Sustainable Higher Education
-
Understanding and Moving Forward

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1. Introduction

The aim of this paper is to stimulate the debate about higher education as a (potential) major catalyst towards sustainable development. Reviewing the contemporary literature related to sustainable development and higher education we want to understand better this role as (potential) catalyst and move Flemish higher education forward in its sustainability transition. It should be noted that while this paper will provide a broad understanding of the literature, it is beyond its scope to deal with each aspect in full depth. Interested readers are therefore encouraged to use the cited literature in this paper as a source to guide them in a more in-depth examination of the literature.
What we aim at is to provide points of reference for various higher education stakeholders, institutions and individuals by dealing with four crucial questions:

1) what is sustainable development about?
2) how to conceive the role of higher education in sustainable development?
3) what are the key aspects of sustainable higher education?
4) what are the major barriers and ways forward in moving Flemish higher education in a (more) sustainable direction?

Higher education is generally seen as a major (potential) catalyst towards sustainable development, in particular through its traditional missions of education, research and public service [2-4]. During the last two decades higher education institutions worldwide have implemented various sustainable development initiatives. In Flanders for example, most universities have signed the COPERNICUS Charter which dedicates universities to becoming leaders in SD through their various activities, including research, education, public service and campus operations. There have been numerous other sustainability initiatives at the institutional level in Flanders, and some regional overarching ones have been undertaken (for example "Ecocampus", "Fenix", "Sociale Economie op de Campus" and "Duurzaam Hoger Onderwijs Vlaanderen") [5].

Ecocampus, currently in its second term, is a project of the Environment, Nature and Energy Department of the Flemish Government that aims to catalyze the implementation of environmental management and SD in Flemish higher education. In support of this objective, Ecocampus initiated a participatory process in 2012 ("Sustainable Higher Education – Beyond Knowledge" or in Dutch "Duurzaam Hoger Onderwijs – De Kennis Voorbij") involving different stakeholders such as the higher education sector itself and other policy areas [6]. This paper is part of that process.

2. Sustainable development

2.1 A Society in Transition

In response to global environmental crises and vast social inequalities, world political leadership formally adopted sustainable development (SD) as a leading development model at the United Nations Conference on Environment and Development, in Rio de Janeiro in 1992 [7-10]. Embraced by many stakeholders worldwide (e.g. governments, businesses, non-governmental organizations, higher education, and citizens), SD is deemed highly imperative for the current and future well-being of humanity and the planetary state (box 1).

Box 1: Sustainable Development State and Objective

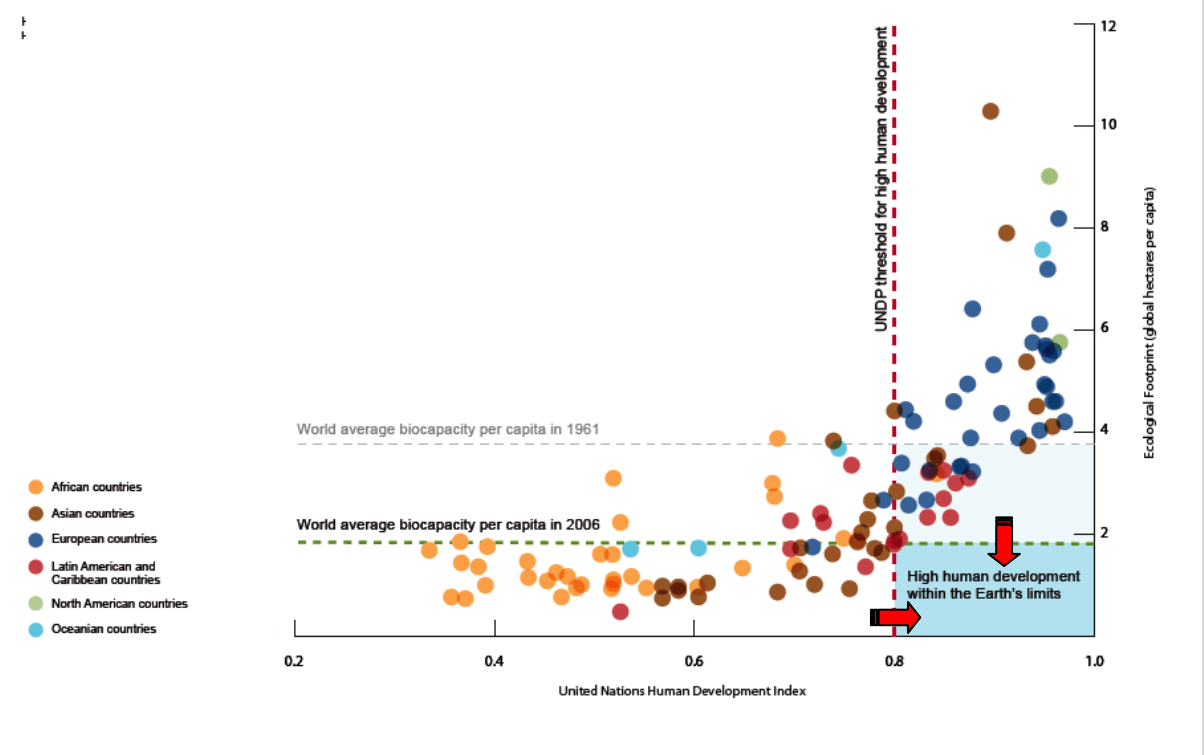


Figure: adapted from [11]

This figure measures SD through two leading indicators, the *ecological footprint* [12] as a measure for the environmental state and the *human development index* (HDI) [13] as a measure of human development (in terms of life expectancy, education, and income). It demonstrates that the current situation is (largely) unsustainable and that global society should move towards a situation within the environmental limits of the planet and a high human development in terms of HDI.

In essence, SD stands for: [14]

- a **solution** for environmental and development problems
- a set of principles implying **positive objectives**
- a focus for **positive change**
- a **critique** on conventional thinking and practice

In spite of past commitments and various SD measures taken, the practical implementation of SD on societal or global levels falls short [15-19]. Humanity is increasingly exceeding environmental limits [12, 20, 21] and extreme poverty remain widespread [13]. "Business-as-usual" measures do not suffice for sustainable development to succeed. Far reaching system changes are needed, which challenge and fundamentally alter our prevailing ways of development, including our fundamental beliefs, values and assumptions regarding what constitutes development [18]. The first essential and logical step should be to eliminate clearly unsustainable practices [22].

