K., MODLEREZ, I., VAN LIEDEKERKE, L., 2015. **Sustainability reporting in higher education: a comprehensive review of the recent literature and paths for further research.** Journal of Cleaner Production. 106, 127-143.

COLE, L., 2003. **Assessing sustainability on Canadian University campuses: development of a campus sustainability assessment framework.** Degree thesis. Royal Roads University, Victoria, Canada.

CONVENTION ON BIOLOGICAL DIVERSITY, 2011. **Strategic goals and targets for 2020.** <https://www.cbd.int/2011-2020/goals/> Accessed 29 September 2015.

COPERNICUS, 1994. **COPERNICUS Charter.** Retrieved 23rd November, 2015, from: https://www.iisd.org/educate/declarat/coper.htm.

CORTESE, A. D., 2003. **The critical role of higher education in creating a sustainable future.** Planning for Higher Education 31(3) 15-22

DALAL-CLAYTON, B., BASS, S. **Sustainable Development strategies: a resource book.** Earthscan publications, Ltd. London, UK. 2002.

DERRICK, S., 2013. Time and sustainability metrics in Higher Education. In Sustainability Assessment tools in Higher Education Institutions: mapping trends and good practices around the world. In: Caeiro, S., Filho, W.L., Jabbour, C., Azeiteiro, U.M. (Eds.), Sustainability Assessment tools in Higher Education Institutions: mapping trends and good practices around the world. Springer, Heidelberg and New York. p. 47-63

DISTERHEFT, A., CAEIRO, S. AZEITEIRO, U. M., FILHO, W. L., 2013. **Sustainability science and education for sustainable development in universities: a way for transition.** In: Caeiro, S., Filho, W.L., Jabbour, C., Azeiteiro, U.M. (Eds.), Sustainability Assessment tools in Higher Education Institutions: mapping trends and good practices around the world. Springer, Heidelberg and New York. p. 3-27

DYER, G., DYER, M., **Strategic leadership for sustainability by higher education: The American College & University Presidents' Climate Commitment.** Journal of Cleaner Production xxx, 1-6.

DYLLICK, T., HOCKERTS, K., 2002. **Beyond the business case or corporate sustainability.** Business Strategy and the Environment. 11, 130-141.

EARTH CHARTER INITIATIVE, 2000. **The Earth Charter.** Retrieved November 23, 2015, from: http://earthcharter.org/discover/the-earth-charter/.

EEA, 2013. **Adaptation in Europe: Addressing Risks and Opportunities from Climate Change in the Context of Socio-Economic Developments.** European Environment Agency: Luxembourg, pp. 12-61.

ENERGYSTAR, 2014. 2014 **Federal tax credits: Federal Tax Credits for Consumer Energy Efficiency.** Retrieved 29 November 2015 from http://www.energystar.gov/about/federal_tax_credits

FREEMAN, R. E., 1984. **Strategic Management: A Stakeholder Approach**. Pitman Series in Business and Public Policy, HarperCollins, New York, NY, USA. p.1-275

FROTA, M. N., CASAREJOS, F., 2013. **Commitment and alignment of PUC-Rio's post-graduation education with sustainable development.** Revista Brasileira de Pós-Graduação (RBPG) 10 (21), 693-718.

G8, 2009. **Turin Declaration on Education and Research for Sustainable and Responsible Development.** Retrieved 3rd February, 2015, from: http://iau-hesd.net/sites/default/files/documents/g8torino_declaration.pdf.

GEIGER, R. L., 2015. **The history of American higher education: learning and culture from the founding to world war ii**. Princeton University Press, Princeton, New Jersey.

GILENS, M., PAGE, B. I., 2014. **Testing theories of American politics: elites, interest groups, and average citizens.** Perspectives on Politics 12(3), pp.564-581

GÓMEZ, F. U., SÁEZ-NAVERRETE, C., LIOI, S. R., 2015. **Adaptable model for assessing sustainability in higher education.** Journal of Cleaner Production. 107 (2015) 475-485

GRI, 2013. **G4 Sustainability Reporting Guidelines;** Global Reporting Initiative (GRI): Amsterdam, 2013.

HIS HOLY FATHER, POPE FRANCISCUS, 2015. **Encyclical Letter Laudato Si' of the Holy Father Francis on Care for Our Common Home.** Retrieved November 23, 2015 from. https://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html.

