ACCELERATING EDUCATION FOR THE SDGS IN UNIVERSITIES

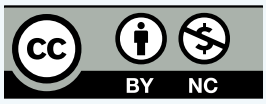
A GUIDE FOR UNIVERSITIES, COLLEGES, AND TERTIARY AND HIGHER EDUCATION INSTITUTIONS

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

SEPTEMBER 2020

© Sustainable Development Solutions Network

This work is licensed under the Creative Commons Attribution-NonCommercial 4.0 International License. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc/4.0/ or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.



Icons in Figure 2 and Figure 8 created by Made from the Noun Project.

The views expressed in this report do not reflect the views of any organization, agency or programme of the United Nations. It has been prepared by the team of independent experts from the SDSN Secretariat and SDSN member institutions.

This guide was prepared by Tahl Kestin (SDSN Australia, NZ and Pacific & Monash University), Julio Lumbreras (Universidad Politécnica de Madrid & Harvard University), and María Cortés Puch (SDSN).

The report should be cited as: SDSN (2020): *Accelerating Education for the SDGs in Universities: A guide for universities, colleges, and tertiary and higher education institutions*. New York: Sustainable Development Solutions Network (SDSN).

The following people provided significant input, research and assistance in the preparation of the guide and the accompanying case study website: Rafael Miñano (UPM), Chandrika Bahadur (SDSN), Liliana Diaz (University of Laval), John Thwaites (Monash Sustainable Development Institute), Leonardo Fernandes Coelho Rezende dos Santos (Newton Pavia University), Carlos Mataix (UPM), Wendy Purcell (Harvard University), Teresa Sanchez Chaparro (UPM), Patrick Paul Walsh (University College Dublin), Carla Alzamora Goncalves (Monash University), Giovanni Bruna (SDSN), Belen Casanas (UPM), Irene Ezquerra (UPM), María Marcote Juste (UPM), Luis Rodríguez Zerolo (UPM), Miguel A. Soberon (UPM), Rhea Madraymootoo (SDSN), Karen Chand (Sunway University), Phui Yi Kong (Sunway University), Wing Woo (Sunway University), and Tawana Kupe (University of Pretoria), Brian Chicksen (University of Pretoria), and Denise Wellington (Monash University).

The preparation of the guide and the accompanying case study website has been made possible with the support of Universidad Politécnica de Madrid (UPM); Monash Sustainable Development Institute, Monash University; and SDSN Australia, New Zealand & Pacific.

POLITÉCNICA

MONASH University

MONASH SUSTAINABLE DEVELOPMENT INSTITUTE

SDSN Australia, New Zealand & Pacific

ACKNOWLEDGEMENTS

In addition to the major contributors, the project team is immensely grateful to the following people who contributed to the guide through case studies, reviews, or other input:

Alison Greig (Anglia Ruskin University), Annie Hale (Arizona State University), Eileen Merritt (Arizona State University), Leanna Archambault (Arizona State University), Elena Pérez Lagüela (ASYPS), Vitalina (Belarusian State Pedagogical University), Sascha Nick (Business School Lausanne), Roy Jantzen (Capilano University), Christian A. Aramayo Arce (Center for human development and employability), Andréia Abrahão Sant'Anna (Centro Universitário Newton Paiva), Martin Eriksson (Chalmers University of Technology), John Rafferty (Charles Sturt University), Simon Wright (Charles Sturt University), Helena Ancos (Complutense University of Madrid), Daurel Gagnami Kiele (Dauvane), Roisin Lyons (Dublin City University), Mubashar Islam (Engineering & Technology Peshawar), Pia Lovengreen Alessi (European University Institute), Lisa Gring-Pemble (George Mason University), Charles Oppe (Global Action Plan), Thomas Gloria (Harvard University), Eric Hartman (Haverford College), Matthew J Pattom (Heartfulness Institute), Amos Obi (Hetaved Skills Academy and Networks), Manuel Acevedo (itdUPM), Kearrin Sims (James Cook University), Amadi Virtue Chigbama (Ken Saro Wiwa Polytechnic), Landouard Habiyaremye (Kepler), Consuelo Iriarte Campo (King Juan Carlos University), Eva Ponce (Massachusetts Institute of Technology), Regina Scheyvens (Massey University), Chris Steuer (Millersville University), Alejandro Molina-Garcia (Ministry of Health at Michoacan State), David Robertson (Monash University), Gitanjali Bedi (Monash University), Lara Werbeloff (Monash University), Michelle Armstrong (Monash University), Rod Glover (Monash University), Bodean Hedwards (Monash University), Elizabeth Bacchetti (Monash University), Arshad Adam Salema (Monash University Malaysia), Foo Su Chern (Monash University Malaysia), Joel Moore (Monash University Malaysia), Priya Sharma Amarjit Singh (Monash University Malaysia), Sharon Adeline Bong (Monash University Malaysia), Wong Zhi Hoong (Cyren) (Monash University Malaysia), Shiuh-Shen Chien (National Taiwan University), Milton G Villarroel (North Gaston High School), Patrizia Lombardi (Politecnico di Torino), Renzo Mori Junior (RMIT University), Sjoukje Wu (Shanghai Theater Academy), Will Hong (SUNY New Paltz), Alejandro Gregory (Sustainable Development Goals Center for Latin America and the Caribbean), Paola Visconti (Tecmilenio), Monmi Barua (The Energy and Resources Institute), Ramkumar (Thiagarajar College of Engineering), Jenny Yi Zheng (Tsinghua University), Nelya Rakhimova (Tyumen State University), Zeinab El Maadawi (United Nations University (UNU) & Cairo University), Alexis Velo (Universidad Autónoma de Madrid), Santiago Atrio (Universidad Autónoma de Madrid), Montserrat Cabré i Pairet (Universidad de Cantabria), Cesar Nanni (Universidad de Monterrey), Carmen Duce (Universidad de Valladolid), Susana de Andrés (Universidad de Valladolid), Susana Lucas Mangas (Universidad de Valladolid), Mirian Jiménez Sosa (Universidad Francisco de Vitoria), Òscar O. Santos-Sopena (Universidad Politécnica de Madrid), Ruth Carrasco (Universidad Politécnica de Madrid), Gemma Angélica Sánchez lerma (Universidad Pública de Navarra), Helen Temple (Universidad Veritas), Leslie Mahe Collazo Expósito (Universitat de Girona), Claudia Schmitt (Universität Hamburg), Sílvia Albareda (Universitat Internacional de Catalunya), Fatine Ezbakhe (Universitat Politècnica de Catalunya), Ana Tomás Miralles (Universitat Politècnica de València), Rosángela Aguilar Briceño (Universitat Politècnica de València), Tania Ansio Martínez (Universitat Politècnica de València), María de los Llanos Gómez Torres Gómez (Universitat Politècnica de València), Rosángela Aguilar (Universitat Politècnica de València), Tania Ansio (Universitat Politècnica de València), Toni Simarro (Universitat Politècnica de València), Patrick Paul Walsh (University College Dublin), Paloma Orte de la Peña (University of Applied Sciences Düsseldorf), Lineo Devecchi (University of Applied Sciences St. Gallen), David Sundaram (University of Auckland), Gabrielle Peko (University of Auckland), Niki Harre (University of Auckland), Mar Grasa Martínez (University of Barcelona), Marta Pérez Vallmitjana (University of Barcelona), Franziska Kastner (University of Basel), Francesco Castelli (University of Brescia, Italy), Aisling Tierney (University of Bristol), Chris Preist (University of Bristol), Ed Atkins (University of Bristol), Eleni Michelopoulou (University of Bristol), Renata Krenn (University of Economics and Business, Vienna), Mallory Xinyu Zhan (University of Geneva), Samuel O. Babalola (University of Ibadan), Arnold Nadine (University of Lucerne), Longinos Marín Rives (University of Murcia), Paul Perrin (University of Notre Dame), Eugenie L. Birch (University of Pennsylvania), Meghna Ramaswamy (University of Saskatchewan), Simone Cresti (University of Siena), Sofia Gruskin (University of Southern California), Roddy Yarr (University of Strathclyde), Ranjit Voola (University of Sydney), Estibaliz Saez de Camara Oleaga (University of the Basque Country), Kadiann Hewitt-Thompson (University of the West Indies, Mona), Monique Lynch (University of the West Indies, Mona), Sharon Bramwell-Lalor (University of the West Indies, Mona), Therese Ferguson (University of the West Indies, Mona), Mat Thijssen (University of Waterloo), Tonya Sweet (Victoria University Wellington), Brenda Dobia (Western Sydney University), Jen Dollin (Western Sydney University), Maria Garcia Alvarez (Windesheim Honours College), Sander Leusenkamp (Windesheim University of Applied Sciences), David Cambra (Zaragoza University), Ennio Mariani (Zurich University of Applied Sciences)

TABLE OF CONTENTS

Foreword ..... **III**

Executive Summary ..... **VI**

About this guide **1**

1. Education for the SDGs: A critical mission for universities **3**

1.1 ESDGs: A critical enabler for SDG implementation 3

1.2 The role of universities in delivering ESDGs 5

2. Unpacking education for the SDGs in universities **9**

2.1 Elements of ESDGs 10

2.2 Transformative learning approaches for ESDGs 12

2.3 Learners 15

2.4 Avenues for implementing ESDGs 16

2.5 Considerations for implementing and mainstreaming ESDGs at universities 18

3. Expanding and deepening implementation of ESDGs in universities **25**

3.1 Steps for implementing ESDGs 26

3.2 Common barriers and challenges, and potential solutions 30

3.3 Stakeholders 35

4. Towards university transformations for ESDGs **38**

4.1 A "Second operating system" approach to university transformations 39

4.2 Case studies 41

Annex A: Acronyms & terminology **54**

Annex B: ESDG-related SDGs and targets **55**

Annex C: Selected resources **56**

C.1 General references 56

C.2 Case study collections 56

C.3 Online resources & tools 57

C.4 Global networks and programs 57

C.5 SDG-related measurement and reporting frameworks 58

C.6 University SDG-related commitments 59

Annex D: SDSN programs supporting ESDGs at universities **60**

D.1 SDG Academy 60

D.2 SDSN Youth 61

References **62**

FOREWORD

One of the thrills of higher education around the world is the amount of invention that is underway. While universities are certainly filled with tradition, with the garb and rituals of graduations often looking like a scene from Padua, Italy in 1350, they are also institutions that change from generation to generation with new fields of knowledge and changing demands of society. In our time, one of the greatest challenges is sustainable development: how to combine economic development with social justice and environmental sustainability. It is not surprising, therefore, that hundreds of universities around the world are reconfiguring themselves to address the complex challenges of sustainable development.

I've been lucky in my own career to help shape the response of higher education to this great challenge in several ways over the course of 30 years. While a professor at Harvard University I was fortunate to help launch a new Center for International Development (CID) and a new Masters in International Development (MPA/ID) at the John F. Kennedy School of Government. Since arriving at Columbia University in 2002, I have been extraordinarily fortunate to help build Columbia's Earth Institute as its Director from 2002 to 2016, and in that capacity to help launch several new degree programs (including a PhD in Sustainable Development, an undergraduate major, and several Masters Degrees). With the support of the MacArthur Foundation I was pleased to help launch a new Masters in Development Practice (MDP) that is now taught in more than 30 universities. And since 2012, I have had the great honor to lead the UN Sustainable Development Solutions Network.

These varied experiences have helped me to gain some perspective on how sustainable development can be taught, researched, and promoted by universities around the world. This current volume offers invaluable insights on this question, adding to my confidence that sustainable development constitutes an important new intellectual discipline and organizing principle for universities in our time. Let me briefly share some key ideas on how universities can fruitfully take up the sustainable development challenge, especially in the context of the globally agreed Sustainable Development Goals and the Paris Climate Agreement.

First, let us recall the meaning of sustainable development, as economic development that is socially inclusive and environmentally sustainable. From the outset, we see that sustainable development is a *holistic concept*, involving economics, social justice, and environmental management. It therefore must be taught, researched, and promoted in a holistic manner – cutting across intellectual disciplines, faculties and departments, and even methods. A sustainable development scholar or practitioner needs to have familiarity with economics, with concepts of social justice and social organization, and with methods of environmental management. Each of these three areas too imply cross-cutting knowledge. For example, environmental management requires familiarity with Earth Sciences (climate, geology, oceanography, and ecology), applied fields (agronomy, conservation, and urban planning), and environmental engineering (energy systems, hydrology, and industrial ecology).

Of course, no single professor, researcher or student will become an expert in most or all of these relevant fields, but the training and research in sustainable development requires a familiarity with the range of fields, a trained vocabulary and span of knowledge to be able to discuss issues across the fields, and an ability to work with colleagues from disparate fields.

Second, not only is there a span across fields, but also a span across the kinds of knowledge being taught and pursued. Sustainable Development requires basic scientific knowledge, applied technical knowledge (e.g. engineering, agronomy, and public health), policy sciences (economics and politics), and the human sciences (e.g. psychology, ethics, pedagogy, and the humanities).

Third, the specific challenges of sustainable development should guide the methods of reorganizing university activities, including the curriculum and research program. Put another way, university programs around sustainable development are best organized according to the problems they seek to address. The major sustainable development challenges, those highlighted by the 17 SDGs, include: ending poverty and hunger (SDGs 1 and 2); universal access to key services such as health (SDG 3), education (SDG 4), water and sanitation (SDG 6), renewable energy (SDG 7), decent work (SDG 8); environmental sustainability (SDG 11 – 15); and inclusive societies with reduced inequalities of life conditions and lifetime opportunities (SDGs 5, 10, 16, 17). Each of these challenges requires academic knowledge from a range of disciplines and types of analysis.

For all of these reasons, I strongly urge universities to do at least four things. First, I urge universities to create new organizational units (departments, schools, faculties, institutes or some other means of organization) to house many or most of the university's programs of sustainable development. Columbia University's brilliant idea to establish an Earth Institute combining science, engineering, and public policy, exemplifies this approach. I was very lucky to be tasked with building this idea after its inception and its first years.

Second, I encourage universities to establish new educational programs, enabling students to train in sustainable development, ideally at each level of higher education (including undergraduate degree, Masters, PhD, and executive training). These education programs should train students to think systematically about the major challenges (poverty alleviation, access to public services, environmental sustainability) from a number of disciplinary perspectives, and with a solutions orientation (e.g. practical problem solving). Often these programs should include policy-related projects working directly with a "client" such as the local government or a ministry at the national level. Such "capstone" projects (or theses, practicums, senior essays, etc.) are a powerful way to mentor students in practical policy design based on rigorous science, engineering, and policy analytics. Finally, these education programs should offer the powerful analytical tools needed and used in sustainable development, including Geographic Information Systems (GIS), statistics and econometrics, simulation modeling, and other analytical skills.