"True, "triple bottom-line" corporate planning is now fairly commonplace; various protocols for "green-building" compete to influence building codes; "new urbanism," "smart growth," and the ecocities movement are gaining ground everywhere; hybrid and electric vehicles are increasing their market share; and green consumerism is becoming mainstream in many developed countries—but none of this activity has made much difference (apart from fostering the illusion of progress)." [18]

From a transition perspective (box 2), society is currently in the beginning of a chaotic and turbulent period of transformation towards a new equilibrium, where structural changes become visible through the accumulation of various system changes (e.g. socio-cultural, economy, environment, institutions, technology) – "early acceleration" [23, 24]. However, it is unclear whether or not SD, understood as a dynamic equilibrium, will be achieved. An unsustainable future is still looming at the horizon. To many, this depends on society's "willingness to act", the choices yet to be made and the actions yet to be undertaken [24].

Box 2: Transition and Transition Phases

A transition is a shift in a system (e.g. society) from an initial dynamic equilibrium to a new dynamic equilibrium, in the form of a set of connected and reinforcing changes in different subsystems (e.g. economy, environment, institutions, technology and culture). A transition is a gradual, continuous process of co-evolution that takes 25 (at least one generation) to 100 years. We can distinguish four phases:

- **Predevelopment**: a dynamic equilibrium where the status quo does not visibly change; there is substantive individual experimentation
- **Take-off**: a process of change gets under way because the state of the system starts to shift

- **Acceleration**: visible structural changes take place through an accumulation and implementation of socio-cultural, economic, environmental and institutional changes; there is collective learning
- **Stabilization**: the speed of societal changes decreases and a new dynamic equilibrium is reached

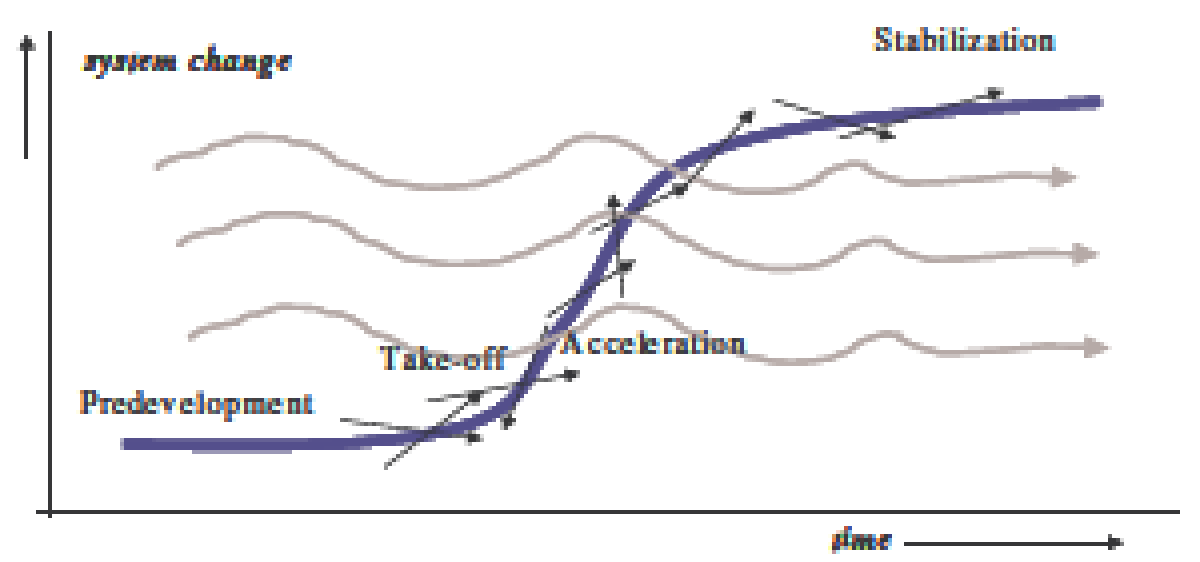


Figure: Rotmans et al. in [25]

Source: adapted from [23, 25, 26]

2.2 Definition and Principles

The most popular definition of SD is the one of the report "Our Common Future" [27] also known as the "Brundtland report" (box 3).

Box 3: Brundtland Definition

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." *[27]*

The report continues stating:

"It contains within it two key concepts:

- *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." [27]*

While essential for a proper interpretation the two key concepts of the Brundtland definition are mostly not quoted and often not considered. However, this clarification is important because it prioritizes the basic needs of the large number of people living in extreme poverty and argues that failure to meet (basic) human needs and aspirations does not lie with the environmental capabilities to meet these needs – it is not a problem of physical environmental limits or resource availability – but is due to humanity's social organization and state of technology – or in other words a shortcoming of human decision making.

The report also clarifies the content of the required change processes and as such renders its famous sustainability definition more concrete and operational:

"In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations." [27]

While definitions abound, SD conceptualizations must contain several "principles" or "rules of action" (box 4) that must always be respected no matter which view one amounts to. Nevertheless, SD, also requires "interpretative flexibility" that allows to take into account the local socio-environmental context (e.g. the view of local stakeholders) but always respecting its principles [28, 29].

Box 4: Sustainability Principles or Rules of Action

- **Normativity** (SD is a social construct and basically amounts to making normative decisions and choices, which are ultimately based on the values we maintain about the way we develop)
- **Equity** (refers to "justice/fairness" in the way we develop and includes inter/intra-generational equity (not compromising the ability of future and current generations to meet their own needs/aspirations), interspecies equity (environmental stewardship that refers to the survival of other species on an equal basis to human survival), geographical equity (global responsibility in a spirit of "shared but differentiated responsibility"), and procedural equity (democratic and participatory governance)
- **Integration** (of the different sustainability principles in an harmonious manner to reconcile socio-economic and development objectives with environmental ones)
- **Dynamism** (SD is a process of change because the environment and society change continuously, entailing uncertainties and risks that need a precautionary approach)

Source: [28]

3. Sustainable Higher Education

3.1 Why Should Higher Education Engage in Sustainable Development?

Sustainable higher education has emerged in response to calls for universities to lead society towards a sustainable future [30-34] and is considered a distinct but interdisciplinary specialization of study and practice within sustainability science [35, 36] and education for SD [36, 37]. Higher education is generally seen as a major (potential) catalyst to work towards SD [2-4]. The urgent societal need and broad call for SD allow higher education to assume a fundamental and moral responsibility in contributing to SD [3, 30]. Through their societal mandate of advancing knowledge, educating leaders, and furthering societal progress and engagement [38], institutions of higher education should be moral visionaries and centres of sustainability innovation and excellence. As 'learning laboratories,' campuses are to provide the lived experience of sustainable communities [39].

As major contributors to the values, health and well being of society, higher education has a fundamental responsibility to teach, train and do research for sustainability. We believe that the success of higher education in the twenty-first century will be judged by our ability to put forward a bold agenda that makes sustainability and the environment a cornerstone of academic practice. [40]

This is a challenging task, recognizing that higher education (still) contributes to and sometimes even accelerates the sustainability crisis [41, 42], which is visualized in box 1.
The scope and range of the negative impacts of university-educated people on the natural systems that sustain Earth are unprecedented. [43] and as Orr [31] states, the sustainability crisis is not so much the work of ignorant people but *"[…] largely the result of work by people with BA's, B.Sc.'s, LLB's, MBA's and PhD's." [31]*

Several reasons to take up this challenging task are listed in box 5.