HOFFMAN, A.J., 2006. **Getting Ahead of the Curve: Corporate Strategies that Address Climate Change.** The Pew Center on Global Climate Change. 1-150.

HOFFMAN, A.J., 2007. **Carbon Strategies: How Leading Companies are Reducing their Climate Change Footprint.** University of Michigan Press, Ann Arbor, MI, USA. 1-192

HOFFMAN, A.J., WOODY, J.G., 2008. **Climate Change: What's Your Business Strategy?** Harvard Business Review Press. Boston, MA, USA. 1-115

IAU, 1993. **Kyoto Declaration on Sustainable Development.** Retrieved 20th June, 2016 from: http://archive.www.iau-aiu.net/sd/sd_dkyoto.html

IGU, 2007. **Lucerne Declaration**. International Geographical Union. Retrieved 20 June, 2016 from http://www.iau-hesd.net/sites/default/files/documents/lucernedeclaration.pdf

IISD, 1993. **The Swansea Declaration.** Retrieved 23 November, 2015, from. http://archive.www.iau-aiu.net/sd/sd_declarations.html.

INTERNATIONAL ENERGY AGENCY, 2015a. **World Energy Outlook: Fossil Fuel subsidy database.** Retrieved 1 December 2015 from http://www.worldenergyoutlook.org/resources/energysubsidies/fossilfuelsubsidydatabase/

INTERNATIONAL ENERGY AGENCY, 2015b. **World energy outlook 2015 factsheet: global energy trends to 2040.** Retrieved 1 December 2015 from

http://www.worldenergyoutlook.org/media/weowebsite/2015/WEO2015_Factsheets.pdf

IPCC. **5th Assessment Synthesis Report: Approved Summary for Policymakers**. Intergovernmental Panel on Climate Change, Geneva. 2014

ISO, 2004. **ISO 14000 Environmental management.** International Organization for Standardization, Geneva.

ISO, 2010. **ISO 26000 Project Overview.** International Organization for Standardization, Geneva. Retrieved February 29, 2016 from http://www.iso.org/iso/iso_26000_project_overview.pdf

ISO, 2014**. ISO 26000:2010 Guidance on Social Responsibility.** International Organization for Standardization, Geneva.

JESWANI, H.K., WEHRMEYER, W., MULUGETTA, Y., 2008. **How warm is the corporate response to climate change? Evidence from Pakistan and the UK.** Bus. Strateg. Environ. 14, 46–60.

JUNQUERA, B., ÁNGEL DEL BRÍO, J., FERNÁNDEZ, E., 2012. **Clients' involvement in environmental issues and organizational performance in businesses: an empirical analysis.** Journal of Cleaner Production 7, 288-298

KARATZOGLOU, B., 2013. **An in-depth literature review of the evolving roles and contributions of universities to Education for Sustainable Development.** Journal of Cleaner Production 49, 44-53

KLEIN, N. **This changes everything: capitalism vs. the climate**. Simon & Schuster, New York, New York. 2014.

KLINE, B. **First Along the River: a brief history of the U.S. Environmental Movement**. Fourth Edition. Roman & Littlefield publishers. 2011.

KOLK, A., PINKSE, J., 2005**. Business responses to climate change: Identifying emergent strategies.** Calif. Manag. Rev. 47, 6–20.

KOSHY, K.C., NOR, N.M., SIBLY, S., RAHIM, A.A., JEGATESEN, G., MUHAMAD, M., 2013. **An indicator-based approach to sustainability monitoring and mainstreaming at Universiti Sains Malaysia.** In: Caeiro, S., Filho, W.L., Jabbour, C., Azeiteiro, U.M. (Eds.), Sustainability Assessment tools in Higher Education Institutions: mapping trends and good practices around the world. Springer, Heidelberg and New York, pp. 237-258.

LAUDER, A., SARI, R. F., SUWARTHA, N., TJAHJONO, G., 2015. **Critical review of a global campus sustainability ranking: GreenMetric.** Journal of Cleaner Production. 108 (2015) 852-863

LEAL FILHO. W., 2011. **About the role of universities and their contribution to sustainable development.** Higher Education Policy, v. 24, p. 427-438. 2011.

LEE, S.Y., 2012. **Corporate carbon strategies in responding to climate change.** Business Strategy and the Environment 21, 33–48.