Third, I believe that universities should turn their sights towards high-level policy advising and analysis, and should reward such work by faculty and students. On any of our pressing challenges today – fighting Covid-19, ending extreme poverty, decarbonizing the energy system, protecting endangered species – governments are typically out of their depth of expertise in the needed sciences, engineering, and policy design. In short, they need help (whether they know it or not). Universities have highly specialized talent and highly motivated students ready to help design solutions, but are often not organized for such efforts, or disapprove of such efforts as a distraction from academic research, or offer no institutional support for such efforts (e.g. faculty time, office space, legal and administrative support, etc.). In my own experience, and in the programs that I have helped to launch and implement, this kind of practical policy work is not only hugely rewarding, and with a high social benefit, but is itself the spur for deeper and more agile research activities as well.

Fourth, I hope that universities will seek out international university partnerships to amplify the work in sustainable development. We face severe and urgent global challenges, many of which require global cooperation to address, whether it is the control of the current Covid-19 pandemic, the transformation of the world's energy systems, or the redesign of agriculture and mining supply chains to encourage their environmental and social sustainability. This is, of course, the very purpose of the United Nations Sustainable Development Solutions Network (SDSN), to forge global networks and partnerships of universities in order to strengthen the global problem solving. There are, indeed, new networks of networks, linking the SDSN, the United Nations Academic Impact, the United Nations University, the Association of Commonwealth Universities, the International Association of Universities, the World University Network, and others, partnering together to accelerate the achievement of the SDGs.

It remains for me to thank the more than 1,300 universities, think tanks, and non-governmental organizations around the world that are members of the SDSN, and the team that put together this year's wonderful report. The SDSN offers this report with the great hopes that it will prove useful to universities around the world during the Decade of Action, 2020-2030. This report offers inspiration and guidance on accelerating Education for the SDGs (ESDGs). This is a crucial role for universities today, and one deeply sought by our students, who are keen to take up the leadership in the fight for sustainable development. By expanding our shared understanding of how universities can contribute to this global mission, this report can help contribute to a new global trajectory of economic progress, social justice, and environmental sustainability.

Jeffrey D. Sachs
President, Sustainable Development Solutions Network

EXECUTIVE SUMMARY

Universities and other higher education institutions have a critical role in helping society achieve the Sustainable Development Goals (SDGs) through their research, learning and teaching, campus operations and leadership. This guide focuses on one of the most important ways they can contribute, which is to harness their learning and teaching functions to provide "Education for the SDGs (ESDGs)", that will help learners develop the necessary knowledge, skills and mindsets.

The need to greatly expand society's capacity to solve complex challenges has never been more important or more urgent, with just ten years remaining to the 2030 deadline of achieving the SDGs, the growing understanding of the urgency of addressing climate change, and now the COVID-19 crisis. By expanding and mainstreaming ESDGs as part of a higher educational experience, universities can respond and adapt to the needs of our "new normal".

While ESDGs builds on the established field of Education for Sustainable Development (ESD), it incorporates a broader agenda of issues, objectives and methodologies than ESD, and responds directly to the greatly increasing interest across the university sector in engaging with the SDGs.

The aim of this guide is to help accelerate the process of mainstreaming ESDGs in universities, by helping stakeholders within and outside universities understand why universities should engage with ESDGs, what ESDGs looks like from an institutional perspective, and what steps they can take towards implementation. It also provides resources, tools and case studies to inspire and support further action.

ESDGs is a critical mission for universities, both because universities are in a unique position to provide this service to society, and because implementing ESDGs can bring benefits to universities.

To effectively address the SDGs, we need professionals and citizens who have the skills, knowledge, and mindsets to tackle the complex sustainable development challenges articulated by the SDGs through whichever career or life path they take. These include:

- A general understanding of sustainable development and the SDGs
- Cross-cutting skills to make sense of complex challenges and devise and implement solutions
- Specific knowledge and skills for how each profession can contribute to the SDGs
- Mindsets to contribute to positive societal change

Universities have compelling reasons and a unique opportunity to lead on ESDGs. As the providers of general, professional and vocational education across all disciplines, and reaching hundreds of millions of learners at all stages in their life, universities are in a unique position – and therefore have a critical responsibility – to provide ESDGs to as many learners as they can within their sphere of influence.

Furthermore, providing ESDGs has other important benefits to universities, including demonstrating the impact and relevance of the university (and the sector) to current and prospective students and staff, as well as other sectors; and facilitating innovative partnerships and collaborations within and across the university.

To mainstream ESDGs, universities need to scale up existing activities and implement new types of activities that go beyond business as usual.

While universities have been providing some aspects of what is needed for ESDGs through their traditional learning and teaching activities, there is a need to both scale up existing activities, as well as implement and mainstream new types of activities that go beyond usual operations.

There are many approaches which universities can take to implement and mainstream ESDGs, depending on their context, capacity and starting point. Some key considerations include:

- Because ESDGs is relevant to all people, universities should aim to provide elements of ESDGs to as many "learners" within their sphere of influence as they can, but prioritize those closest to them, namely "traditional" students and staff.
- Given the breadth and cross-cutting nature of the SDGs, elements of ESDGs can be incorporated in and add value to most existing formal and informal learning and teaching activities in universities.
- To help learners develop cross-cutting ESDGs skills, competencies, and mindsets, universities will also need to develop new "transformative learning" activities, which employ interdisciplinarity, action-based learning, and multi-actor involvement, and which are not currently standard practice within universities.

With these considerations in mind, some of the most common approaches used so far by universities for ESDGs are awareness raising, interdisciplinary introductory units, integration into the existing discipline curriculum, project-based units, co-curricular activities, leadership programs, student-led activities, MOOCs and other online content, and sustainable development degrees.

However, these approaches are not all equal in terms of their reach, depth and suitability for different aspects of ESDGs, and there is no single approach that covers all bases. So, in order to mainstream ESDGs, universities will need to implement a combination of approaches.

Mainstreaming ESDGs can be an organizationally difficult process, but there are many actions universities can take to support it.

The best way for universities to identify and implement the right combination of ESDGs activities for their context is through a university-wide strategic process. This is not an easy task, because expanding ESDGs requires universities to add new activities or modify their existing activities at a university-wide scale. Furthermore, some of these activities represent a significant shift from how the teaching and learning domain is currently organized and delivered.

To help the strategic ESDGs implementation process, universities can follow the following five steps:

1. Map what you are already doing
2. Build capacity and ownership for ESDGs
3. Identify priorities, opportunities and gaps
4. Integrate, implement and embed the SDGs
5. Monitor, evaluate and communicate

A wide range of internal and external stakeholders – from university leaders, to faculty members, to students, to university partners – can contribute in different ways to this process, and, in fact, all their contributions crucial for success.

Nonetheless, universities are likely to come up against a range of personal, organizational and external barriers and challenges relating to ESDGs being a relatively complex and new agenda. Universities can take a range of actions to address some of these barriers and challenges, but possibly not all of them.

A transformation in how the university operates may be needed to overcome all the barriers to implementing ESDGs, and to ensure mainstreaming happens fast enough and deep enough.

The scale of the change that needs to take place in order to mainstream ESDGs across the sector is enormous and urgent, and an incremental approach like the process described above may not be sufficient or fast enough. For this reason, a transformation is also needed in how universities operate.

One approach to this transformation, which we propose here, is a “second operating system” within the university, which would focus solely on developing innovative mechanisms and approaches to support ESDGs, and would complement the existing governance system of the university. This approach can happen in parallel to more traditional approaches.

ABOUT THIS GUIDE

In 2017, SDSN Australia, New Zealand & Pacific, in partnership with the Australasian Campuses Towards Sustainability (ACTS) and the global SDSN, published *Getting Started with the SDGs in Universities: A guide for universities, higher education institutions, and the academic sector* [1]. That publication aimed to help the sector[1] understand its critical role in achieving the Sustainable Development Goals (SDGs) and the many ways it can contribute to them through research, learning and teaching, campus operations and leadership.

One of these ways is for universities to harness their learning and teaching functions towards the creation of "SDG implementers". By this we mean providing students and people working in all professions with the knowledge, skills and motivation to tackle the complex sustainable development challenges articulated by the SDGs through whichever career or life path they take. In this guide we refer to this as "Education for the SDGs" (or ESDGs).

While *Getting Started* included a short section on mainstreaming ESDGs in universities, it has become apparent since it was published that more detailed guidance was needed to help clarify what is needed and how it can be done. There is a growing recognition of how important ESDGs is for all learners in our increasingly complex 21st Century, and the unique abilities universities have to deliver ESDGs widely. This has led to a notable increase in the interest of universities in ESDGs, in discussion and development of resources for this across the sector, as well as in innovation and experimentation by institutions, university staff and students. However, on a sector-wide basis, it remains a largely niche activity. This is largely because the activities and approaches needed to expand ESDGs in universities requires them to go beyond traditional approaches of learning and teaching, to teach new things in new ways, and to consider more fundamental transformations in how they operate in order to better support these new activities.

The aim of this guide is to help accelerate the institutional process of mainstreaming ESDGs in universities, by helping stakeholders within and outside universities understand why they should pursue this goal, and how. It aims to expand, update and refine the information provided in the previous guide [1] based on new resources, tools, thinking, and learnings from universities working to implement ESDGs, to consider what ESDGs mean for universities. The guide touches on the pedagogical aspects of ESDGs, in terms of how they affect institutional approaches to ESDGs, but does not attempt to provide a comprehensive review of them.

The Guide outlines the case for mainstreaming education for the SDGs at universities, what this does and could look like in practice, and the processes and activities universities can take to support implementation. It also provides practical guidance, resources, and case studies to inspire universities to take action and deepen their practice.

1. While we use the term "university" throughout this guide, much of the discussion Is equally relevant to higher education and tertiary institutions more broadly, including colleges, vocational training schools, and so on.

- **Chapter 1** introduces the overall case for why universities need to accelerate their engagement with the SDGs, and specifically in the area of education for the SDGs.
- **Chapter 2** unpacks what ESDGs means for a university, including the various ways universities can deliver and accelerate education for the SDGs. It identifies that some aspects of ESDGs are difficult to implement within the traditional structure of universities.
- **Chapters 3 and 4** provide guidance on how universities can support the implementation of ESDGs, including whole-of-institution approaches and tools to support education activities towards the SDGs. Chapter 3 suggests a stepped approach that builds on existing university structures and processes, whereas Chapter 4 discusses the concept of institutional transformation to enable universities to greatly accelerate what they can do.

This Guide is for anyone who can contribute to or influence the implementation of ESDGs at universities, including:

- Staff involved in the delivery of learning and teaching across all areas of the university, such as instructors, teachers, professors, learning facilitators, curriculum coordinators, education directors, and central learning and teaching support services
- University leaders
- Campus and operational services, international engagement, fund-raising arms, research and those supporting academic excellence
- Students and student clubs and societies
- External stakeholders that influence, participate in, or support learning and teaching activities at universities, like governments, standards organizations, university networks, professional associations, and university partners from other sectors

We hope universities and their stakeholders will find this guide a useful and inspiring resource for their journey to accelerate education for the SDGs at their institution.

Case studies

As part of the development of this guide, we invited universities around the world to submit case studies of how they are already implementing and supporting education for the SDGs. A selection of the many innovative and inspiring case studies we received is referenced in this guide and presented in full in the website, blogs.upm.es/education4sdg. Each case study is mentioned once as an example in a relevant section, but most fit multiple sections. We invite you to browse the website to explore all of the case studies.

1. EDUCATION FOR THE SDGS: A CRITICAL MISSION FOR UNIVERSITIES

Universities have a critical and unique role in helping society address the Sustainable Development Goals (SDGs). This guide focuses on one area where their potential contribution is particularly significant, but still largely niche, which is the development of "SDG implementers" through Education for the SDGs (or ESDGs). This means providing students and other learners within their sphere of influence with the knowledge, skills and mindsets to address the SDGs through their current or future roles.

The need to greatly expand society's capacity to solve complex challenges has never been more important or more urgent, with just ten years remaining to the 2030 deadline of achieving the SDGs, the growing understanding of the urgency of addressing climate change [2], and now the COVID-19 crisis, showcasing how interconnected the environment, our prosperity and social wellbeing are. By expanding and mainstreaming ESDGs as part of a higher educational experience, universities can respond and adapt to the needs of our "new normal".

This chapter explains the case for why ESDGs is a critical mission for universities. It provides an overview of ESDGs, the importance of mainstreaming it, and how universities can contribute to this. It explains why the role of universities is particularly critical in delivering ESDGs, and highlights some of the important benefits to universities from developing and mainstreaming their delivery of ESDGs.

1.1 ESDGs: A critical enabler for SDG implementation

In September 2015, world leaders at the UN unanimously adopted *Transforming Our World: The 2030 Agenda for Sustainable Development* [3], one of the most ambitious and important global agreements in recent history. At the heart of the agenda are the 17 SDGs, with their 169 targets (Figure 1), which aim to guide all countries in trying to solve together the world's most pressing challenges by 2030, including ending poverty and hunger; protecting the planet from degradation and addressing climate change; ensuring that all people can enjoy prosperous, healthy and fulfilling lives; and fostering peaceful, just and inclusive societies free from fear and violence.

The SDGs cover a wide range of complex social, economic, and environmental challenges and addressing them will require transformations in how societies and economies function and how we interact with our planet. Addressing these challenges and achieving transformations requires all sectors to operate in more collaborative, interconnected, systemic, and responsible ways [4].

To effectively play their part in achieving these changes, we need professionals and citizens who have the skills, knowledge, and mindsets to effectively play their part.

The SDGs themselves recognize the importance of building the knowledge and capacity of different sectors, and learners in general, to enable the achievement of the SDGs, and these have explicitly been written into a number of SDGs targets, as shown in Annex B. This is most strongly highlighted in SDG 4.7, which calls for "By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development…"

There is considerable discussion in global educational circles on how to implement this agenda. Much of the discussion centers on the role of primary and secondary education. Universities, as key components of society's educational and professional training system, have a significant role, opportunity, and responsibility to contribute to the implementation of this agenda. However, as will be explained in more detail in Chapter 2, many aspects of ESDGs are not currently considered part of a standard education, let alone a university education.

Figure 1: The Sustainable Development Goals.