Box 5: Reasons to Engage

- **Student interest**: increasingly students are expecting institutions to address sustainability issues and consider this as a criterion in selecting a place to study
- **Research funding**: increasingly funding agencies expect higher education to deal with SD in their research
- **Quality assurance**: education for SD contributes to quality education and pedagogical quality assurance
- **Community outreach**: SD offers the opportunity to "reach out" to the (local) community and to contribute/provide leadership to the community's transition towards SD
- **Employability**: to improve employability and recruitment because employers are seeking graduates with sustainability competences

- **Accountability**: increasingly institutions are held accountable for their sustainability performance by stakeholders
- **Moral obligation**: considering the urgent need for SD and the historical role of higher education in transforming societies and serving the greater public good, institutions have a moral obligation to lead society towards sustainability

Source: adapted from [44, 45]

3.2 Declarations

Demonstrating their commitment since the 1990s, and as a first step on the institutional level, higher education institutions worldwide have increasingly embraced the SD movement and more than 1000 institutions have signed international declarations towards implementing SD: Talloires Declaration (1990), Halifax Declaration (1991), Kyoto Declaration (1993), Swansea Declaration (1993), COPERNICUS Charter (1994), Thessaloniki Declaration (1997), Lüneburg Declaration (2000), Barcelona Declaration (2004), Graz Declaration (2005), Turin Declaration (2009) and Abuja Declaration (2009) [33, 34]. Box 6 describes the major themes that occurred in these declarations.

In Flanders, most universities have signed the COPERNICUS Charter [5] which commits the university to implement SD in all their activities including research, education, public service and campus operations (and other higher education institutions). Further, the International Association of Universities [46] considers SD as an integral part of the higher education mission, next to democratization and internationalization.

Becoming a signatory to a declaration is only the beginning of the process toward achieving sustainability within universities. Much remains to be done for SD to become genuinely and fully implemented and for higher education to become a true leader in SD [3, 33].

Box 6: Declaration's Points of Action

- Focus on **environmental degradation**, threats to society, and unsustainable consumption
- **Moral obligation** of higher education to engage in SD
- Inclusion of SD in **curricula** in all disciplines
- Encouragement of **sustainability science**
- Move towards more sustainability oriented **physical operations**
- **Collaboration** among institutions of higher education and with stakeholders
- Engage in **public outreach** for SD
- Promoting **transdisciplinarity**
- Implementing sustainability through **campus experiences**, by incorporating sustainability into the day-to-day activities of institutions
- **Educating-the-educators** on education for SD

- Including sustainability in the **institutional framework**, where sustainability should evolve as the "golden thread" integrating all of these

Source: adapted from [33, 34]

3.3 A Whole Systems Approach

SD has implications for the entire higher education system and at the organizational level for the entire institution, including: higher education public policy; its traditional threefold mission of education, research, public service; internationalization; democratization; innovation; campus/physical operations; student life; organizational structures and cultures; reporting and assessment; and ethics [47-51].

To date, most efforts in the emerging field of sustainable higher education have been focused on education (curricula/teaching) and campus operations, in particular environmental courses/programs and environmental management [3]. However, this field is increasingly dealing with research as well as assessment and reporting. Public service as a cross-cutting issue [52] is also addressed. The attention paid to the establishment of "Regional Centres of Expertise" as platforms for local collaborative learning for SD, involving all types of learning (formal, non-formal and informal) is a good example. In this paper we focus on education, research, public service as a transversal theme and physical operations.

Sustainable higher education needs to go beyond integrating SD in higher education that results in SD becoming an "add-on" to existing practices by instead integrating higher education in SD implying fundamental changes and requiring a holistic and systemic view (see box 7) [48, 49, 51, 53]. From this perspective, sustainable higher education deals with the (re)orientation of higher education towards SD through the implementation of its principles. Therefore, and after Sterling [51, 54] we prefer the term "sustainable higher education" over "sustainability "in" higher education", similar for education, research and campus operations used hereafter.

Sterling [51] states it as follows:

"[…] the effect of patterns of unsustainability on our current and future prospects is so pressing that the response of higher education should not be predicated only on "the integration of sustainability" into higher education, because this invites a limited, adaptive, response. […] we need to see the relationship the other way around – that is, the necessary transformation of higher education towards the integrative and more whole state implied by a systemic view of sustainability in education and society […]" [51]
In this sense Rees [55] speaks of "reinventing" instead of "changing" higher education:

"Schools, colleges and universities should be engaged in a deliberate process of reinventing themselves and, in the process, helping to reinvent society. If our prevailing cultural myth has become maladaptive, we should be engaged in constructing another, one whose derivative political philosophies will better map to biophysical reality." [55]

The University Leaders for a Sustainable Future (ULSF), which was during the 1990s a leading organization regarding sustainable higher education and the secretariat of the Talloires declaration states it this way:

"[Sustainable higher education] implies that the critical activities of a higher education institution are ecologically sound, socially just and economically viable, and that they will continue to be so for future generations. A truly sustainable college or university would emphasize these concepts in its curriculum and research, preparing students to contribute as working citizens to an environmentally healthy and equitable society. The institution would function as a sustainable community, embodying responsible consumption of energy, water, and food, and supporting sustainable development in its local community and region." [40]