LOONEY, A., YANNELIS, C., 2015. **A crisis in student loans? How changes in the characteristics of borrowers and in the institutions they attended contributed to rising loan defaults.** Brookings Papers on Economic Activity. BPEA Conference draft, September 10-11, 2015.

LOZANO, R., 2006a. **A tool for a graphical assessment of sustainability in universities (GASU).** Journal of Cleaner Production, v. 14, n. 2, p. 963-72, 2006.

LOZANO R., 2006b. **Incorporation and institutionalization of SD into universities: Breaking through barriers to change.** Journal of Cleaner Production, v. 14, n. 9-11, p. 797-796, 2006.

LOZANO, R., 2011. **The state of sustainability reporting in universities.** International Journal of Sustainability in Higher Education. Vol. 12 No. 1, 2011. pp. 67-78

LOZANO, R., 2014. **Creativity and organizational learning as means to foster sustainability.** Sustainable Development 22, 205-216.

LOZANO, R. PEATTIE, K., 2011. **Assessing Cardiff University's Curricula Contribution to Sustainable Development Using the STAUNCH(RTM) system.** Journal of Education for Sustainable Development 5, 115-128.

LOZANO L., LUKMAN R., LOZANO F. J., HUISINGH D., LAMBRECHTS W., 2013. **Declarations for sustainability in higher education: becoming better leaders, through addressing the university system.** Journal of Cleaner Production, v. 48, n. 10-19, 2013.

LOZANO, R., CEULEMANS, K., ALONSO-ALMEIDA, M., HUISINGH, D., LOZANO, F. J., WAAS, T., LAMBRECHTS, W., LUKMAN, R., HUGE, J., 2015. **A review of commitment and implementation of sustainable development in higher education institutions in higher education: results from a worldwide survey.** Journal of Cleaner Production. 108, 1-18.

LUKMAN, R., KRAJNC, D., GLAVIC, P., 2010. **University ranking using research, educational and environmental indicators.** Journal of Cleaner Production v. 18(7) 619-628

MULDER, K. F., FERRER-BALAS, D., SEGALAS-CORAL, J., KORDAS, O., NIKIFORIVICH, E., PEREVERZA, K., 2013. **Being scared is not enough! Motivators for education for sustainable development.** In: Caeiro, S., Filho, W.L., Jabbour, C., Azeiteiro, U.M. (Eds.), Sustainability Assessment tools in Higher

Education Institutions: mapping trends and good practices around the world. Springer, Heidelberg and New York, pp. 29 – 45.

NWF, 2008. **Campus Environment 2008: A National Report Card on Sustainability in Higher Education.** National Wildlife Federation, 1-136 pp.

NIDUMOLU, R., PRAHALAD, C., K., RANGASWAMI, M. R., 2009. **Why sustainability is now the key driver of innovation.** Harvard Business Review. September, 2009.

PEOPLE AND PLANET, 2014. **People and planet university league: the 2014 guide.** People and Planet, Oxford, UK. 1-88 pp.

PERSSON, T., TABELLINI, G., 1993. **Is inequality harmful for growth?** Institute for International Economic Studies, Stockholm, Sweden. Seminar Paper No. 537 June 1993. Retrieved February 25, 2016 from http://www.diva-portal.org/smash/get/diva2:338002/FULLTEXT01.pdf

PRINCETON REVIEW, 2014. **The Princeton Review's Guide to 353 Green Colleges.** 2015 Edition. TPR Education IP Holdings, LLC, Natick, Massachusetts, USA.

RAMOS, T., PIRES, S. M., 2013. **Sustainability Assessment: the role of indicators.** In: Caeiro, S., Filho, W.L., Jabbour, C., Azeiteiro, U.M. (Eds.), Sustainability Assessment tools in Higher Education Institutions: mapping trends and good practices around the world. Springer, Heidelberg and New York, 81 – 99.

RAMOS T. B., CAIERO S., VAN HOOF, B., LOZANO, R., HUISINGH, D., CEULEMANS, K., 2015. **Experiences from the implementation of sustainable development in higher education institutions: Environmental Management for Sustainable Universities.** Journal of Cleaner Production 106, 3-10.

RAUCH, J. N., NEWMAN, J., 2009. **Defining sustainability metric targets in an institutional setting.** International Journal of Sustainability in Higher Education, 10 (2), 107-117.