1.2 The role of universities in delivering ESDGs

Universities have a unique and critical role in delivering ESDGs to those within their sphere of influence. It is well established that universities are a critical partner for delivery of all the SDGs [1]. The capabilities of universities in education, research and innovation, as well as their contribution to civic, societal and community-level leadership, mean that they have a unique role in helping society address these challenges (see Figure 2). Arguably, none of the SDGs will be fully achieved without the contribution of the university sector.

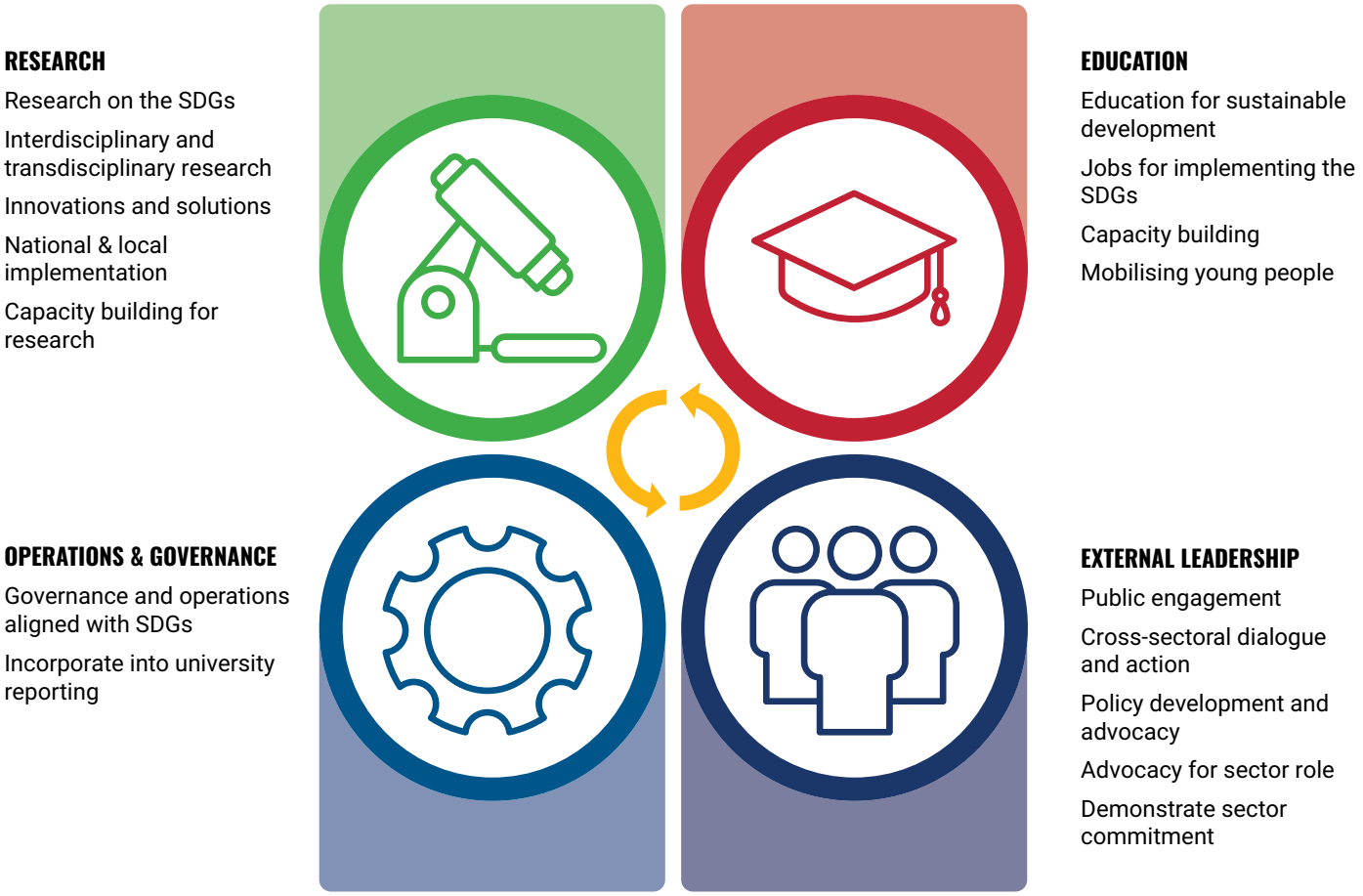


Figure 2: Overview of university contributions to the SDGs (from [1])

While universities are already undertaking many of the activities highlighted in Figure 2 as part of their "business as usual" research and teaching activities, delivering the ESDGs requires universities to both scale up existing activities as well as implement and mainstream new types of activities that go beyond usual operations.

Since 2015, there has been great interest and activity in the university sector related to the SDGs, from identifying and implementing pathways for universities to increase their contribution to the SDGs across all academic and service functions, to developing new tools and resources to facilitate and accelerate action. This has resulted in numerous publications, conferences, network activities, reporting frameworks, commitments, and funding schemes, all focusing on the SDGs.[2] Many universities have also embraced the SDGs as an opportunity to do things differently, from activities by individual researchers, teachers or students, to incorporating the SDGs into the strategic mission of the university.

While this level of interest, innovation, experimentation and activity is highly encouraging, there is still a long way to go before the sector delivers on its full contribution to achieving the SDGs. One area where there is a particular need to scale up and accelerate action is in the delivery of Education for the SDGs to help the development of SDG implementers.

Universities are considered to have a moral imperative to support education for the SDGs as part of their social mission of providing people with professional and personal skills and capabilities. What students learn at their university will have a direct impact on them as citizens, professionals, consumers as well as on businesses they will work for or create. Universities need to help students develop the knowledge, skills, attitudes and values they will need to address global challenges as responsible professionals and citizens.

The following are some of the key features of universities that endow them with a unique and critical ability – and responsibility – for helping society address the SDGs through ESDGs:

- **Reach:** In 2015, 214 million students were enrolled in university education worldwide [5], a very significant number and opportunity to influence a whole generation of professionals and leaders.
- **Responsibility in the direct areas covered by ESDGs:** As part of their educational mission, universities have responsibility for providing people with professional and personal skills and capabilities for professional employment and meaningful contributions to society.
- **Access to learners at all stages of learning:** Universities have access, and opportunities to expand their access, to learners at all stages of life, including people who are already working. This is through undergraduate and graduate degrees, vocational training, professional training, executive and adult education, online learning, outreach activities, and community engagement.

2. These are far too numerous to cite here, but some of the key resources are listed in Annex C.

- **Learning and teaching expertise:** Universities have significant practical expertise in learning and teaching methodologies, and capacity to undertake research on pedagogy and trial new approaches and methodologies.
- **Broad expertise:** Universities, through their schools and faculties, have broad academic and content expertise relevant to teaching all areas of the SDGs.
- **Special role in society:** Connections to all other sectors and an increasing focus on public mission and impact.

While these capabilities and responsibilities should be sufficient to convince universities to aim to increase their action to deliver ESDGs, it is useful to note that there are also many side benefits to this action:

- **Relevance and reputation:** The SDGs are becoming part of the everyday language and structure of national and subnational governments, multilateral organizations, funding agencies, civil society, and the private sector. Those who are not familiar with them are at risk of being left behind.
- **Increase the appeal** of the university to help draw in students – who want to be change makers.
- Help facilitate and deepen **relationships** and collaborations with other sectors, and provide an avenue for universities to be involved in solving actual sustainable development problems.
- Help facilitate **collaborations** across different faculties and functions of the institution.
- **Demonstrate** the important role of universities, demonstrate the impact, demonstrate the societal responsibility.
- **Future-focused:** The education for the SDGs supports other useful tools for framing a new university paradigm; teaching future-ready skills. The new skills that employers want/need.
- **Competitiveness:** Universities are increasingly being measured on and compared/ranked by engagement with SDGs.
- SDGs can be a great opportunity to **overcome barriers** that hinder the inclusion of Education for Sustainable Development (ESD) in formal teaching, such as lack of motivation and funding.
- **Financing:** funders – including government agencies, international banks, and philanthropists – are increasingly framing funding calls around the achievement of the SDGs.
- **Act on commitments:** Implementing aspects of ESDGs is an important component in the range of commitments to the SDGs or climate action that many universities have signed up to recently (see Section 3.1 and Annex C.6). With the growing global concern about lack of progress on the SDGs and climate, universities need to demonstrate that they are acting on these commitments beyond business as usual.

- **Attracting/retaining talent:** University staff are increasingly aware of the SDGs and the challenges of our planet and are seeking to make a difference. Universities with innovative plans to incorporate the SDGs in their operations, educational plans and research endeavors, will be more attractive to staff and students alike.
- **Living labs:** Many transformations in practices of consumption, production, investment, housing, and interacting are needed to implement the SDGs. New practices can be fostered, tested and shared across campuses as evidenced by the many campus experiences such as "living labs".
- **Innovative partnerships:** The SDGs call for a balanced consideration of the interests of all actors in the ecological transition. Universities can respond to this new demand by offering training for the jobs of the future, while supporting employers in the transformation of the workplace.

Universities clearly have compelling reasons and a unique opportunity to lead the education for the SDGs. This guide addresses some of these opportunities, allowing readers from different contexts and in different positions within the university to choose a path that makes the most sense to them, considering the available resources.

However, putting ESDGs into practice can have many challenges. As will be shown in Chapter 2, which considers in greater detail what ESDGs is and what implementing it could look like in a university, many aspects of ESDGs do not represent or fit well within universities' "business as usual" learning and teaching structures. Chapter 3 aims to provide universities with practical guidance on implementation, including overcoming some of these challenges within existing structures. Further to this, Chapter 4 proposes some ideas on how universities can think through a deeper transformation to become societal leaders on this topic.

2. UNPACKING EDUCATION FOR THE SDGS IN UNIVERSITIES

Education for the SDGs can take a wide range of forms within a university. The term itself includes several distinct elements, and these can be implemented through a range of pathways, with varying degrees of depth, to a wide range of potential learners. There is no one-size-fits all for what delivering ESDGs at universities looks like, and each institution has to find its own way.

The aim of this chapter is to lay out the range of possibilities for delivering ESDGs at universities, to help institutions think broadly and ambitiously about how they can contribute, and to enable them to identify the options and pathways that best suit their context.

In order to identify the potential options for implementing ESDGs in a university, we start by considering different aspects of what ESDGs is and how these relate to universities. These are covered in Sections 2.1–2.4. Section 2.5 provides some general principles on how to select from among these options, and summarizes the main approaches for implementing ESDGs in universities. The structure of the chapter is summarized in Figure 3.

While the chapter touches on the pedagogical aspects of ESDGs, such as what it includes and teaching methods (particularly in Sections 2.1 and 2.2), the focus is on how they affect institutional approaches to ESDGs. A comprehensive review of the pedagogical aspects of ESDGs is beyond the scope of this guide, and some further resources on these can be found in Annex C.

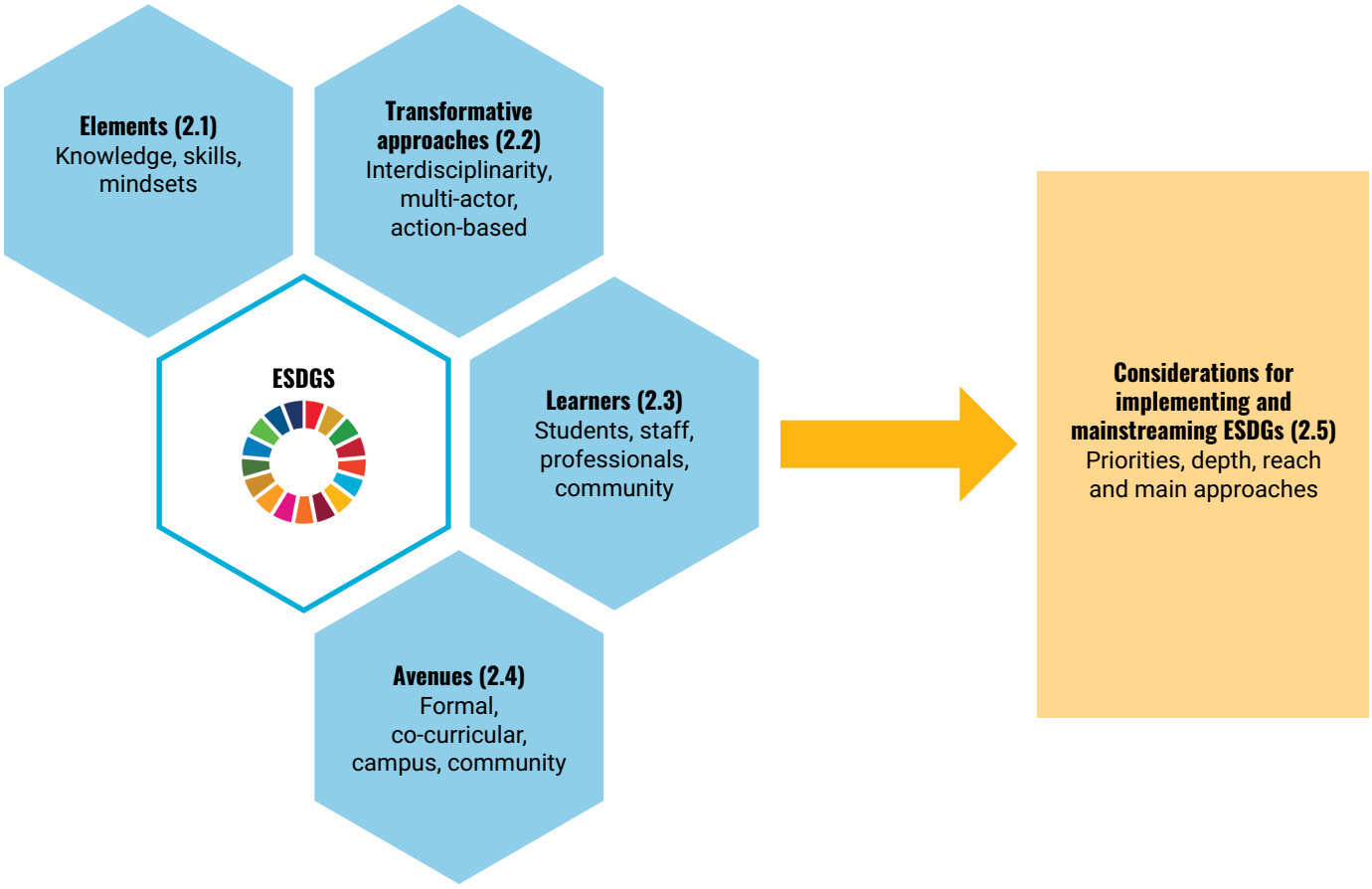


Figure 3: Identifying the main approaches to delivering ESDGs at universities

2.1 Elements of ESDGs

As explained previously, we define ESDGs as education that provides people, regardless of their chosen profession or path in life, with the skills, knowledge and mindsets to address the challenges captured by the SDGs and to contribute to the transformations needed in society.