Box 7: Whole Systems Approach

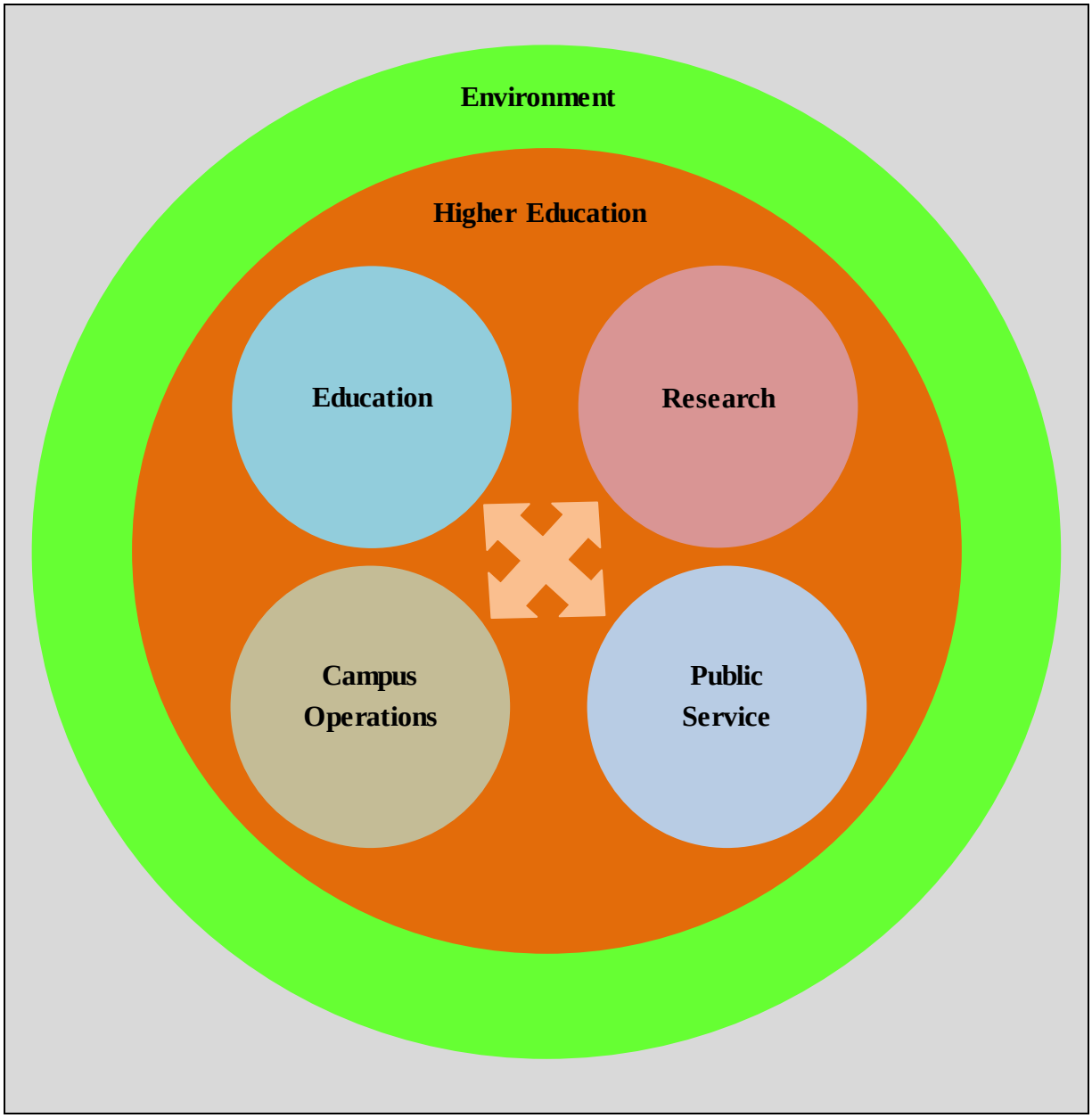
Sustainable higher education requires a **holistic and systemic approach** for at least the following reasons:

1. it targets the whole system at the macro level and at the micro/institutional level
2. it requires fundamental or deep system transformations going beyond "add-on" implementation and fragmentation

A whole-systems approach addresses the whole system, recognizes that higher education is composed of interdependent subsystems and implies that all subsystems and their interlinkages should be considered together for sustainable higher education as a dynamic equilibrium to be achieved [49, 51]. This conceptualization is presented in the graph below.

In general a number of shifts moving "from" – "to" could be identified: [51]

- Incoherence and fragmentation ⇒ Systemic coherence and positive synergy
- Large scale, loss of connectivity ⇒ Human scale, high connectivity
- Closed community ⇒ Open, 'permeable' community
- Teaching organization ⇒ Learning organization
- Microcosm of unsustainable society ⇒ Microcosm of sustainable society


Environment
Higher Education
Education
Research
Campus Operations
Public Service

4. Sustainable Education

4.1 Definition, Concepts and Principles

SD requires alternative ways of learning and education (see box 8) [56-58] and whilst in general all education is considered as a good thing and the more of it the better *"the truth is that without significant precautions, education can equip people merely to be more effective vandals of the Earth" [59]*.

Formal education is a type of learning that is institutionalized and that aims at realizing defined learning competences (values/attitudes, skills and knowledge) for defined target groups. Learning is the result of continuous interaction of an individual or a group with its physical and social environment, and includes formal (e.g. the educational system), non-formal (e.g. training on the job), and informal learning (e.g. family life and leisure time) [60].

To address the need for alternative ways of learning and education, sustainable higher education emerged during the 1990s [61] and at the beginning of this century the United Nations Educational, Scientific and Cultural Organization (UNESCO) launched the Decade for Education for Sustainable Development (2005-2014). The objective of the decade is:

[...] to integrate the principles, values and practices of sustainable development into all aspects of education and learning. This educational effort will encourage changes in behaviour that will create a more sustainable future in terms of environmental integrity, economic viability and a just society for present and future generations. [62]

Box 8: Definition, Concepts and Principles of Education for Sustainable Development

"Education for sustainable development aims to help people to develop the attitudes, skills, perspectives and knowledge to make informed decisions and act upon them for the benefit of themselves and others, now and in the future. ESD helps the citizens of the world to learn their way to a more sustainable future." [63]

Concepts or key words that often appear in definition of education for SD include: [64]

- creation of awareness
- local and global vision
- responsibility
- learning to change
- participation
- lifelong learning
- critical thinking
- systemic approach and understanding complexity

- decision-making
- interdisciplinarity
- problem-solving
- satisfying the needs of the present without compromising future generations

The following principles of education for SD could be distinguished: [64]

- a transformative and reflective process that seeks to integrate values and perceptions of sustainability into not only education systems but one's everyday personal and professional life;
- a means of empowering people with new knowledge and skills to help resolve common issues that challenge global society's collective life now and in the future;
- a holistic approach to achieve economic and social justice and respect for all life;
- a means to improve the quality of basic education, to reorient existing educational programmes and to raise awareness

4.2 Competences and Learning/Teaching Approaches

One of the critical roles of higher education is to prepare future policy- and decision makers in taking up an active role in society (Cortese, 2003). Taking into account this crucial role of higher education, (all) students should be equipped with the necessary competences to cope with complex sustainability challenges [65-67]: [68]

- students should know about sustainability (knowledge)
- students should have the skills to act sustainably (skills)
- students should have the personal and emotional attributes that require them to behave sustainably (values/attitudes)

Obviously, sustainable education goes beyond establishing a "knowledge base" for SD [56, 69]. Competence based education offers opportunities to re-examine and reorient educational policy and systems towards sustainability [70].

Competences for SD exist in various forms, definitions, settings and interpretations. Several authors defined these competences [57, 67, 71, 72], offering a complete set of knowledge, skills, values, and attitudes, necessary to ensure that students are able to cope with the complexity and uncertainty of sustainability issues. We introduce the partial list of competences developed by Rieckmann [67] (box 9) because this list reflects the consensus view on most important competences, developed by an international group of education for SD experts.