RAWORTH, K., 2012. **A safe and just operating space for humanity**. Oxfam discussion paper

RAZAK, D. A., SANUSI, Z. A., JEGATESEN, G., KHELGHAT-DOOST, H., 2013. **Alternative university appraisal (AUA): reconstructing universities' ranking and rating toward a sustainable future.** In: Caeiro, S., Filho, W.L., Jabbour, C., Azeiteiro, U.M. (Eds.), Sustainability Assessment tools in Higher Education Institutions: mapping trends and good practices around the world. Springer, Heidelberg and New York, 139 – 154.

UN, 2012. **Report of the United Nations Conference on Sustainable Development Rio+20**, United Nations, New York. 2012

ROCKSTRÖM, J., STEFFAN, W., L., NOONE, K., PERSSON, A., CHAPIN, F. S. III, 2009. **Planetary boundaries: exploring the safe operating space for humanity.** Ecology and society 14(2): 32

ROORDA, N., 2013. **A strategy and a toolkit to realize system integration of sustainable development (SISD).** Sustainability Assessment Tools in Higher Education Institutions – Mapping Trends and Good Practices Around the World. Springer. New York. p. 101-119. 2013.

ROORDA, N., RAMMEL, C., WAARA, S., PALEO, U. F., 2009. **Assessment instrument for sustainability in higher education (AISHE) 2.0 Manual.** Retrieved 16th February, 2016, from: http://www.hu2.se/hu2old/2010v/AISHE_2.0_Manual_-_2nd_draftswa.pdf.

SAI, 2014. **Social accountability 8000: international standard.** Retrieved February 3, 2016 from. http://sa-intl.org/_data/n_0001/resources/live/SA8000%20Standard%202014.pdf.

SECOND NATURE, 2007. **American College and University Presidents' Climate Commitment.** Retrieved 3rd February, 2016, from: http://www2.presidentsclimatecommitment.org/html/commitment.pdf

SECOND NATURE, 2016. **Second Nature**. Retrieved 3rd February, 2016, from: http://secondnature.org/

SEI, 2011. **The College Sustainability Report Card 2011.** Retrieved 20th June, 2014, from: http://www.greenreportcard.org

SIERRA CLUB, 2014. **Sierra Club Cool Schools 2014 Ranking**. Sierra Club. Oakland, California, USA.

SIERRA CLUB, 2015a. **Who we are.** Available at <http://www.sierraclub.org/about>. (Accessed September 9 2015)

SIERRA CLUB, 2015b. **Cool Schools 2014: Methodology.** Available at <http://www.sierraclub.org/sierra/2014-5-september-october/cool-schools-2014/methodology>. (Accessed September 9 2015)

SHI, H., LAI, E., 2013. **An alternative university sustainability rating framework with a structured criteria tree.** Journal of Cleaner Production 61, p59-69

SHRIBERG, M., 2002a. **Institutional assessment tools for sustainability in higher education: strengths, weaknesses, and implications for practice and theory.** Higher Education Policy 15, 153-167

SHRIBERG, M., 2002b. **Sustainability in U.S. Higher Education: organizational factors influencing campus environmental performance and leadership.** Degree thesis. University of Michigan, USA.

SPIRA, F., TAPPESER, V., MEYER, A., 2013. **Perspectives on sustainability governance from universities in the USA, UK, and Germany: how do change agents employ different tools to alter organizational cultures and structures?** In: Caeiro, S., Filho, W.L., Jabbour, C., Azeiteiro, U.M. (Eds.), Sustainability Assessment tools in Higher Education Institutions: mapping trends and good practices around the world. Springer, Heidelberg and New York. 175 – 187.

SPRENGEL, D.C. BUSCH, T., 2011. **Stakeholder engagement and environmental strategy—The case of climate change.** Bus. Strateg. Environ. 20, 351–364.

STEFFAN, W., PERSSON, A., DEUTSCH, L., ZALASIEWICZ, J., WILLIAMS, M., RICHARDSON, K.., CRUMLEY, C., CRUTZEN, P., FOLKE, C., GORDON, L., MOLINA, M., RAMANATHAN, V., ROCKSTRÖM, J., SCHEFFER, M., SCHELLNHUBER, H. J., SVEDIN, U., 2011. **The Anthropocene: from global change to planetary stewardship.** Ambio. 2011 40:739-761.