These challenges are characterized by complexity, uncertainty, and conflicts of values, and contradiction. Many of these challenges have so far proven hard to address, partially because of people's (and institutions') tendencies such as reductionist thinking, working in silos, and ignoring uncertainty. Education needs to provide individuals, communities, and institutions the capability to understand, adapt and to respond to these challenges [6].

There are no exact definitions yet of what ESDGs includes, however it is generally accepted that ESDGs is aligned with the more general and very well-established field of Education for Sustainable Development (ESD) [7, 8], and in many ways builds on its approaches and methodologies. The body of knowledge and experience developed by the ESD field should be the backbone of efforts to implement ESDGs [7].

Despite ESD being a key component of ESDGs, we deliberately chose to use the broader and less well-defined term of ESDGs in this guide. There are two main reasons for this: First, a number of educational approaches beyond ESD are being seen as crucial for the SDGs, and therefore ESDGs incorporates a broader agenda of issues, objectives and methodologies than ESD. Examples of these include Global Citizenship Education [9, 10], Jobs for the Future [11], innovation and entrepreneurship [12], indigenizing and decolonizing the curriculum [13], Theory U [14], and social and emotional learning [15]. Second, this guide aims to respond and build on the incredible increase in engagement across the university sector with the SDGs, and this term reflects this unique situation and opportunity.

Based on ESD [7] and these other educational approaches, there are a number of distinct elements for what comes under ESDGs. These include:

- **Cross-cutting skills and 'key competencies'** that are relevant to the general education of all learners in addressing the SDGs, such as (but not limited to): systems thinking, critical thinking, self-awareness, reflection, integrated problem-solving, and anticipatory, normative, strategic and collaboration competencies; creativity; entrepreneurship; curiosity and learning skills; human-centered design thinking; social responsibility; partnership competencies; interdisciplinarity skills; critical-ethical analytical skills; influencing change; behavioral insights; cross-cultural skills; empathy; and communication.
- **A basic "cross-cutting" understanding of key sustainable development issues,** relevant to learners across all disciplines and professions. This includes understanding of the concept of sustainable development and related concepts, such as human rights, social justice, planetary boundaries, models of nature-society-economy interactions and dependencies, diversity, gender equality, sustainability, global citizenship, and inequality. It also includes understanding of the key global and local sustainable development challenges, such as climate change and inequality, and their causes, dynamics and interconnections [16].
- **An understanding of the SDG framework and how it can be used** to address long-standing and intractable sustainable development challenges, including what the SDGs and Agenda 2030 are, their purpose and importance, and their relationship with other global commitments; the universality and relevance of the SDGs to all countries; key SDG concepts such as "leave no one behind", inter-connectedness, synergies and trade-offs, and indivisibility; how the framework is currently being used at different scales and by different actors; and how the framework can be used as a tool to enhance positive impact on sustainable development.

- **Profession-specific knowledge and skills,** including understanding how the SDGs and global sustainable development challenges are relevant to a particular profession (or discipline or subject), and specific knowledge and skills that will help the learners advance the SDGs through this profession. Examples include management [17], engineering [18], public policy [19], academic research [20], health [21], teaching [22], information and communication technology [23], etc.
- **Mindsets and agency:** Learning the framework of the SDGs or sustainable development does not in itself guarantee changes towards the SDGs. ESDGs must also inspire and empower learners to want to create positive change on sustainable development and become agents of change.
- **Networks:** Addressing the SDGs and complex sustainable development challenges more generally will require extensive collaboration within and across sectors. This can be significantly facilitated through networks of peers and experts that students could draw on as they engage in the world. Universities can have a significant role in helping learners develop these networks, as they are large, diverse, multi-disciplinary, and highly-connected organizations.

While this is a large and diverse list, many of the cross-cutting skills and mindsets can be – and in fact need to be – addressed simultaneously through transformative learning approaches, which are described in Section 2.2.

2.2 Transformative learning approaches for ESDGs

Universities cannot approach ESDGs as they would do with any other subject or stream of study. This is because the SDGs cover a very broad range of topics, they are interconnected, their status in the real world is constantly evolving, they are at the frontiers of human knowledge, they are universal but need to be adapted to local contexts, they require a whole range of cross-cutting soft skills (Section 2.1), require cross-sectoral collaboration, and solutions vary across the world. Furthermore, the goal of ESDGs is to empower and motivate learners to become active actors in shaping a sustainable future [7].

To address these aspects of the SDGs, ESDGs activities need to employ a number of transformative learning approaches that are not currently standard practice within universities [24]. These are interdisciplinarity, action-based learning, and multi-actor involvement. This section briefly explains why these approaches are important in the ESDGs context and provides an overview of what they could look like in the context of a university.

Part of the reason why these approaches are not commonly used in universities is that they can be difficult to implement through the linear and often silo-based structures of most universities. Chapters 3 and 4 discuss approaches and strategies to overcome these difficulties.

2.2.1 Interdisciplinarity

Interdisciplinary approaches are crucial for teaching the SDGs for two main reasons:

- The SDGs cover a wide range of topics that span far beyond what is usually covered by a particular discipline or within the expertise of a particular lecturer. Therefore, providing even a basic overview of the SDGs framework requires utilizing expertise from other disciplines, which are typically housed in different departments and schools of study.
- The SDGs are interconnected, so that each of the goals can be influenced by the other goals both positively (synergies) and negatively (trade-offs). This implies that successfully addressing a particular goal requires understanding and simultaneously managing consequences for other goals [25]. The same principle extends to ESDGs. Crucial relationships cut across each of the goals and the underlying issues that govern them. This offers multiple opportunities for universities, such as bringing together different departments and schools in innovative arrangements that can better serve the educational needs and the search for solutions of future societies.

Therefore, ESDGs activities, even if they focus on just one area of the SDGs, should always attempt to meaningfully draw linkages across different fields of study to explore interconnections with other goals and get a holistic systems-view of the issues involved.

This could be done through, depending on the topic, guest lectures from other schools or external experts, joint projects or activities involving interdisciplinary teams from different faculties and programs, and other activities/courses that teach students systems thinking and how to think of interconnections in a practical manner.

2.2.2 Action-based learning

The complexity and multi-dimensionality of solving SDG-related challenges cannot be pursued through a lecture-based approach alone. Structuring ESDGs activities around real-world projects or solving real-life challenges – for example in students' lives, on campus, in the community, in local organizations, or in other contexts – can bring many benefits, including:

- Allowing students to see first-hand how solutions for the SDGs can be implemented, and the practical concerns that emerge when seeking to transform theory into action.
- Allowing students to delve deeply into real issues around the SDGs and undertake detailed research and analysis can enable students to deepen their analytical understanding of the SDGs.
- Creating opportunities for students to exercise not only technical or specialist knowledge, but also ESDGs cross-cutting skills and competencies.
- Helping students see the applicability of the SDGs to their lives and their future careers, and showing them how they can be part of the solution.
- Providing an opportunity for personal and professional development for faculty members and others involved in supporting teaching and learning.

- Enabling multidisciplinary collaboration within the university, new research opportunities for faculty members, as well as partnerships with new institutions.
- Helping make the learning current and topical.
- Producing practical ideas and initiatives to address sustainable development challenges on campus or in the wider community, that could be implemented by either the university or students.

These activities can be incorporated into a range of teaching and learning activities, including formal curriculum activities, extra-curricular activities, and student-led activities, and can take many forms, including:

- Providing partner organizations with research, advisory services, and practical advice to implement aspects of the SDGs through internships, action-based units, and practice-based graduate research programs
- Multi-stakeholder research and implementation projects, such as campus and community-based "living labs" [26, 27]
- Hackathons and entrepreneurship initiatives for students to devise and potentially implement solutions to these problems
- Study trips, model UN activities, and exchanges with universities in other countries

2.2.3 Multi-actor involvement

Engaging actors who are involved in addressing sustainable development challenges and implementing the SDGs in the "real world" has an important place in ESDGs activities. Such actors can provide deep insights on the challenges and strategies of putting knowledge learned in the classroom into complex real-world situations, provide inspiration for and testament to the relevance of ESDGs outside the university, bridge knowledge gaps in teaching resources, bring issues to life, and make the offerings more current and topical. Engaging these actors can also allow universities to increase their internal and external networks, reach and impact.

These actors can be leaders and experts from government, civil society, or the private sector; community members; or experts from other units within the university, such as those focusing on university sustainability, social inclusion, entrepreneurship, and industry relations.

They can be involved in a range of ways, such as:

- Providing expertise, advice or case studies on the development of learning materials; as guest teachers; or as interviewees in classroom settings, online resources, or student projects
- Providing project ideas, mentorship, feedback or judging student projects
- Providing internship opportunities
- As project partners or team members in living labs or other multi-stakeholder collaborative research/implementation projects

Case studies: Transformative learning

- Developing coursework and supplementary activities (University of Pennsylvania)
- Honey Bee Initiative (George Mason University)
- Introducing the Sustainability Bootcamp and the SDGs (Western Sydney University)
- Leveraging local knowledge through global practice (Harvard University)
- Making the makers and innovators for the SDGs (University of Geneva & Tsinghua University)
- Positive Energy Fund (Millersville University)
- SDG Impact Assessment Tool (Chalmers University of Technology)
- SDGs in practice: Innovation and social impact (Thiagarajar College of Engineering)
- Smart Campus Newton (Centro Universitário Newton Paiva)
- Sustainable solutions: Students localize the SDGs in Philadelphia (University of Pennsylvania)
- "Your move" - The gamification of the SDGs (Dublin City University)

2.3 Learners

The elements of ESDGs described in Section 2.1 have relevance to all people, because every person is affected to some extent by some or all of the challenges of the SDGs, and therefore every person – either as a professional or a citizen – can contribute to addressing them. In fact, SDG 4.7 calls for all learners to gain the knowledge and skills to promote sustainable development.

This section aims to map out the range of "learners" that universities can reach so as to help universities think broadly and creatively about how they can maximize their contributions to this area.

As complex and often large institutions with multiple functions and extensive links to the local, national and global community, universities have access to a wide range of potential "learners". These include:

- **"Traditional" students** enrolled in undergraduate, graduate or research degree programs, who are the most obvious, and most significant, group of learners for universities. Students also have an important role in helping implement ESDGs in the university.
- **University staff**, including faculty, professional staff and senior leadership. Understanding ESDGs is relevant for them as they all have an important role in implementing ESDGs in the university, as well as a role in promoting sustainable development more broadly in their personal and professional capacities.

- **Students and participants in non-degree programs** offered by the university, such as executive education or summer schools. These can be professionals from other sectors, including government, the private sector, and civil society. They can also be academics and students from other universities, including from developing countries, which are particularly highlighted in the SDGs.
- **Partners in collaborative university projects** from other sectors, such as government, the private sector, civil society and the community.
- **The community at large**, including the university's local community and other communities it is connected to through academic and university networks or industry partnerships.

Case studies: The community at large

- EduKid-CE: Inspiring young generations with circular economy (United Nations University & Cairo University)
- Enabling communities to use SDGs as a reference frame for local development (University of Applied Sciences St. Gallen)
- ODSesiones (University of Murcia)
- SDGs Ambassador Program (Universität Hamburg)

2.4 Avenues for implementing ESDGs

While the range of learners described in Section 2.3 is large, the range of avenues through which they can be reached is also large. Given the breadth and cross-cutting nature of the knowledge, skills and mindsets associated with ESDGs, elements of ESDGs can be a natural fit for and add value to most formal and informal learning and teaching activities in universities.

Table 1 summarizes the main avenues for reaching the different groups of learners described in the previous section.

There are two main options for implementing ESDGs through these avenues [28]:

1. To develop new subjects, programs or initiatives that focus specifically on the SDGs and the knowledge, skills, and mindsets needed to implement them. This option is useful for providing a broader or fundamental understanding of sustainable development across all the SDGs, and for interdisciplinary or cross-university settings.
2. To integrate relevant elements of ESDGs into the existing curriculum and other activities. This option helps reduce timetabling pressure, and is also useful for profession-specific contexts and to demonstrate and reinforce the relevance of the SDGs across most areas of study.

Table 1: Potential ESDGs learners for universities, and potential avenues for reaching them.

Learners	Avenues
"Traditional" students	• Through the curriculum, including lecture material, assignments, class activities, class projects, study trips, etc. • Foundation courses or Massive Open Online Courses (MOOCs) • Co-curricular and student engagement activities • Clubs and societies and student-led activities • Welcome and orientation activities • Volunteering programs • Living lab initiatives on or off campus • Graduate research student training • Scholarships, internships, and exchange programs • Hackathons and entrepreneurship initiatives • University website and student-oriented communications • Unit/course/program handbook/catalogue • Learning & teaching support services, such as libraries • Signage on campus facilities
University staff	• New staff orientation • Professional development • Sustainability programs for staff • University website and staff-oriented communications • Signage on campus facilities • Staff engagement activities on the SDGs
Students and participants in non-degree programs	• Executive education, professional development, adult education • Vocational training • Adult education • Language proficiency courses • Bridging courses • Summer schools • MOOCs
The community at large	• Public events and community outreach and engagement activities • Performances and exhibitions • High-school extension programs • Living labs initiatives outside campus • Seminars, conferences • MOOCs

2.5 Considerations for implementing and mainstreaming ESDGs at universities

Sections 2.1 to 2.4 identified a range of elements – knowledge, skills and mindsets – that are included in ESDGs, and a wide range of potential learners and avenues through which they can be conveyed. While universities should aim to mainstream ESDGs, there is no one avenue that would fulfil this task on its own, so universities will need to look to implement a combination of approaches. The aim of this following section is to identify some of the common and effective approaches for implementing ESDGs (or aspects of it), and provide universities with a general framework to strategically assess and identify the combination that is most suitable for their own context.

2.5.1 Common approaches to implementing ESDGs

Universities have been experimenting with a wide range of approaches to implement ESDGs. Below are examples of some of the most common approaches, but this is not an exhaustive list. While they aim mostly at "traditional" students, many of them can be used to engage with other types of learners.