Box 9: Competences of Education for Sustainable Development

- Competency for systemic thinking and handling of complexity
- Competency for anticipatory thinking
- Competency for critical thinking
- Competency for acting fairly and ecologically
- Competency for cooperation in (heterogeneous) groups
- Competency for participation
- Competency for empathy and change of perspective
- Competency for interdisciplinary work
- Competency for communication and use of media
- Competency for planning and realising innovative projects
- Competency for evaluation
- Competency for ambiguity and frustration tolerance

Source: [67]

Important to note is that both in international policy discourse and in the sustainable education literature, issues of sustainable development are usually seen as matters of individual learning, as problems that can be tackled by applying proper learning strategies. Yet, translating sustainable education into a process of qualification is not unproblematic. In the context of sustainability, ready-made solutions and uncontested truths are rare. Nevertheless, the consequences of sustainability issues are far-reaching and cause social controversy. Wals [73] highlights this as a paradox between the sense of urgency emerging from a deep concern about the state of the planet and the conviction that it is wrong to persuade people to adopt pre- and expert-determined ways of thinking and acting. This challenges our dominant conception of education and shifts the focus from the competences that students must acquire to the democratic nature of educational practices in which students can participate. What it means to be a citizen should not be defined in advance. It can only emerge within the engagement in all kind of educational practices. Lawy and Biesta [74] call this perspective 'citizenship-as-practice'. It is a perspective on citizenship that touches upon the ambivalence of belonging to a globalising and diverse society today. A world where there is no universal, rational answer to contemporary challenges, but a plurality of voices. Central to this second concept is a more direct concern with the contingency of deliberation and the interactional base of citizenship.

It requires alternative ways of teaching and learning [51, 57, 75, 76] as summarized in box 10.

Box 10: Shifts in Learning and Teaching Approaches for Sustainable Development

- Transmissive learning ⇒ Learning through discovery
- Teacher-centred approach ⇒ Learner-centred approach
- Individual learning ⇒ Collaborative learning
- Theory dominated learning ⇒ Praxis-oriented learning (theory & experience)
- Emphasis on cognitive objectives only ⇒ Cognitive affective and skills-oriented objectives
- Institutional, staff-based teaching/learning ⇒ Learning with and from outsiders
- Low-level cognitive learning ⇒ Higher-level cognitive learning
- Accumulating knowledge and content ⇒ Self-regulative learning and real issue orientation orientation

Source: [76]

We should underline that sustainable education targets "all" students. Therefore, and adopting a holistic perspective, sustainable education is not solely about separate courses or programs but also, and more fundamentally about, integrating SD and its implications for education in existing and traditional ones [77].

5. Sustainable Research

5.1 Research Needs

It is generally acknowledged that research, as a generator of new knowledge, including the one conducted at universities, is pivotal for SD. The ‘‘Declaration on Science and the Use of Scientific Knowledge’’, adopted at the World Conference on Science, held in Budapest in 1999 and co-organized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Council for Science (ICSU), firmly states:

The sciences should be at the service of humanity as a whole, and should contribute to providing everyone with a deeper understanding of nature and society, a better quality of life and a sustainable and healthy environment for present and future generations. [78]

However, there is an increasing recognition that conventional and prevailing research practice falls short and does not adequately address the research requirements of SD [79]. New approaches are needed because the organizing principles of SD (e.g. its normative nature and the integration of environment and development) require specific scientific demands [80]. Being part of the problem, simply more of the same kind – “business as usual” – cannot be considered the solution [3].

Conventional research is based on static and reductionist approaches, whereas SD requires dynamic and holistic ones. Imperative is the need to focus on linkages between the biological, chemical, economic, geological, physical, political and social systems, and to search for dynamic and cross-systemic explanations [79]. In this sense, Lubchenko [81] calls for a new ‘‘social contract’’ for research. By recognizing the extent of human domination of the planet, the new social contract should express a commitment: [81]

- to harness the full power of the scientific enterprise in discovering new knowledge
- in communicating existing and new understanding to the public and to policy-makers
- in helping society to create a more sustainable world

5.2 Research Characteristics

Anticipating the research requirements of SD, a “vibrant movement” of various disciplines is emerging [82] applying a wide variety of scientific approaches, often through multi-, inter- and transdisciplinary modes, as a way of social learning. Social learning is about developing creative answers to challenges that are new, unexpected, uncertain, conflicting and hard to predict [83]. The notion of ‘social learning’ points at the opportunity in real life settings to (a) increase the reflective and reflexive capacities of researchers, and (b) create conditions of democratic participation enabling a maximum mobilization of capacities of different stakeholders involved.

Sustainability science can be applied as a generic term describing research performed in a solution-oriented context of social relevance, characterized by complexity, uncertainty and the importance of values in support of SD [84]. Scholars have proposed specific terms & initiatives describing the characteristics of sustainability science (box 11):

- mode 2 science [85]
- post-normal science [80]
- sustainability science [86]

Box 11: Characteristics of Sustainability Science

- Multi-, inter- and intra-disciplinarity
- Co-production of knowledge & participation (transdisciplinarity)
- Normative
- Systemic integration
- Exploratory character
- Recognizing its own limitations and assumptions
- Learning-oriented perspective
- Production of socially robust and socially relevant knowledge
- Attention to system innovation and transition

Source: [84]

Sustainability science does not replace but rather complements conventional approaches to scientific inquiry, which are necessary when it comes to SD. For example, disciplinary research applying traditional disciplinary scientific approaches is a *sine qua non* for excellent multi-, inter- and transdisciplinary research for SD [3].

However, and similar to sustainable education if one were to adopt a whole systems perspective, it is not only about the establishment of a new and additional "vibrant arena" of sustainability science, but rather about the (re)orientation of all research towards SD. This implies taking into account the particular implications of SD for various established ways of scientific practice. In this sense, research practiced in higher education for SD could be defined as:

"all research conducted within the institutional context of higher education that contributes to sustainable development" (adapted from [3])

While further exploration and development are necessary, several generic characteristics of such a holistic approach for research in higher education for SD are introduced in box 12. It should be noted, however, that several tensions remain, such as the need for inter-/transdisciplinary versus disciplinary research; problem-oriented (applied) versus knowledge-

oriented (fundamental) research; and the fundamental question whether or not all characteristics should be considered together [3].

Box 12: Holistic Characteristics of Sustainable Research

- Action orientation
- Continuity
- Environmental, safety and security management
- Independence
- Knowledge transfer
- Local–global level of scale
- Local knowledge
- Multidimensionality
- Multi-/interdisciplinarity
- Participation
- Precautionary principle and uncertainty
- Public interest
- Short, medium and long term perspective (intergenerationality)
- Societal peer review
- Sustainability impact
- Sustainability relevance
- Transparency

Source: [3]

6. Sustainable Campus Operations

Campus operations are supportive to the scholarly mission of the university, and should also be (re)-oriented towards SD for at least two reasons. First, "greening" campus operations can improve an institution's environmental, institutional and socio-economic performances. Second, by reorienting campus operations toward SD the institution models pro-sustainability behaviour and provides an informal way of learning about sustainability for the academic community – "practice what you preach".