STEFFAN, W., RICHARDSON, K., ROCKSTRÖM, J., CORNELL, S. E., FETZER, I, BENNETT, E. M., BIGGS, R., CARPENTER, S. R., VRIES, W de., DE WIT, C. A., FOLKE, C. A., GERTEN, D., HEINKE, J., MACE, G. M., PERSSON, L. M., RAMANATHAN, V., REYERS, B., SÖRLIN, S., 2015. **Planetary boundaries: guiding human development on a changing planet.** Science Vol. 347 Issue 6223. 13 February 2015

THE INSTITUTE FOR COLLEGE ACCESS & SUCCESS, 2015. **Student debt and the class of 2014. 10th Annual Report**. Retrieved February 27, 2016 from http://ticas.org/sites/default/files/pub_files/classof2014.pdf

TOGO, M., LOTZ-SISITKA, H., 2009**. Unit Based Sustainability Assessment Tool. A Resource Book to Complement the UNEP Mainstreaming Environment and Sustainability in African Universities Partnership.** Share-Net, Howick, ISBN 978-1919991-09-2. Artwork by: Tammy Griffiths.

UI, 2016. **GreenMetric world university ranking.** Universitas Indonesia. available at: http://greenmetric.ui.ac.id/ranking>. (Accessed 6 June 2016).

UI, 2015. **GreenMetric Guidelines**. Universitas Indonesia. available at: http://greenmetric.ui.ac.id/ranking>. (Accessed 6 June 2016).

ULSF, 1990. **Talloires Declaration.** Retrieved 3rd February, 2016, from: http://www.ulsf.org/talloires_declaration.html

ULSF, 2009. **Sustainability Assessment Questionnaire (SAQ) for colleges and universities.** Retrieved 16th February, 2016, from: http://www.ulsf.org/pdf/SAQforHigherEd09.pdf.

UN, 1972. **Report of the United Nations Conference on the Human Environment**; United Nations: Stockholm, Sweden, pp. 3–76.

IUCN/UNEP/WWF, 1980. **World conservation strategy: living resource conservation for sustainable development**. IUCN, UNEP, WWF.

UN, 1987. **Report of the world commission on environment and development: our common future.** The Brundtland Report.

UN, 2000. **Millennium Declaration**. Retrieved 20 June 2016 from http://www.un.org/millennium/declaration/ares552e.htm

UN, 2002a. **The Ubuntu Declaration on Education, Science and Technology for Sustainable Development.** Retrieved 23rd November, 2015, from: http://www.icsu.org/publications/other-key-icsu-statements/ubuntu-declaration-on-education-science-and-technology-for-sustainable-development/194_DD_FILE_10-3-1_Ubuntu_Declaration.pdf.

UN, 2002b. **UN Resolution 57/254: United Nations Decade for Education for Sustainable Development**. United Nations: New York, NY, USA.

UN, 2012. **Report of the United Nations Conference on Sustainable Development**. United Nations: New York, NY, USA, pp. 1–126.

UN, 2014. **Guide to corporate sustainability: shaping a sustainable future**. United Nations: New York, NY, USA, pp. 1–48.

UN, 2015. **Impact: transforming business, changing the worlds.** United Nations: New York, NY, USA, pp. 1–201.

UNCED, 1991. **Creating a Common Future: University Action for Sustainable Development - The Halifax Declaration**.

UNESCO, 1975. **The Belgrade Charter**. Retrieved 23rd November, 2015, from: http://unesdoc.unesco.org/images/0001/000177/017772eb.pdf.

UNESCO, 1977. **The Tbilisi Declaration**. Retrieved 20 June, 2016 from http://www.gdrc.org/uem/ee/tbilisi.html

UNESCO. **The Thessaloniki Declaration**. International Conference Environment and Society: Education and Public Awareness for Sustainability. 1997, available at: <http://resources.spaces3.com/f49d326a-5930-45cfa9ef-4d23a0670a6d.pdf (Accessed 20 June 2014).

UNESCO, 1998. **World Declaration on Higher Education for the twenty-first Century: vision and action and Framework for Priority Action for Change and Development in Higher Education**. Retrieved 23rd November, 2015, from: http://www.unesco.org/education/educprog/wche/declaration_eng.htm#world%20declaration

UNESCO. **Lünenburg Declaration**. Paper presented at the Higher Education for Sustainability – Towards the World Summit on Sustainable Development (Rio+10), Lünenburg. 2001.