- **Awareness raising:** Awareness raising activities, such as social media campaigns, signage, articles in staff or student publications, public events, and so on, can be a relatively simple way to provide staff and students with basic information on the SDGs, and help reinforce a university's commitment to the SDGs.
- **Interdisciplinary introductory units:** At a more detailed level, cross-university interdisciplinary short courses or units can provide a broad overview of sustainable development and SDGs in an interdisciplinary setting to any student (or staff) at the university. These can range from short informal and voluntary courses, for example as part of student or staff welcome activities, to semester-long for-credit units. The courses can be online [29], blended, in person or through an interactive website. To support the mainstreaming of ESDGs, courses should be compulsory to all incoming students, or something they are highly-encouraged to take – such as a core optional unit, or a prerequisite for students or staff seeking to apply for leadership programs and so on.
- **Discipline-specific units and programs focused on the SDGs:** Special units, or event whole degree programs, can focus on how students can advance the SDGs through their chosen discipline or profession. They can include introductory or core units, electives, project-based units, program streams, and whole degrees programs.
- **Integration into the existing discipline curriculum:** Core ESDGs concepts, principles and examples can be integrated into the curriculum across the most appropriate disciplines and units. Including ESDGs does not necessarily mean adding more topics to the course syllabus, rather ESDGs can be integrated by orienting elements of the curriculum to the SDGs - for example, by using cases and applied problems that relate to the SDGs, class assignments that encourage reflection on the SDGs, and so on. ESDGs fundamentals, as relevant to a discipline, can also be included into core foundation units for that discipline. To support this integration process, ESDGs concepts should be incorporated into graduate attributes and learning outcomes.

- **SDG-focused project-based units:** This involves embedding sustainability and SDGs into general project units, capstone projects, or work placements. Throughout the process, students must embed sustainability criteria or references to some specific SDGs, and reflect on the project purpose, impact and affected stakeholders. They must also consciously minimize the negative consequences and effects of their projects and encourage positive ones.
- **SDG-focused co-curricular activities:** Co-curricular activities, such as entrepreneurship challenges, campus improvement projects, living labs, and the like, are particularly important for providing students with opportunities to develop the skills and mindsets of ESDGs, because they allow a degree of design innovation that can be difficult to implement in the formal curriculum.
- **SDG-focused leadership programs:** Such co-curricular programs focus on developing students' change-agent and leadership skills for sustainable development, within a disciplinary setting or for a cohort from across the university.
- **Student-led activities:** Students across the world, through programs like SDSN Youths' SDG Student Program or through their own initiative, have been initiating, designing, and leading activities to engage their fellow students (and university staff) with the SDGs. As activities by students for students – which often capture and harness students' entrepreneurial behavior, creativity, idealism, passion, and desire to make a difference – such activities can be particularly engaging for students. Universities can support and encourage these activities, for example by providing guidance, mentorship, subject expertise, training, funding, space for events, access to potential partners, and so on [30, 31].
- **MOOCs and other online content:** Universities can use MOOCs and other web-based content to reach many learners, including beyond the university. Conversely, universities can use online content developed by others (such as the SDG Academy) to fill gaps in ESDGs for which there is no in-house expertise, provided the content is used imaginatively and carefully, and backed by resources for faculty members to respond to student needs.
- **Sustainable development degrees:** Undergraduate, Masters and Doctoral degrees focused on developing expertise in sustainable development and across all the SDGs aim to develop experts in solving sustainable development challenges, in bringing different stakeholders together to solve these problems, and in influencing organizational and societal change.

Case studies: Common approaches

Awareness raising

- Communication campaign on the SDGs: "Set your SDGoals! YOU are part of the chain towards sustainability!" (Universitat Politècnica de València)
- SDGs at the Theater (University of Brescia)

Co-curricular programs

- Leave No One Behind (Monash University)
- Positive Action: Incorporating SDGs in social service community projects (Tecmilenio)
- SDGs Mobility and Global Citizenship Awareness Program (Universidad Autónoma de Madrid)
- Sustainability Challenge (University of Economics and Business, Vienna)

Disciplinary curriculum

- Calling future educators to action through the SDGs (Arizona State University)
- Connect the dots! Bring SDGs into the classroom through active learning and industry participation (Monash University Malaysia)
- Embedding SDGs content in existing courses (Monash University Malaysia)
- National SDGs: Budgets, audit and accountability (Universidad Pública de Navarra)
- Re-imagining the purpose of business: Embedding SDG 1: No Poverty (The University of Sydney)
- SDG Explorer - A new course on sustainability using SDGs as a guide (Business School Lausanne)
- The right to health in the global world (Universidad de Cantabria)

Interdisciplinary curriculum

- Embracing interdisciplinarity: The SDGs as a route to cross-disciplinary dialogue in the classroom (University of Bristol)
- Integration of the SDGs in a cross-faculty interdisciplinary Masters course (Monash University)
- Interdisciplinary learning for intersectional goals (James Cook University)
- SDG Index as a tool to learn about sustainable development (Tyumen State University)
- Seminar: Sustainability at the university - actions for the 17 SDGs (University of Applied Sciences Düsseldorf)
- Sustainability: Criteria and decision-making course (King Juan Carlos University)
- Sustainable Sainji: Experiencing the SDGs first-hand (Anglia Ruskin University)
- Sustainable solutions to Los Angeles' wicked problems: Using human rights to implement the SDGs in LA (University of Southern California)
- Value Creators, transformative learning and transdisciplinary approach to SDGs (Windesheim Honours College)

Online content

- Adapting SDG Academy Course to the Institutional Learning Curriculum (Kepler)
- Democratizing knowledge - MITx MicroMasters programs (Massachusetts Institute of Technology)
- Whakawhitinga Kōrero: Interdisciplinary education on the SDGs through place-based video production (Victoria University of Wellington)

2.5.2 Framework for assessing ESDGs implementation options

The potential avenues identified in Section 2.4 are not all equal in terms of their suitability and effectiveness for ESDGs. Table 2 identifies some principles to help universities compare and prioritize different options.

Table 2: Principles for helping universities compare and prioritize different options for implementing ESDGs.

Priority	For the groups of learners identified in Section 2.3, universities should prioritize the comprehensive implementation of ESDGs for the groups they have the greatest access and educational responsibility for. These, in order, are the "traditional" students, university staff, students and participants in non-degree programs, partners in collaborative projects, and the community. Universities should still aim to reach these other groups, when opportunities arise.
Suitability	Different pedagogical methods and avenues may be more suitable for implementing some of the elements of ESDGs (Section 2.1) than others. In particular, it might be useful to distinguish between: • General knowledge, which covers a basic "cross-cutting" understanding of key sustainable development issues and the SDGs. This type of "sustainability literacy" can be incorporated in a wide range of cross-university or specialized avenues, from campus signage to lectures and co-curricular activities. • Profession-specific knowledge, which is most suited to discipline-specific contexts (whether through formal teaching, co-curricular or student-led activities). • Transformative learning approaches (Section 2.2), which are needed to help learners develop cross-cutting ESDGs skills, competencies, mindsets and networks. As discussed in Section 2.2, these are best delivered through hands-on interdisciplinary, multi-actor project-based activities – such as course-related projects, co-curricular activities, placements, living labs, etc. – rather than as classroom lecture material.
Depth	The avenues described in Section 2.4 are not equal in terms of the level of knowledge, skills and mindsets that they can help learners develop – for example between a campus awareness campaign and a degree specializing in sustainable development. Low-depth activities can still be useful, as they are often less intensive to implement, can reach more students, and can help reinforce the importance the university places on sustainable development and the SDGs. However, on their own they are not sufficient to develop "SDG implementers". Very high-depth activities, such as sustainable development degrees, can help develop specialists who can facilitate others to focus on sustainable development. However, by their nature, these activities are only suitable for a relatively small number of students.
Reach	The avenues are also not equal in terms of how many learners they can potentially reach. Reach is often inversely proportional to depth, particularly for transformational learning activities, a challenge for mainstreaming this aspect of ESDGs.

Table 3 provides an indicative assessment of how the common approaches to ESDGs discussed earlier in Section 2.5 perform against each of these principles.

This assessment highlights some key points, with important implications for how ESDGs could be mainstreamed at universities:

- There is no single approach that reaches all the learners and provides all the elements of ESDGs to them. Each approach has different strengths and weaknesses. Therefore, universities will need to implement a combination of approaches.
- The approach that covers most (but not all) bases in terms of reach and elements of ESDGs is the integration of ESDGs into the existing disciplinary curriculum across all relevant disciplines.
- Transformative learning approaches have the strongest relationship between reach and depth, in that these activities work better with a limited number of students. Therefore, to increase the number of learners who can participate in these programs, universities should either help increase the number of these programs that are offered at the university, or develop innovative programs that can deliver the same results at scale.

Ultimately, the best way to approach mainstreaming ESDGs is through a university-wide strategic approach, which is the subject of the next chapter.

Table 3: An indicative assessment of potential reach and depth of different types of common approaches to implementing ESDGs at universities. Lots of caveats, because it all depends on how they are designed and delivered…

Approach	Potential reach (in one "instance" of the approach)	Potential depth		
		General knowledge	Profession-specific knowledge	Transformative learning
Awareness raising	High	Medium	Low	Low
Interdisciplinary introductory units	Low/Medium (unless compulsory)	High	Low	Medium/High
Integration into the existing discipline curriculum	High	High	High	Low
SDG-focused project-based units	Low	Medium	High	Medium
SDG-focused co-curricular activities	Low	Medium	Low/Medium	High
Student-led activities	Low/Medium	Medium	Low	High
MOOCs	Very high	High	High	Low
SDG-focused leadership programs	Low	High	Low/Medium	Very high
Sustainable development degrees	Low	Very high	High	Very high

3. EXPANDING AND DEEPENING IMPLEMENTATION OF ESDGS IN UNIVERSITIES

There are many ways in which universities can implement ESDGs, as shown in Chapter 2, and many universities or areas within universities already do some of these things for some of their learners. However, as outlined in Chapter 1, for society to successfully address the SDGs, there is a significant need, and opportunity, for universities to maximize the breadth and depth of their ESDGs offerings across as many learners as they can within their sphere of influence.

This is not an easy task. Expanding ESDGs requires universities to add new activities or modify their existing activities at a university-wide scale. While there are many approaches for doing this, as outlined in Chapter 2, there is no single approach that reaches all the learners and provides all the elements of ESDGs to them, and therefore each university will need to identify the combination of approaches and the pathway that best suits its own context. Furthermore, incorporating some of the key ingredients that are needed – namely action-oriented learning, interdisciplinarity, and multi-actor collaboration – can be challenging, because they represent a significant shift from how the teaching and learning domain is currently organized and delivered.

This chapter aims to help universities expand and deepen their implementation of ESDGs by suggesting a strategic step-by-step process they could follow (Section 3.1), based on the five steps identified in *Getting Started with the SDGs in Universities* [1]. In addition, it identifies some of the common barriers and challenges universities are likely to come across, and some potential solutions (Section 3.2); and outlines how different stakeholders, both within and outside the university, can support the process (Section 3.3).

The five-step process suggested in this chapter builds on the traditional ways universities currently operate. However, there is a growing discussion that this approach will not get us as far as we need to go or as quickly as we need to get there. Instead, what is needed is a transformation in how universities operate [14]. Chapter 4 discusses what this transformation could look like, why it is needed, and suggests a pathway for reaching it that can happen (and needs to happen) in parallel with the more traditional approach described in this chapter.

3.1 Steps for implementing ESDGs

Getting Started with the SDGs in Universities [1] identified three levels for university engagement with the SDGs – recognition, opportunistic alignment and organizing principle. Adapted to the context of ESDGs, these are:

- **Recognition:** Identifying and acknowledging what the university is already doing in the ESDGs space.
- **Opportunistic alignment:** Different areas across the university recognize the usefulness and importance of ESDGs and find opportunities to implement aspects of it within discrete activities and programs, without an overall university strategy.
- **Organizing principle:** The university as a whole makes a commitment to making ESDGs part of 'business-as-usual' for the university, and integrates this commitment into all relevant university governance structures and frameworks, undertakes a strategic process to identify how to maximize its contribution to ESDGs, and provide sufficient resources and support to operationalize this strategy.

With these levels in mind, *Getting Started* suggested the five-step process for deepening engagement with the SDGs, which is depicted in Figure 4. These five steps can also be applied specifically to the implementation of ESDGs, as described below.

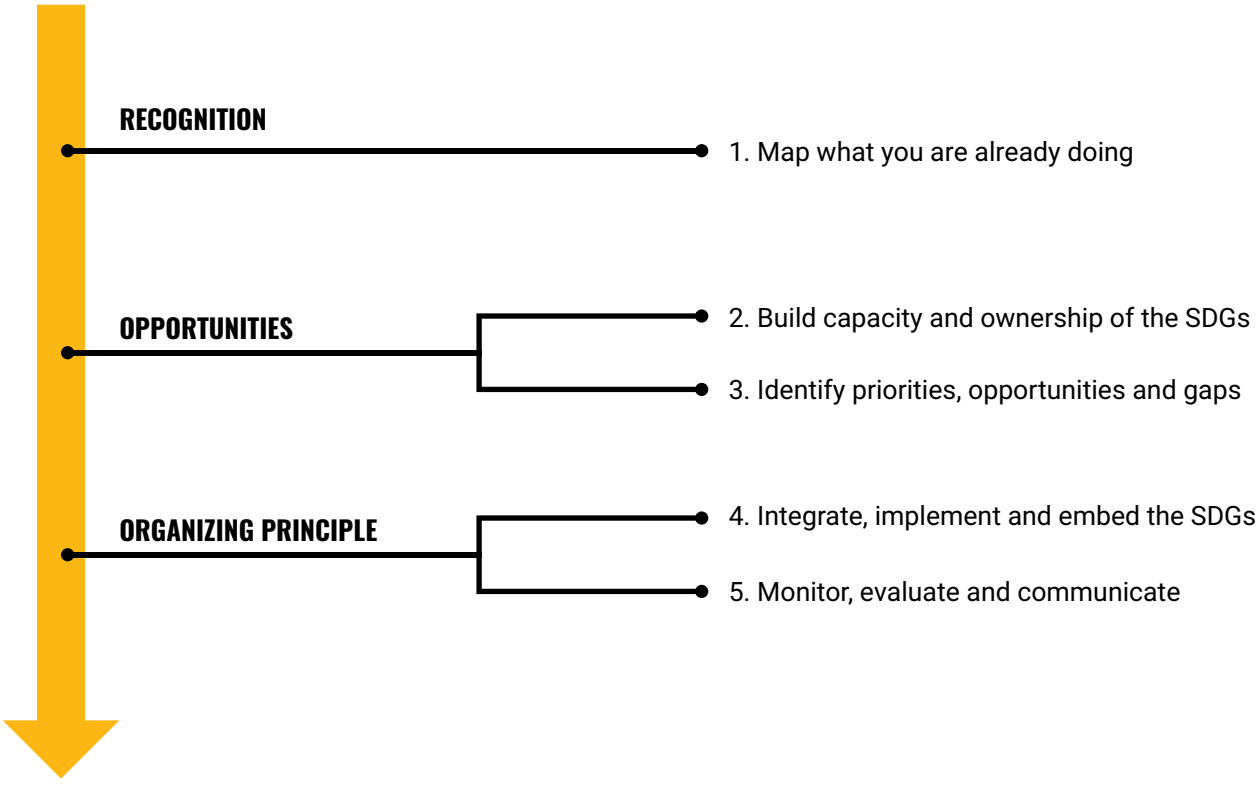


Figure 4: Overview of the step-by-step process to deepen and expand implementation of ESDGs (Adapted from [1]).