Sustainable campus operations up until now mostly dealt with the environmental management of higher education institutions [3] in order to reduce the environmental impact of their various activities. However (re)orienting campus operations towards SD is much broader than recycling programs and energy efficiency and includes socio-economic objectives and stakeholder participation as well [87, 88].

For example, the Campus Sustainability Assessment Framework (CSAF) [88], adopts such a broad perspective and distinguishes two broad categories. The first is Environment, which is subdivided into the following dimensions: 1) air, 2) water, 3) land, 4) materials and 5) energy. The second category is People which is subdivided into the following: 1) knowledge, 2) community, 3) governance, 4) economy and wealth, and 5) health and well-being. Each of these is further subdivided in a number of elements (box 13) [89].

Box 13: Characteristics of Sustainable Campus Operations

Environmental Dimensions	**Elements**
Air	<u>Indoor</u> Indoor air quality is largely concerned with human health. Older buildings often have poor ventilation, and may have mold, asbestos and other pollutant issues. New spaces can have materials that off-gas potentially hazardous chemicals in to the air. By ensuring good quality indoor air, a healthier and more productive work force and academic community will result. <u>Outdoor</u> Outdoor air quality deals with outdoor air quality issues, including both negative impacts, and potential improvements that campuses can make to enhance outdoor air quality. Although many campuses will be affected by outdoor air quality impacts that are not directly caused by the campus community, this is still an important issue to understand and take action on. It deals with greenhouse gases, and other emissions produced by campus energy consumption, and also the quality of air being vented to the exterior environment from specific high-risk locations.

Water	Consumption Water consumption is concerned with the amount of water (re)used on campus, in particular water savings and the appropriate use of potable and rain water. Management The active management of water infrastructure and use is important for understanding the system, operating it at maximum efficiency, and minimizing water use and waste (e.g. leaking fixtures, leaking water distribution infrastructure, management of water use information at an appropriate scale, on-site wastewater treatment, and water efficient fixture installation). Wastewater Wastewater quality is an important sustainability issue for the campus, the surrounding community, and the receiving ecosystem. It is an ecosystem and human health issue that is often not effectively addressed by university campuses.
Land	Managed greenspace Managed greenspace includes all permeable (i.e. not paved, and water can penetrate) surfaces on campus that are managed in some way, including lawns, landscaped beds (with both native and non-native plant species), gardens, agricultural lands, gravel walkways, etc. Any greenspace on campus that requires maintenance by university staff should be included. These areas are important contributors to campus sustainability both in terms of human and ecosystem well-being. Natural areas Natural areas include all permeable spaces on campus that are in a natural or semi natural state. Both degraded and healthy ecosystems should be included. Many campuses have large tracts of natural areas that they should work to maintain, protect and even enhance over time in order to protection local biodiversity and habitat. Intensity of use The intensity of land use address the issues of open space, sprawling versus compact growth, built space achieved with reducing impacts of impermeable building footprints, and the compact/sprawling qualities of parking facilities.
Materials	Buildings Buildings deal with the sustainable construction and use of building on campus. Buildings require an immense amount of resources in their design and use, especially when aggregated over the whole lifetime that

	the building is in use. Paper Paper may seem like a relatively arbitrary material to focus on, but universities tend to use an extraordinary amount of paper in their day-to-day operations and functions. It represents a large environmental impact of most universities and changes in the purchase and use of this material offer great potential for environmental improvements. Food The ecological and socio-economic impact of foods consumed on most campuses is huge, including its choice, production and transportation. Local food, produced in a sustainable way should be preferred reducing the negative environmental impact and socio-economic effects, while promoting the local economy. Equipment Equipment purchases are major investments, and purchase decisions should be based on a range of issues, not just the cheapest initial purchase price. Product durability and ease of repair are important for longevity. Energy, water, and other resource consumption over time should also be considered in product purchase. Life-cycle assessment approach is an appropriate way to deal with it. Waste Solid waste reduction and waste management are important campus sustainability issues. Hazardous materials – even in minute concentrations – can have devastating effects on both humans and the ecosystems. Campuses tend to use a large volume of hazardous materials, primarily for laboratory teaching and research purposes. Often they are even stockpiled for many years, creating a potential hazard for the campus community.
Energy	Sources Energy sources deals with the sources of energy that fuel educational institution, and how far they must travel before reaching your campus. There are many energy source options available today, and some are much more ecologically and socially responsible than others (e.g. renewables versus non-renewables) Management There are many management options available to campuses to greatly reduce energy consumption. Energy conservation has long been a sustainability issue, especially in terms of cost-efficiency but also to allow renewables to replace unsustainable energy sources.

People Dimensions	Elements
Knowledge	Training Ongoing training for campus community members on social and ecological sustainability issues is important for continued learning on these topics as new and emerging information becomes available. Training in general is also important as part of human resource management in terms of personnel development and job satisfaction. Research See section 5 Curriculum See section 4
Health & well-being	Recreation Physical and social activity leads to improved human wellbeing through activation of the body and mind. It is important for campuses to support and encourage recreation on campus for these reasons. Food Access to healthy, nutritious, safe, and sustainable food products on campus is critical to the wellbeing of a campus community. Safety All campuses should work to protect the personal safety of their students, staff, faculty and visitors, as this is essential for long-term social sustainability. Health services The provision of on-campus services to promote and protect the physical and mental wellbeing of the campus community is an important aspect of campus sustainability. Environment As a vital convergence in sustainability work on campus environmental issues should be specifically linked with human well-being. Issues that have potential impacts on both humans and ecosystems together should be addressed (e.g. accessible green space, noise and light pollution)
Economy & wealth	Individual (accessibility, university as employer) Post-secondary education should be fairly accessible for students (democratization). It deals with the balance between the costs of education, and the financial support available to students to counter these costs. It also addresses how the university performs as an employer in terms of pay equity, wage gap, and benefits provided. Institutional (income, expenditures, investments) Higher education institutions are often showing a trend of incomes