UNESCO, 2009. **The Bonn Declaration**. Retrieved 23rd November, 2015, from: http://unesdoc.unesco.org/images/0018/001887/188799e.pdf.

UNFCCC, 2015. **Adoption of the Paris Agreement**. United Nations Framework Convention on Climate Change: New York, NY, USA, pp. 1-31.

UNI GRAZ, OIKOS, COPERNICUS & TUG, 2005. **The Graz Declaration on Committing Universities to Sustainable Development**. Retrieved 23rd November, 2015, from: http://iau-hesd.net/sites/default/files/documents/graz_declaration.pdf.

U.S. CONSTITUTION, 1789. Retrieved February 28, 2016 from http://www.usconstitution.net/const.pdf

U.S. DEPARTMENT OF EDUCATION, 2005. **Education in the United States: a brief overview.** Retrieved 22 January 2016 from http://www2.ed.gov/about/offices/list/ous/international/edus/overview.doc

U.S. DEPARTMENT OF EDUCATION, NATIONAL CENTER FOR EDUCATION STATISTICS, 2013. **Digest of education statistics.** Retrieved 23 January 2016 from http://nces.ed.gov/programs/digest/d13/figures.asp

U.S. DEPARTMENT OF EDUCATION, NATIONAL CENTER FOR EDUCATION STATISTICS, 2013. **Digest of education statistics.** < https://nces.ed.gov/programs/digest/d13/ch_3.asp>. Accessed 1 Oct 2015

U.S. DEPARTMENT OF EDUCATION, NATIONAL CENTER FOR EDUCATION STATISTICS, 2014. **Digest of education statistics.** Retrieved 28 November 2015 from http://nces.ed.gov/programs/digest/d14/tables/dt14_105.20.asp?current=yes

U.S. DEPARTMENT OF EDUCATION, NATIONAL CENTER FOR EDUCATION STATISTICS, 2015. **Digest of Education Statistics.** < https://nces.ed.gov/fastfacts/display.asp?id=84>. Accessed 2 October 2015.

U.S. DEPARTMENT OF STATE, BUREAU OF INTERNATIONAL INFORMATION PROGRAMS, 2013. **Outline of U.S. Government.** Retrieved February 28, 2016 from http://photos.state.gov/libraries/amgov/30145/publications-english/1310_Outline_of_US_Government_English_TEXT_Low_WEB.pdf

US NEWS & WORLD REPORT, 2014. **US News & World Report Best College Rankings**. US News & World Report. Washington D.C., USA.

U.S. NEWS & WORLD REPORT, 2015a. How U.S. News calculated the 2016 best colleges rankings. Retrieved February 29, 2016 from

http://www.usnews.com/education/best-colleges/articles/how-us-news-calculated-the-rankings?page=2

U.S. NEWS & WORLD REPORT, 2015b. **10 Universities with the largest endowments.** Retrieved February 26, 2016 from http://www.usnews.com/education/best-colleges/the-short-list-college/articles/2015/10/06/10-universities-with-the-largest-endowments

VIEGAS, C. V., BOND, A. J., VAZ, C. R., BORCHARDT, M., PEREIRA, G. M., SELIG, P. M., VARYAKIS, G., 2016. **Critical attributes of Sustainability in Higher Education: a categorisation from literature review.** Journal of Cleaner Production 126, 260-276.

WAAS, T., VERBRUGGEN, A., WRIGHT, T., 2010. **University research for sustainable development: definition and characteristics explored.** Journal of Cleaner Production 18, 629-636.

WATSON, M. K., LOZANO, R., NOYES, C., RODGERS, M., 2013. **Assessing curricula contribution to sustainability more holistically: Experiences from the integration of curricula assessment and students' perceptions at the Georgia Institute of Technology.** Journal of Cleaner Production 61, 106-116.

WEINHOFER, G., HOFFMANN, V.H., 2010**. Mitigating climate change—How do corporate strategies differ?** Business Strategy Environment 19, 77–89.

WHITE, L. Jr., 1967. **The historical roots of our ecological crisis.** Science. Vol. 155, No. 3767. March 10, 1967

WILSON, M., 2003. **Corporate sustainability: what is it and where does it come from?** Ivey Business Journal March/April 2003