Step 1: Map what you are already doing

Identifying what the university is already doing on ESDGs is very important, as this will help the university understand its starting point in the ESDGs process, identify gaps that need to be filled, assess potential pathways for moving forward, and identify resources and expertise that can support the process. An understanding of what is already being done and how different initiatives complement each other will also help to efficiently build on what is already in place and increase impact.

For example, universities can undertake an ESDGs audit to identify:

- What is already being done: Who is working on it (units, professors, departments, research groups, educational innovation groups, student groups, etc.), and results (skills, contents, key competencies, learning objectives, graduate attributes, etc.).
- What elements of ESDGs (General knowledge, Profession-specific knowledge, Transformative learning) are already being undertaken within formal and informal learning and teaching activities, and who/how many learners they already reach (Section 2.5).
- Key resources and experts on specific SDGs, on ESD/ESDGs, on transformative learning approaches, etc. that already exist in the university and can be drawn on.
- SDG champions and allies among students, staff, clubs and societies. Liaise with them to see how to amplify the impact of their work.
- The level of sustainability literacy (e.g., with Sulitest [16]) and awareness (e.g., with surveys [32-34]) among students and staff as a baseline and to track progress on implementing ESDGs.

The audit will provide input into the next steps of the process.

Step 2: Build capacity and ownership for ESDGs

Successfully expanding and deepening ESDGs in a university requires support, collaboration and involvement from a wide range of internal and external university stakeholders (see Section 3.3.). These include obvious groups, such university and faculty/school leaders, who are needed to provide high-level institutional support and mandate on ESDGs; and teaching and curriculum development staff across most faculties/schools, who will need to identify opportunities for implementing ESDGs in the curriculum and put it into practice. But it also includes other stakeholders, such as students and student engagement areas of the university, who can help in developing, delivering, and championing ESDGs.

Building ownership for a complex agenda such as ESDGs can be challenging, often because awareness and/or capacity to take action are low. Section 3.2 discusses these personal barriers to action, and identifies a number of potential ways to overcome them.

Step 3: Identify priorities, opportunities and gaps

The mapping done in Step 1 can be the basis for each university to identify the main gaps between its current situation and what it wishes to aim for (for example, in terms of offering comprehensive ESDGs or related to the way the organization performs according to organizational frameworks such as the one presented in Laloux [35]). Involving a range of university stakeholders in this discussion can be a useful way to build capacity and ownership, as well as develop a more robust outcome.

Pointing out the gap between what is mapped and what should be done according to the SDGs. The gap could be related either to contents and skills that are relevant for ESDGs or the organizational aspects of the university to promote SDG implementation.

Step 4: Integrate, implement and embed the SDGs

Once a university knows its starting point and where it wants to get to with ESDGs, the next step is to establish a roadmap to improve the organization (including priorities, strategies and sequencing) and implement it using tools for change (such as ideating, testing/piloting, and upscaling).

There are many pathways universities can take to implement ESDGs, depending on university characteristics, starting point, strengths, weaknesses, and priorities. A clear roadmap that can be adapted to institutional needs or traditional activities may be a good way to spread awareness of the SDGs and encourage working towards them in a multi-actor manner.

Below are examples of activities that universities could consider when developing their roadmap towards implementation of ESDGs. Each institution will decide which are more relevant for them, their priorities, and the way to effectively implement them.

- **Addressing barriers and challenges:** As described in Chapter 2, expanding and deepening ESDGs in universities requires them to do new things in new ways – that often don't fit well within the way universities function – and to do this at scale. Therefore, universities are likely to come up against a range of personal, organizational and external barriers and challenges that will hinder implementation of their ESDGs roadmap. Some of these barriers will be easy to anticipate, others will become apparent while implementing the roadmap. In both cases, the institution needs to be ready to acknowledge them and adapt. Sometimes, this may require additional funds or innovation resources, a change in internal procedures, review of incentives for individuals to become actors of change or even awareness-raising initiatives to increase understanding and acceptance towards ESDGs. Section 3.2 describes some of the most common barriers and challenges to implementing ESDGs at universities, and provides some potential approaches to addressing them.
- **Whole of institution approaches:** A university can use the SDGs to define a holistic vision of the institution, permeating all operations, including research, operations and leadership. Moreover, the SDGs can be an institutional commitment reflected in campus governance. In this sense, the creation of specific structures provides a greater visibility to institutional efforts and facilitates the attraction of resources.

- **University commitment:** Making a public commitment or pledge to the SDGs at the highest institutional levels can help set the stage and provide an impetus for more comprehensive strategic processes and support across the organization. It is also a way to show internal and external stakeholders the importance of the sector in working towards addressing the SDGs. There is no official way for universities to "sign up" to the SDGs. Universities can choose to develop their own or sign one of a range of informal commitments that have been initiated over the past few years (see Annex C.6).
- **Iconic strategic measures:** Deploying iconic strategic measures can raise the profile of ESDGs within the university, and help attract new allies and champions.

Step 5: Monitor, evaluate and communicate

Reporting on progress in implementing the ESDGs-related actions identified in Chapter 2 and previous sections of this chapter is an important part of tracking progress and supporting accountability in implementation, evaluating the effectiveness of the measures implemented, as well offering an opportunity to demonstrate and showcase the impact of the university and its wider role in society.

There is no globally agreed standard for how universities should measure and report on their progress in implementing SDG 4.7 and ESDGs more generally. This is because ESDGs has a wide range of different interpretations, as discussed in Section 2.1, and many aspects of it can be difficult to measure – or at least measure at the scale.

Over the last couple of years, a number of SDG-aligned reporting frameworks, many created specifically for the higher education sector, have attempted to develop useful measures for progress in ESDGs. A list of those can be found in Annex C.5. The ESDGs-related measures in these frameworks use different methodologies and measure different aspects of ESDGs. They each have different strengths and disadvantages. Most attempt to measure the extent that ESDGs is being implemented, rather than the learning outcomes. Universities might find it useful to review the different frameworks to find or adapt an approach that suits their context and their strategy for ESDGs implementation.

Case studies: Enabling ESDG implementation

- Case studies to integrate and promote global issues in STEM education (Universitat Politècnica de Catalunya)
- Education for sustainability: Initiatives from the Network of Universities for Sustainable Development (RUS) (Politecnico di Torino / RUS)
- Improving university governance by accelerating progress towards the SDGs (Politecnico di Torino)
- Infusing Education for Sustainable Development into curricula: Efforts of the School of Education (The University of the West Indies)
- Introducing the SDG on the educators training plan: Short course on how to introduce SDGs in lectures (Universidad de Cantabria)
- One SDG at month, Sustainability Antennas project (Universidad Politécnica de Madrid)
- SDG Lab Campus UAM (Universidad Autónoma de Madrid)
- The formation of the university community as a first step for the contribution to the SDGs (Universitat Politècnica de València)
- University-wide SDGs Project (RMIT University)

3.2 Common barriers and challenges, and potential solutions

This section identifies some of the common barriers and challenges that universities may face trying to implement the ideas presented in this guide. Identifying these is important in order to find ways to address them and eventually make necessary structural changes to transition into an environment where the SDGs can become the principal framework of action.

Most of these barriers and challenges arise because sustainable development and the SDGs are a complex agenda that is not broadly familiar or understood, even within universities, and that ESDGs requires universities and individuals to do new things in new ways.

We find it useful to classify these barriers and challenges according to three main types: personal, organizational and external. According to these categories, we discuss some common barriers and challenges below. For each, we also suggest some potential solutions or ways of addressing them – noting that these are often very context dependent.

3.2.1 Personal barriers

As discussed in Section 3.1 (Step 2), expanding and deepening ESDGs at the university requires the support and cooperation of a wide range of individuals, including institutional leadership, learning and teaching staff, and students. However, for a variety of reasons, these stakeholders may not be interested or able to provide this support and cooperation. These lead to two main personal barriers, which are closely linked:

- **Mindsets**, including resistance to change, and not seeing the benefit or relevance of ESDGs to themselves.
- **Capacity,** including lack of time and funding for new endeavors; lack of knowledge on what sustainable development is; lack of knowledge on what ESDGs consists of and how to implement it; misunderstanding of the relevance of sustainable development or the SDGs; lack of access to appropriate resources; lack of skills or access to innovative teaching methods; and lack of access to appropriate partners.

Here are some possible approaches universities can take to address these barriers:

- **Articulate/showcase the benefits of implementing ESDGs**, for example by:
  - Presenting ESDGs as an opportunity to advance the goals of the institution or school (e.g., through the benefits identified in Section 1.2), or the goals of individuals (e.g., developing important new skills and professional development, increasing personal impact and satisfaction).
  - Showcasing existing ESDGs activities and their outcomes within the university (e.g., in forums, award submissions, communications).
  - Enlisting staff and student champions.
- **Provide resources and support for personal development around ESDGs**, such as:
  - Provide access to training courses on what sustainable development is and how to develop and run ESDGs activities.
  - Introduce new ways to train and support staff and student leaders around how to design ESDGs-related activities that are active, collaborative and personally engaging, such as mentoring; interdisciplinary groups that work together to design activities; participation in SDG-related projects, where they can share their knowledge and experience; and peer networks or communities of practice to share experiences (within the university or with other universities).
  - Share or develop ESDGs teaching resources, including teaching materials and case studies, that can be accessed by staff and students across the university.
  - Allocate funding and time for staff (and students) to integrate or develop new ESDGs-related activities.
  - Reassure Faculty members that their role when teaching competences in SD is being a guide throughout the learning process – as opposed to being required to convey very specialized knowledge.

- **Provide incentives for staff and students to engage in ESDGs**, such as:
  - Recognition for participating in ESDGs activities, including formally (e.g., in promotion consideration, or awarding of degrees) or informally (such as awards or badges)
  - Access to funding, leadership development opportunities, and other benefits

3.2.2 Organizational barriers

Institutional structures, policies, and processes, and lack of leadership, capacity and resources, can limit or slow down universities' ability to introduce new ESDGs activities across the university. This is particularly the case because of the breadth and interdisciplinary nature of the material, and the need to implement transformative learning activities that require interdisciplinary settings and multi-actor partnerships. Some of the main organizational barriers and challenges include:

- **Barriers to institutional change**, such as rigidity in processes (such as curriculum development, timetabling, hiring), slowness in adaptation processes, lack of consistency between levels (faculty members, decision makers, administrators), outdated hierarchical structure, lack of innovative vision, misaligned incentives, cultural norms, and lack of leadership (top-down and bottom-up).
- Silos that hinder collaboration across disciplines or university areas (learning & teaching, research and operations, student clubs & societies).
- Lack of institutional capacities and resources to implement ESDGs, including financial resources, human resources, technical capacities, and knowledge and expertise across all areas of the SDGs.

Universities can address these barriers and challenges in a number of ways, such as those below. However, some of these barriers can be very difficult, or very slow, to overcome within the traditional structure of universities, and require a more transformational approach (Chapter 4).

- **Set up institutional mechanisms to ensure/encourage the success of a strategic process for ESDGs**, such as:
  - Ensure there is a high-level commitment by the university to undertake this work, and that this is reflected in key strategic and planning documents.
  - Allocate sufficient funding and human resources for carrying out the process and for implementing its recommendations.
  - Establish a cross-university working group to steer the process, with representation from all key areas and stakeholders within the university.
  - Track and report on progress in implementing ESDGs to ensure accountability.
- **Support cross-university, interdisciplinary collaboration on ESDGs**, for example:
  - Develop standard equitable structures for resource sharing (of both expenses and income), timetabling, credit allocation, and assessment for ESDGs activities that involve multiple faculties or schools.

- Create spaces, opportunities and incentives for interdisciplinary and cross-university engagement, such as campus-based living laboratory initiatives, both with the specific purpose of developing ESDGs activities and with the aim of creating a general culture and relationships that will lead to future collaborations.
- Draw on expertise and coordination capacity of interdisciplinary sustainable development innovation, research and education centers or institutes, as they have expertise in both sustainability and interdisciplinary work and studies.
- Promote interdisciplinary ESDGs working groups as part of the University's or School's overarching strategies (sustainability, educational innovation, action research, etc.)

- **Identify and draw on expertise from across the university and from outside the university**, such as:
  - Map expertise available within the university by SDG, and make that available to curriculum designers.
  - Invite guest lecturers from other faculties, universities or organizations.
  - Partner with other universities to create joint degrees or joint resources.
  - Draw on online resources such as MOOCs or other web-based content to supplement existing gaps.
  - Sign the university up to national and international networks that support the implementation of ESDGs in universities, such as SDSN and Principles for Responsible Management Education (UN PRME).
- **Set up institutional mechanisms to help develop and maintain multi-actor partnerships for ESDGs**, such as:
  - Provide financial support (e.g., to finance dedicated positions), technical support (such as partnership agreement templates and access to partnership brokers) and professional development support (for developing partnership and cross-sector collaboration skills) to develop new partnerships and look after existing partnerships for ESDGs activities.
  - Help those designing ESDGs activities to access existing university partnerships and connections, such as those developed through industry partnerships offices, workplace-integrated learning units, sustainability institutes, flagship collaborative research initiatives, and sustainable development-related networks of which the university is a member.