	shifting away from government sources towards student and corporate sources. CSAF promotes government financed post-secondary education as the sustainability choice. The power of a campus' investments is an often underrated or unexamined element of campus sustainability. As societal innovators, a campus has a responsibility to both the on- and off-campus communities to invest in a socially and ecologically responsible manner.
Governance	<u>Policy (university government, student government)</u> To manage institutions of higher educations various policies, including those specific to SD are required. However, a policy is only arguably as good as the mechanisms in place to ensure its implementation and enforcement. Nevertheless it represents an important commitment by high-level university management and students to certain issues. <u>Implementation (university government, student government)</u> Implementation deals with how well the university's and student's policies are working: do they have working groups, are the working groups inclusive of different interest groups, and do the working groups have the ear of a high-level campus administrator. Sustainability in terms of governance requires both a strong policy and implementation structure. Both staff and funding are required to deliver on policy objectives, and their associated implementation plans. All three must work in harmony to make progress toward sustainability. <u>Monitoring (university government, student government)</u> The performance of campus sustainability policies should be monitored and reported. Transparency in university and student governance is an important sustainability issue, and both the on- and off-campus communities affected by the campus operations and functions should have access to information on performance, and ideally to influence future policy and implementation planning decisions as well.
Community	<u>Involvement & cohesion</u> A community with involved and engaged citizens has a much better chance of making coordinated and cooperative progress towards sustainability. Community cohesion is the on-going process of developing a community of shared values, shared challenges, and equal opportunity, based on a sense of trust, hope, and reciprocity. <u>Diversity (disabilities, ethnicity, gender)</u> Active promotion of employment equity for faculty and staff, and for recruitment and accessibility equity for students for people living with disabilities is a vital component of social sustainability on the campus. The hiring and recruitment policies and practices of universities should be

	designed to fully include this diversity in the campus community to promote equity, and the cross-cultural sharing of ideas and knowledge for enhanced learning. Services Provision of accessible services that are available on campus promote campus community, well-being, and thus sustainability.
Source: [89]	

As illustrated above, characteristics of sustainability in higher education must transcend traditional notions of environmental management of campus to include human elements of sustainability in order to truly embrace the full meaning of the term.

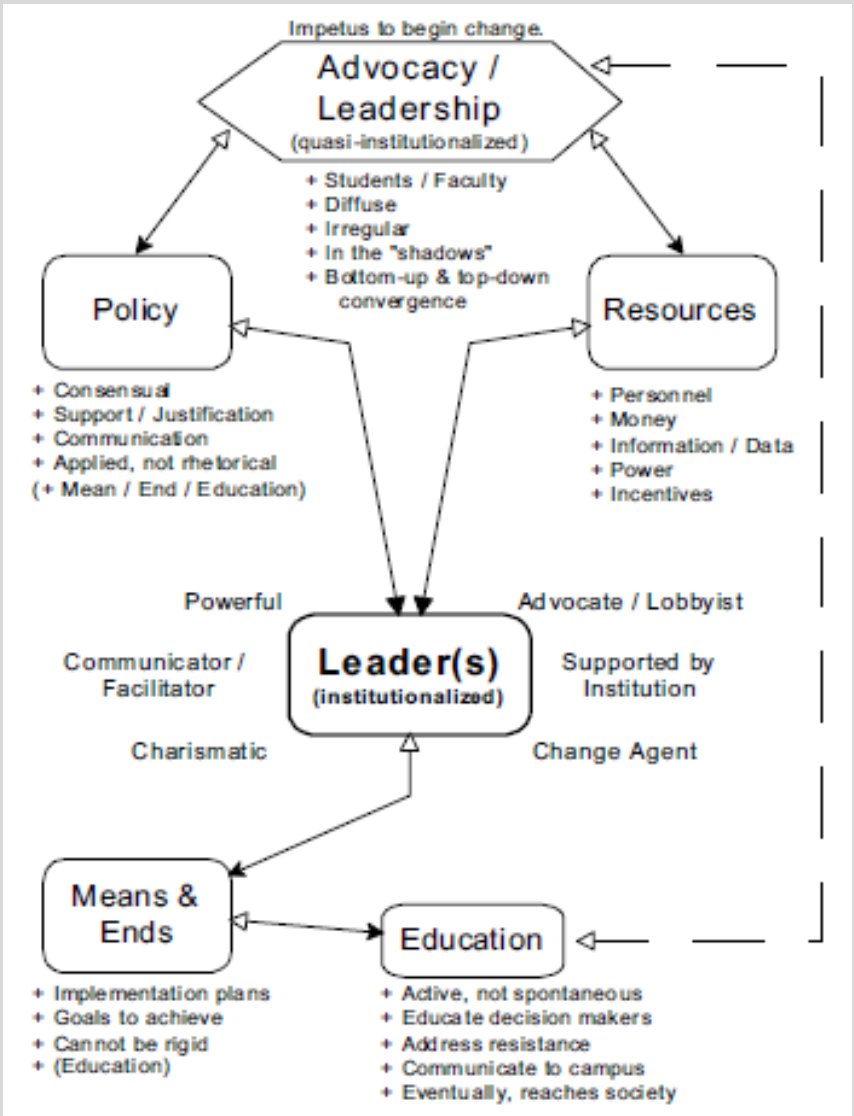
7. Managing Change in Institutions

7.1 A General Framework

Implementing SD in institutions of higher education implies moving from a current situation towards a desired situation (a period of transition). Research shows that such a process of change requires at least six key elements for success: [1, 90]

- Advocacy is the impetus to begin the change movement
- Policy addressing the proposed change(s) is required
- Resources for the change movement are imperative
- Leadership is the key for a successful change movement
- Well-defined means and agreed upon ends are important success factors
- Education in and out of the classroom for students and employees is the primary mean and end

Box 14: Change Management



Source: [1]

7.2 Barriers to Sustainability in Higher Education

Implementing sustainability is not an easy task [50]. It is complex, confusing and time consuming, and there are many uncertainties and various stakeholders should be involved [41]. There is often resistance to change, evident through the large number of barriers to change, which should be identified, addressed and overcome.

There are many barriers that higher education encounters in working toward sustainability. Box 15 provides an overview of challenges and barriers.

Box 15: Barriers to change

- **Disciplinary organizational structure** hindering integrative thinking and interdisciplinary cooperation and learning
- SD is perceived as an **"add-on"**, not a built-in aspect of higher education
- **Lack of vision and prioritization/leadership** of SD among higher education leaders
- **Lack of awareness, common understanding and knowledge** of sustainability in higher education and its consequences
- Perceived **lack of scientific basis of sustainability**
- **Confusion** about SD
- **Broadness** of SD
- **Lack of coordination and vision** to change sustainability policies and education at government level
- Little or no **motivation or realism**
- Sustainability is considered to be **radical**
- Changes into curricula are translated into **budget claims**
- **Overcrowded curricula**
- Sustainability is considered to have **little or no relevance** to the discipline, its courses and research
- **Lack of (financial) resources** and uncertainty about the required efforts/resources to engage and implement sustainability
- **Threat to academic credibility** of scholars and teachers

Source: adapted from [91-95]

In addition to documenting barriers, we provide in box 16 some answers to criticisms of sustainability sceptics often heard within academia [45].

Box 16: Typical Criticisms and Potential Answers to Sustainability Sceptics

Academic freedom ("Being expected to integrate sustainability into my teaching interferes with academic freedom.")

- It is perhaps debatable just how free universities and individual academics are given Government, funding council and internal policies, and tied funding sources, but this point aside, most academics have considerable choice over if, how and where to embed sustainability, even if it is part of their university's policy.

Ideology ("Promoting sustainability is promoting an ideology and that is not the job of higher education.")