3.2.3 External barriers

Universities operate within a complex external context that may not be aligned with the required changes needed to deepen or expand ESDGs, and thus hinders or discourages universities from taking action. This includes:

- **Institutional environment:** The multi-layered set of rules and requirements to which universities must conform in order to receive legitimacy, resources and support can fail to encourage, or actively discourage, universities from implementing ESDGs. This environment involves a diversity of official and non-official mechanisms and actors, such specific legislation; funding and contracting schemes; official quality assurance frameworks which require the evaluation or accreditation of programs and institutions by external bodies; other non-official accreditation or labelling bodies such as professional accreditation bodies or thematic accreditations awarded by international standards organizations; and national and international sectorial rankings. Universities are also influenced by the institutional environment of other levels of education, such as primary and secondary education, which determines the base level of ESDGs that students come into the university with.
- **Social, cultural, political and economic contexts** can influence what agenda universities feel they are able to pursue and invest in. While the SDGs have been adopted by all 193 UN member nations, priorities and support for different aspects of the agenda can vary locally or among different groups. Market forces and the economic situation can also significantly affect what universities can do.
- **Knowledge (or lack of knowledge) context:** The SDGs are new, so are still lacking standard methodologies and conceptualizations for teaching them. Much of what happens now around ESDGs is experimental, may not be evaluated rigorously, and the learnings are not shared widely.

While the external context can be difficult for universities to change, here are some potential actions they can take:

- **Advocate for changes in the institutional environment to support ESDGs**, for example:
  - Work with policy makers, quality assurance agencies, accreditation bodies, mass media and other regulatory and opinion bodies to make the case for change and to design alternative policies, regulations, standards, and so on that create an SDG-friendly institutional context.
  - Exercise the university's role as an involved stakeholder in policy discussions, individually or through sector-related associations and peak bodies.
  - Advocate for greater inclusion of core ESDGs concepts in primary and secondary education, to ensure that students are coming in with a higher level of understanding.

- **Evaluate and learn from ESDGs-related efforts within and outside the university**, for example by:
  - Develop suitable measures and tools to help educators assess the quality and impact of ESDGs activities, and ensure they have sufficient time to undertake monitoring and evaluation.
  - Establish mechanisms to share learnings within and outside the university, such as forums, communities of practice, case studies, publications, conferences, and so on.
  - Encourage academic research on ESDGs and the university's experiences with implementing it.
  - Enlist ESD/ESDGs educators to help keep track of, and share key lessons from, the growing academic and case study literature on ESDGs.

3.3 Stakeholders

While we often refer to "the university" in the previous sections as the main agent in implementing ESDGs, universities are made up of many different stakeholders. Each of these stakeholders can contribute in different ways, and the engagement of all of them is crucial to ensure that ESDGs is implemented at the scale and pace needed to spread the SDGs across the society.

This section, in Table 4, identifies some of the key groups of stakeholders and what they can do to contribute to accelerating ESDGs in universities. It aims to highlight a number of key points:

- Pretty much anyone within the university (and many external stakeholders) can contribute to implementing ESDGs in the university in one way or another.
- Many stakeholders can take actions to implement ESDGs within their sphere of influence, without waiting for a university-wide mandate.
- Stakeholder groups without direct control of decision making at the university or faculty/school level can still have a significant influence by championing and pressuring the university to act.
- The potential impact from stakeholders goes far beyond the university walls.

Table 4: How different university stakeholders can contribute to accelerating education for the SDGs in universities.

Stakeholders	How they can contribute to accelerating ESDGs in universities
University leadership	• Make a university-level commitment to delivering ESDGs to all learners within the university • Mandate and resource a strategic process to develop a university-wide approach to ESDGs and to implement it • Recognize and promote what the university is already doing in the ESDGs space, including acknowledging staff and student SDG champions • Create incentives for all stakeholders to act • Measure how the university is progressing on delivering ESDGs
Learning & teaching leadership and support services for the university as a whole and at the faculty/ school level	• Provide training, resources and incentives to support teaching staff to implement ESDGs • Include SDG skills as required competences for graduation • Break down silos between departments, fostering and incentivizing multi-disciplinary collaboration
Teaching staff, including lecturers, unit/program coordinators, curriculum developers, and so on	• Include SDG areas, concepts, cases, and skills in syllabi • Use active learning methodologies (like Project Based Learning) • Incorporate external professionals to courses (as guest lecturers, mentors, training hosts, etc.) • Connect and reinforce research to solve global challenges with teaching • Incorporate interdisciplinary challenges to courses
ESD experts	• Support/mentor others in the university to understand sustainable development and the latest pedagogical thinking on how to integrate it into learning and teaching activities • Help facilitate/support faculties/schools to a strategic approach to integrating ESDGs • Help monitor and evaluate the success of ESDGs-related activities in the university, and draw and share the learnings from them
Cross-university sustainability/sustainable development centers	• Help build internal capacity and support in the university on the SDGs and the need for the SDGs • Help the university run strategic planning to expand ESDGs • Provide coordination (and if needed, hosting) to interdisciplinary and cross-university ESDGs activities • Provide opportunities for students to get involved in real-world, multi-actor interdisciplinary projects run by the center • Help other areas of the university access external stakeholders and partners to strengthen ESDGs activities • Showcase alternative governance systems • Prototype, experiment with different processes, methodologies and projects to massively implement the SDGs in close collaboration with local stakeholders (locally rooted, but globally connected)

Student support services, university operations, student engagement units	• Map co-curricular, student-led, and other university activities relating to ESDGs that are available to students, and make this information readily available to students • Integrate elements of ESDGs into existing co-curricular initiatives, and develop new activities that help students develop ESDGs knowledge, skills and mindsets • Develop an SDG-related experience roadmap for every student during his/her stay in campus
Students	• Make access to ESDGs a criterion in how you select where to study • Advocate to your university or faculty/school leadership, course coordinators and lecturers to incorporate ESDGs • Take every opportunity to join co-curricular activities that provide you with elements of ESDGs • Integrate and promote ESDGs into the activities of existing clubs and societies • Organize activities to educate your fellow students on the SDGs
Governments and policy makers	• Promote the use of campuses as living labs, test beds and sandboxes for public policies • Create appropriate incentives to foster transdisciplinary research and teaching attached to the SDG challenges • Encourage collaboration between universities • Develop spaces for radical collaborations between universities, multi-scale governments, private companies and civil society
University networks and associations	• Provide opportunities for mutual sharing and learning about the practicalities of implementing ESDGs among universities by organizing symposia, webinars, case study collections, guidance documents, communities of practice, etc. • Showcase the role of universities in delivering ESDGs to governments, multilateral agencies and other external stakeholders, and advocate for greater support for universities to be able to deliver on this role • Develop shared resources that could be used by any university
Professional associations, educational quality assurance organizations, and university reporting schemes	• Incorporate ESDGs-related criteria into graduate attributes and standards • Incorporate meaningful ESDGs-related measures into assessment, reporting and ranking schemes • Advocate to universities the importance of implementing ESDGs, and help universities integrate these into their curricula
Industry, government and civil society partners	• Collaborate in research and teaching • Create/expand opportunities for students to undertake projects or work placements with your organization • Work with universities to develop doctorates focused on advancing the implementation of the SDGs in your organization
Donors	• Link donations to impact on SDGs and keep universities accountable for that • Demand SDG-oriented investments for endowments

4. TOWARDS UNIVERSITY TRANSFORMATIONS FOR ESDGS

In the previous chapters we have shown how universities can start integrating elements of ESDGs into traditional organizational structures and processes (incremental approach). Many universities are already taking this approach, as shown by the case studies in Chapter 2. This approach is widely used, because it is relatively easy to get started. In this sense, Chapter 3 provides a classical change theory process for how universities can get started on this approach.

However, the scale of the change that needs to take place is enormous. The SDGs require deep and radical transformations in each country and a Copernican turn in the way we approach every one of our activities. Even more, incremental approaches are not enough to tackle the urgent and complex challenges associated with the SDGs and real transformation of universities. Classical approaches will not be fast or deep enough. In that sense, Waddell [36] considers that the systemic transformational changes needed will require new ways of working beyond simple incrementalism. Such systemic transformational changes are also needed in how universities operate [14]. For this reason, we are devoting this last chapter to showing what this transformation could look like.

As discussed throughout this guide, universities and higher education institutions can play a critical role in developing new systemic and transformative solutions through multi-stakeholder collaboration. They could offer "new platforms and new capacities that upgrade our mental and social operating system" [14]. However, to play this role, they will need to embrace transformation of varying scales and depths.

In some cases, universities are century old institutions, that have developed sophisticated systems to deliver high quality education and research while remaining independent from political and economic changes. These characteristics often go hand in hand with structural constraints to rapid change. However, the SDGs can offer a framework to trigger this change.

Many higher education institutions are already embracing the SDGs as a source of transformation and re-invention. But is the sector, as a whole, acting fast enough and are the changes sufficiently deep, given the pace and scale of change and the timeline signaled by the SDGs?

4.1 A "Second operating system" approach to university transformations

Since universities need to continue to deliver their essential mission, implementing organizational reform at scale must not come at the expense of a delay or halt to their day-to-day activities. Universities need to ensure continuity in the effective management of quality and risks throughout the transformational period.

For this reason, one approach could be to develop a kind of "second operating system." This second operating system would be focused solely on designing the appropriate transformation that could complement the existing governance system of the university. While the traditional hierarchy of the university ensures continuity, the second operating system can work as "an agile, network-like structure and a very different set of processes" [37] that "complements, rather than overburdens the traditional hierarchy." This way, the "traditional hierarchy", or the existing governing system of the university, can continue leading the daily functions of the university but it will do so in close liaison with the second operating system that would, in the meantime, be charged with thinking through and devising mechanisms to implement the necessary transformation.

The main features of this second operating system, including some references for further information, are as follows:

- a community convened around shared purpose [38];
- minimum viable size: number of people, structure, objectives;
- new functions at the center of the organization: integration; caring; facilitation; deep listening and conversation; curiosity, compassion, and courage [14];
- a "holding environment" to foster critical daily practices (hard conversations, accountability, information flow, etc.) [39];
- promotion of self-management, wholeness, and evolutionary purpose [35];
- new governance and organization (from centralized to ecosystem) [14];
- development of demonstrative/inspirational projects;
- diverse and legitimated members; and
- quick wins.

The second operating system must, in itself, operate with an innovative philosophy and work methods. As briefly mentioned in the previous list, it would comprise a minimum of 15-20 people from different branches and levels of the university that will represent the diversity of the institution and promote diversity of ideas and approaches. The specific structure of the organization could take various forms as reflected in the case studies shown in this chapter.

This second operating system will influence how the university governance works. Ideally, it will refresh the structures and processes through people who move in and out of both systems, acting as conduits to the new ways of working. This process has been used in a number of organizations that faced risks by not being able to quickly adapt to a changing environment [37].

Alternatively, universities may be able to implement transformative actions using their existing hierarchies if there is a strong alignment of vision and a shared sense of purpose across different groups: university administration, faculty, university staff and students. In this second model, a strong leadership can help promote action around the shared vision.

Throughout the world, universities are starting to try different methods to accomplish deep transformations. We will now present some cases of such attempts (Section 4.2). All of them have the following characteristics in common:

- They engage faculty members across the university, thereby breaking disciplinary silos;
- They have created spaces for multi-stakeholder engagement and partnerships;
- They focus on real world challenges trying to address them through doing pertinent research and education (transdisciplinarity);
- They actively use the campus as a living lab.

Three of the cases presented have followed the model of creating a “second operating system” to catalyze change and propose innovative actions. The fourth case showcases strong leadership in a scenario of shared vision. These are all recent cases and findings will evolve with time. We believe that a key factor in scaling up change will be sharing knowledge and experiences amongst universities. This guide offers a first tool to facilitate such exchanges, and, throughout the Decade of Action, SDSN will aim at being a useful platform for universities from across the world to share knowledge, learn from others, and connect initiatives in order to foster deep transformations.

4.2 Case studies

4.2.1 itdUPM, Universidad Politécnica de Madrid

The Universidad Politécnica de Madrid (UPM) recognizes the need for a systemic transformation to implement the SDGs, and there is a realization that, at present, this is not happening. The main reasons are related to the existence of two-way blockages inside the internal behavior of the University (see Figure 5). On the one hand, top-down initiatives, such as university-wide strategies approved at the Government Council level, are rarely implemented fully due to a variety of reasons including: lack of engagement of faculty members or students in the planning phase that results in unrealistic strategies; resistance to change from faculty members who are overburdened; or because these strategies propose no accountability mechanisms to evaluate progress or adequacy. These blockers prevent profound change coming from the leadership team alone. On the other hand, relevant actions developed by groups of students, faculty members or staff are not getting traction or being upscaled to the whole university because they are not interconnected, do not have a systemic approach, or do not have enough political support from above. Therefore, the bottom-up stream of initiatives cannot itself provoke a transformative process of the university as a system. As a consequence, there is a need for an intermediate structure that operates as a connecting tissue, accelerating the change processes that come from both the "top" – formal and institutional initiatives, and the "bottom" – spontaneous impulse of the academic community.

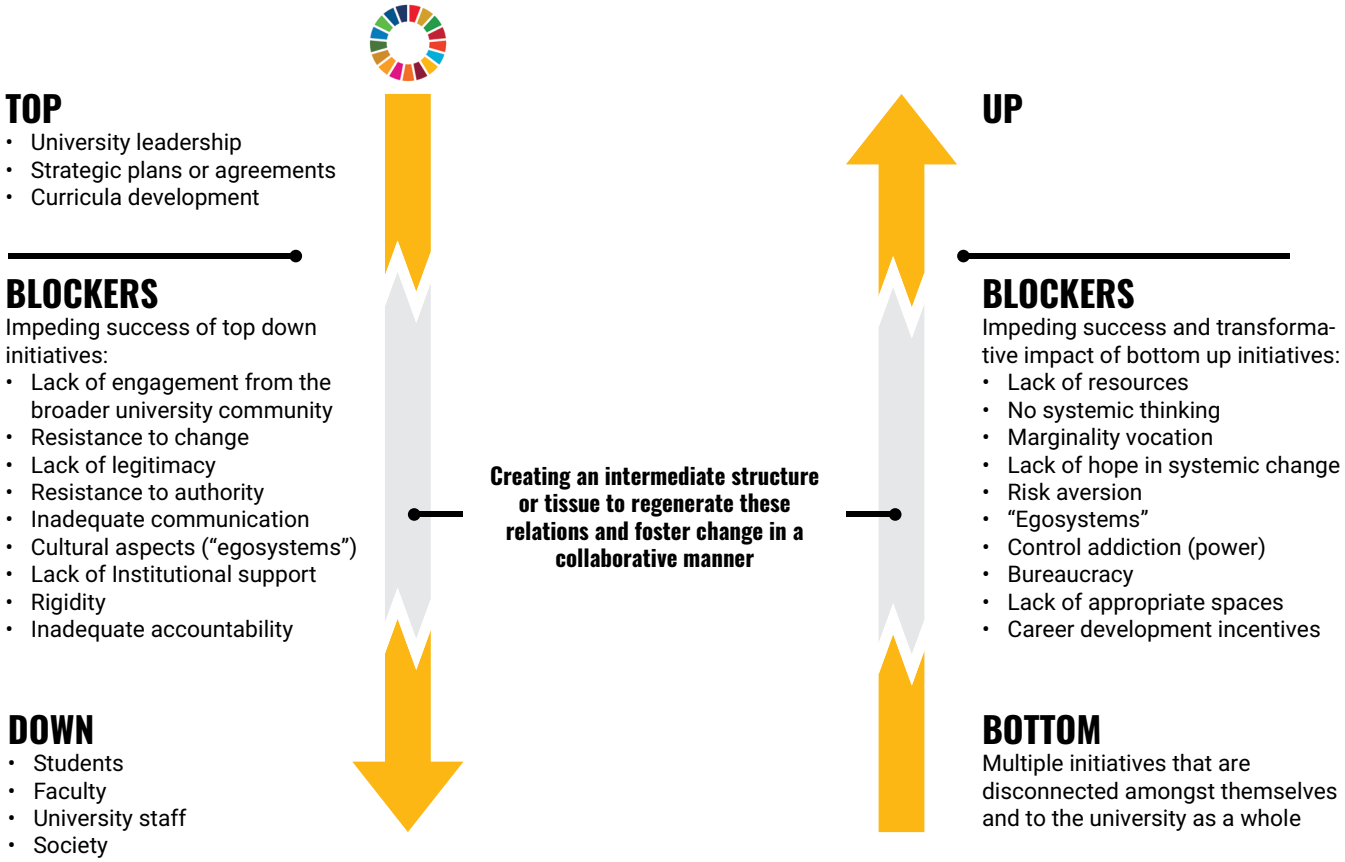


Figure 5: Two-way blockers in the internal behavior of the University.