- Most academics would agree that it is the job of higher education to promote critical inquiry and reflection. This particularly applies to sustainability issues, which are often contentious and complex. That said, there are a broad range of ideological positions associated with sustainability/unsustainability debates and higher education is well placed to bring a critical lens to the discourses associated with this field of inquiry.

Floodgates ("If sustainability, why not a whole raft of other areas – where's it going to stop?")

- This view tends to see sustainability as a separate and contained area competing for attention, whereas it is more accurately seen as a dimension, backdrop, approach or context that can inform and enrich most areas of curriculum concern.

Apathy ("If students aren't interested, it's not my job to sell sustainability.")

- It's not higher education's job to 'sell' anything, but arguably, it's higher education's responsibility to anticipate and prepare graduates for the world they will inherit and give them competencies to cope with and shape the social, economic, environmental and political pressures and influences they will undoubtedly encounter.

Rapid change ("There's enough change happening in the sector – now isn't a good time to take on any more!")

- Sustainability issues – including the sustainability of any particular institution itself – are very much part of the shifting agenda that higher education now faces. With policy advancing towards the low carbon economy and the need for green skills, universities need to get ahead of the game.

Source: [45]

7.3 Ways Forward

To move forward in the transition towards sustainable higher education, various concrete steps have been identified (box 17), also in response to several change barriers.

Box 17: Ways Forward

1. Assess & Measure
Develop assessment frameworks and indicators to assess the progress of sustainability in higher education at the institutional, regional, national and international level. This step is key in order to translate the concept of sustainability into a decision-making strategy. Indicators should make sustainable higher education measurable and demonstrable.

2. Communicate
Communicate regularly about the implementation of sustainability to all –internal and external- stakeholders. Institutions should publish regularly sustainability reports to demonstrate commitment and accountability.

3. Engage Stakeholders
Develop innovative and creative initiatives to engage the university community (including external stakeholders) in discussions about the role higher education can play in the transition towards SD and in developing an institutional understanding, culture, vision, mission and planning on sustainability in higher education. This will ultimately lead to ownership, empowerment, participation and willingness to contribute to and be responsible for change. Public outreach, through environmental communication, is an effective vector in social change and should be used to make sustainability a cultural norm on campuses.

4. Make Concrete
Implement sustainability into the everyday life of all on campus and go beyond abstract conceptualizations that do not relate to the day-to-day work.

5. Multiply
Achieve a multiplier effect by encouraging people involved in innovative sustainable experiments and practices to share their experiences.

6. Meet Needs
Understand and meet individual needs in the quest for sustainability: customize the approach to sustainability in higher education for various stakeholders (academics and non-academics).

7. Promote Understanding
Promote a deeper and more meaningful understanding of SD among societal leaders and decision-makers of all stakeholders (for example higher education actors, business,

politicians and citizens). This can be achieved through forums and discussions in which the interpretational limits of sustainability are clarified in a participatory way.

8. Incorporate in Quality Education

Include SD criteria in pedagogical quality insurance mechanisms.

9. Reward

Support the development of an innovative incentive system for academics: quality indicators and tenure criteria acknowledging and rewarding inter-and trans-disciplinary work for SD should be developed and adopted. This means academics have to move beyond disciplinary boundaries.

10. Educate University Wide

Promote the development of university-wide educational programmes that allow students to learn for SD, going beyond "business as usual" disciplinary categorizations.

11. Promote Empowering

Promote the development of an active and empowering curriculum focused on creating change for a sustainable future. Adopt new ways of teaching that incorporate experiential and transformative learning techniques so that students can translate knowledge into positive actions.

12. Create Management Positions

Create campus sustainability manager positions to facilitate the realization of sustainability in higher education. A sustainability officer should be standard at every higher education institution.

13. Develop and Participate in Networks

Develop regional, national, and international networks of (non-) academics engaging in research in the field of sustainability in higher education. Higher education institutions should start to engage within existing networks as a first step in making sustainability in higher education effective through collaborative partnership and intellectual exchange.

14. Engage in Regional SD Initiatives

Linked to this networking, engage in **regional SD initiatives** and participate in regional centres for sustainability learning (for example "Regional Centres of Expertise" supported by the United Nations University).

15. Develop Research Priorities

Further develop research priorities and comprehensive research strategies in the field of sustainability in higher education to gain (further) insights in critical issues necessary to advance the field.

16. (Re)orient Public Higher Education Policy and Funding
Governmental **subsidy programmes** should stimulate sustainability in higher education initiatives and collaboration and networking at all levels (regional, national, international).

Source: adapted from (Granados et al., 2012, Lozano, 2006, Rikers and de Snoo et al., 2012, Wright and Heather, 2012)

Additionally, Sterling [45] introduces a simple but effective 'first step' model – the "4 Rs model" – to change the direction of higher education towards SD: [45]

- **Retain** (keep what is useful, valid and relevant for SD)
- **Revise** (modify what is partially useful, valid and relevant but what needs some updating/revision for SD)
- **Reject** (abandon what is not useful, invalid/contradictory or irrelevant for SD)
- **Renew** (innovate regarding what is further needed for SD besides what can be retained/modified)

8. Conclusions and Recommendations

In an era of dramatic human-induced environmental problems and failing socio-economic and institutional systems, seriously threatening the well-being of current and future generations, it is widely recognized that higher education has the ethical and moral responsibility to transform itself to become a leading force in catalysing societal changes for sustainable development. Central to its "raison d'être" higher education has always been at the forefront of societal developments and progress through their traditional mandates of education, research, and public service. As such an extension to sustainable development is logical.

For more than two decades, and since Chapter 36 "Promoting Education, Public Awareness And Training" of Agenda 21 – the global sustainability plan of action – higher education has been examining, grapping with, and in some cases engaging with and attempting to implement the concept of sustainable development. One public way of doing this is by signing declarations and attempting to implement sustainability in various activities throughout the institution. However, in transition terms, it can be argued that higher education must take its efforts further and move towards (early) acceleration in which policy and structural changes become visible. In order to accelerate the transition to sustainability in higher education, institutions must (re)orient themselves "towards" SD, and use it as a constant frame of reference.

In moving towards becoming more sustainable, higher education requires a whole systems approach that targets the entire system and its various subsystems (all activities and the way it is organized) in need of fundamental system changes and considering all sustainability principles together. The proposed 4 Rs models offers simple and useful practical guidance.
Various aspects of managing change towards a desired future including the identified barriers and concrete steps forward should be addressed. While sustainable higher education is still an emerging field of study and practice, the acceleration process can already build upon a sound body of knowledge of implications and approaches for various higher education activities including education, research, public service and campus operations. Insufficient or unavailable knowledge cannot be an argument to slow-down or postpone further action. If any, it is more a question of priority setting, willingness and learning. We hope that this paper contributes to the transition of Flemish higher education towards SD.

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