In this sense, the itdUPM [40] emerged as a second operating system (as framed by Kotter [37] [41]) with a clear intention to restore those organizational systems, by addressing complex problems of sustainable development and co-creating practical solutions involving agents from all spheres. Since 2014, through a variety of projects, the itdUPM has evolved from being a small center developing a handful of innovation and educational projects – operating through a non-conventional, open and horizontal, organizational structure – to an attractive and recognized space that contributes to incorporating interdisciplinary and innovation practices in a variety of research and teaching programs at the whole UPM. The center is part of a new university-wide tissue that connects previous silos and initiatives that have been traditionally isolated. The relational work model has produced the following results that highlight the abovementioned blocks:

- Creation of a different type of organization: In 2012, an ad hoc regulation was designed that allowed faculty members and researchers to simultaneously belong to their disciplinary research centers and to itdUPM, preventing a misalignment of incentives. This means, for example, that peer-reviewed papers can be counted at both centers without lowering the ranking position of the research group.
- Design of a new Master Program [42]: Through this innovative program, an interdisciplinary teaching community was developed, which worked together to set up a high-quality teaching program where faculty members can deploy their credit hours in an innovative way – for example to develop a project-based learning semester [43]. As a critical additional benefit, a new community of engaged students and alumni was established, which became the main source of talent to build the itdUPM management team.
- Shire Alliance [44]: a radical collaboration alliance with experts in various fields, companies, civil society organizations and public administration was established to provide access to energy in a refugee camp in Ethiopia. This project broke down disciplinary silos and helped show the relevance of socially conscious initiatives in a major technical university. The Shire Alliance started raising the profile of itdUPM within the university as a center that could connect existing initiatives, enriching their scope, maximizing their social impact and making them visible to a larger audience.
- Iberdrola Chair [45]: while the university had established chairs with private companies in the past, this one moved away from the regular transactional model to a transformational approach. Both itdUPM and Iberdrola agreed to use this relationship to transform their operations and to launch projects that entail some level of risk (e.g. including achievement of SDGs as a metric for senior management bonus). In turn, this innovative and successful relationship with a major private company as an ally, helped itdUPM gaining legitimacy vis-a-vis the governance of the university while also making an impact outside of the university.

- Cities Platform: a platform to work on transformation of cities towards climate neutrality as part of a deep demonstration project financed by EIT Climate-KIC [46]. Via this project, itdUPM began to participate in a transformative program of the city of Madrid, in collaboration with other local agents (especially the city council) showcasing the role that universities can have beyond their regular activities. This helped students visualize that change is possible, brought prestige to the leadership of the university, provided faculty members with a motivational incentive to engage, and also connected citizens with the university as a place of knowledge, discussion, and action.
- SDGs seminars [47]: a program in operation since October 2018 based on the concept of "mission-oriented" research [48, 49] adopted by Horizon Europe [50] (2021-2027), the new European framework program for funding R&D&I. It promotes a culture of collaboration between researchers from various disciplines and at different points in their academic careers (from professors to doctoral students). They work in workshops (in a relaxed and horizontal environment and thinking more about what unites them rather than what separates them) to propose a common mission of the Agenda 2030 (for now, "energy transition" and "circular economy") to be fulfilled in 2030, creating a research community related to the transversal topic. For example, the energy transition community (which is a top-down initiative) aims at achieving carbon-neutral campuses by 2030 and it opens up a space for bottom-up ideas for Carbon-neutral proposals that, when approved at the community level, move up to the university leadership.

In summary, these and other projects at itdUPM have served as a "sandbox" to test other forms of relationship from the governing structures of the university, towards its centers and faculty members. The result is that the leadership of the university is now reaching out more to faculty members to co-design university-wide strategies. In addition to this, individual initiatives started by student or faculty groups are now seeking to be connected to each other and to the governance of the university. All of this has been made possible by applying a number of working principles developed at itdUPM that have contributed to reinforce the aforementioned connecting tissue that allows permeability. Mostly, itdUPM aims to create a context, as described below (and Fig. 6), where people can work with meaning (purpose), mastery (developing deep skills) and membership (community honoring individuality) [51]:

- Sharing its values of collaboration, permanent listening and respect to diversity of thought, interpretation and actions.
- Creating a meaningful physical space: a building with experimentation areas, no closed doors and walls made of glass to enhance the collaborative environment.
- Being mindful and meticulous in the management of time and resources and respecting personal relationships.
- Creating a network of faculty members, researchers, companies, alumni, and freelancers (+250 people) who are respected and called upon for exciting opportunities.
- Demonstrating that another way of doing things is, in fact, possible and great.
- Putting focus on creativity for every process, creating a professional and fun environment.

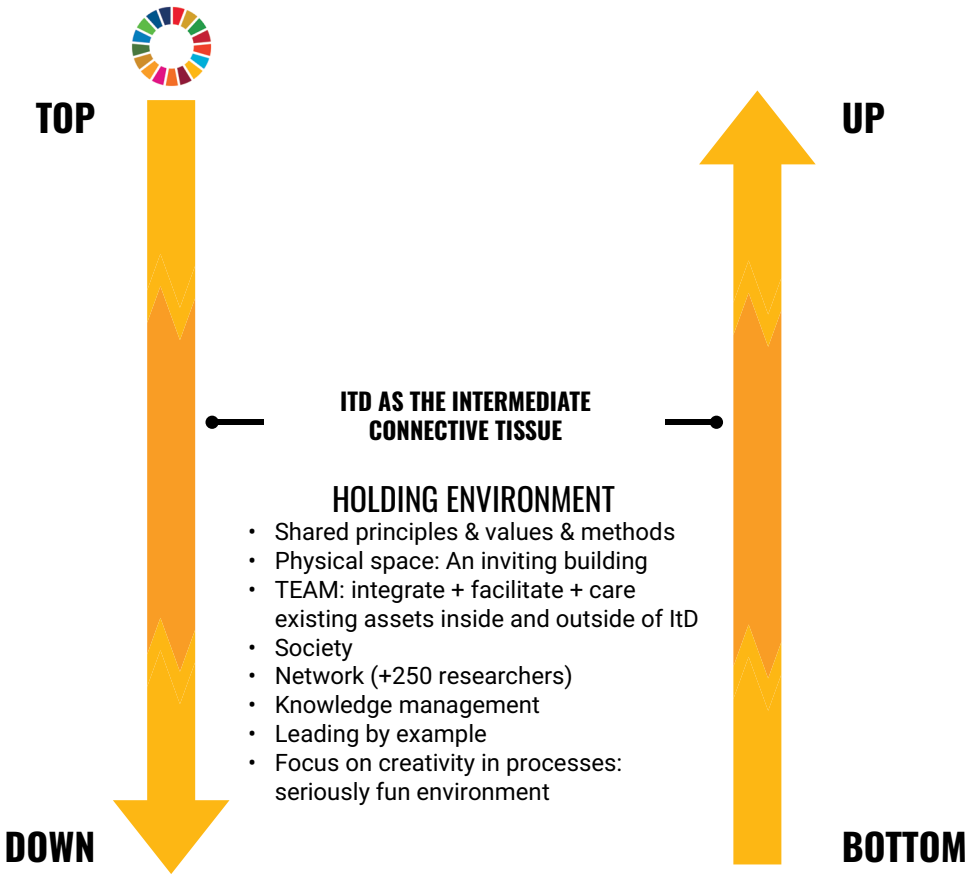


Figure 6: itdUPM role as an (intermediate) connecting tissue.

4.2.2 The Monash Sustainable Development Institute

Monash Sustainable Development Institute (MSDI) is a cross-university institute that harnesses research, education and engagement to catalyze sustainable development solutions to global challenges and the SDGs. In many ways, the Institute might be considered as a second operating system within Monash University, which has enabled it to undertake many innovative initiatives, including towards education for the SDGs.

MSDI was created by Monash University in 2006 as an interdisciplinary space to work alongside, and in collaboration with, faculties and external stakeholders to innovate, experiment, coordinate and host new initiatives that address the complex and interconnected challenges posed by the SDGs. It now has over 150 staff and PhD students and a range of unique and well-regarded flagship programs, including:

- ClimateWorks Australia, a partnership between Monash University and a philanthropic foundation that acts as an expert, independent advisor committed to helping Australia and the Asia/Pacific region transition to net zero emissions by 2050.
- BehaviourWorks Australia, a research enterprise that brings leading behaviour change researchers and practitioners together to find behavioral solutions to real-world problems.
- MSDI Water, which supports interdisciplinary research and action on urban water from faculties and institutes across Monash.
- Revitalising Informal Settlements and their Environments (RISE), a multi-stakeholder partnership that is developing and testing a localized, water-sensitive approach to improve both the environment and people's health in informal settlements in Indonesia and Fiji.
- The UN Sustainable Development Solutions Network (SDSN) Regional Network for Australia, New Zealand and Pacific, hosted by MSDI, which works with universities and other stakeholders in the region and globally to mobilize support and action towards SDG implementation.
- A public policy innovation program, which seeks to embed innovation and systems transformation approaches and capabilities in public policy.
- Sustainable Development Education, which delivers postgraduate courses and PhD supervision alongside executive education, capacity development and student leadership activities.

Some of the key principles that help guide MSDI's work and contribute to its success are:

- A focus on real-world problems and needs. The Institute measures its impact by its ability to apply research to practical problems and to influence change in policies and practice.
- Partnerships and collaboration with others, both within Monash University and beyond it across academia, industry, government and civil society. These are at the center of everything the institute does. There is particular focus on collaboration and mutual learning with the users of our work, on everything from problem identification, to project co-design and delivery.
- An institutional culture that is open to innovation, entrepreneurship, experimentation and learning in how initiatives are designed, to ensure that they best fit the problem being addressed and its context.
- Taking a systems transformation view of sustainable development challenges, and in the development of pathways and solutions to solve them, bringing in all relevant disciplines and stakeholders.

Being an external-facing, impact-focused institute has driven MSDI's flexibility in the kinds of projects it pursues, the partnerships it forms and the ability to undertake projects on short timelines, in line with the ways government and business operate. It has also given MSDI the ability to gather high-caliber project staff with diverse academic and non-academic backgrounds to meet its purpose. This includes people who have worked extensively in government, business and community sectors, who understand how these sectors work and have extensive networks. It also includes people with expertise in, and a passion for, interdisciplinary and transdisciplinary research, education and engagement. All of these are important factors in MSDI's success.

Education for the SDGs is a core focus of MSDI, through its Sustainable Development Education Program and as an important component of its other programs. As a non-faculty aligned institute, MSDI has drawn on its unique position, structure, networks, and capabilities – including staff who are ESD and transformative learning experts – to develop and collaborate on unique interdisciplinary educational programs at Monash that focus on developing participants' practical skills, knowledge and mindsets to contribute to and lead sustainable development transformations. These include formal degree programs and units, co-curricular programs, graduate research, professional development, and capacity building programs for traditional students and other audiences both within and outside the university. Examples of these programs are:

- Master of Environment and Sustainability, a cross-faculty degree program delivered in collaboration with the Faculties of Science and Arts, Monash Business School and MSDI. MSDI runs the Master's Leadership for Sustainable Development stream, a core unit on sustainable development, and an interdisciplinary project-based unit in collaboration with industry partners.

- Green Steps, a co-curricular leadership program for Monash students that seeks to equip and transform them to become effective sustainable development leaders. The program is celebrating its 20th anniversary in 2020, and its original focus on environmental sustainability has been extended and now covers the whole SDG agenda. It is delivered through experiential workshops and 'real world' sustainability consultancy projects.
- Behaviour Change Graduate Research Industry Partnership (GRIP) program, which supports PhD candidates to work with practitioners in government and non-government agencies to address public policy issues through behaviour change. The students are co-supervised by academics from MSDI and faculties across the university.
- "Teaching our future health workforce about environmental sustainability and its impacts", a joint project between MSDI and the Faculty of Medicine, Nursing and Health Science, which is building ESD development capabilities among academics to teach climate change literacy and green skills to emerging health professionals.
- Climate Change and Business Risk, an executive education course for senior corporate managers and executives on how to develop a strategic approach for successfully integrating climate into business strategy.
- The McKinnon Institute, a new non-partisan and not-for-profit organization established through a partnership between the university and a philanthropic foundation. It is dedicated to providing professional development programs for state and federal politicians working in an increasingly complex world.
- Embedding SDG-related knowledge and skills in business teaching through several practical and experiential units taught by MSDI in Monash Business School programs. One unit, in collaboration with B Corp, gets students to undertake sustainability impact assessments on real life businesses.
- Leave No One Behind, a social entrepreneurship program led by MSDI and run in collaboration with the Faculties of Arts, Law, Education, Business, and Art, Design and Architecture, which gives Monash students the opportunity to address social inclusion challenges in the community by developing social business ideas.

The university and MSDI have worked collaboratively and have navigated structural challenges to get to this point where MSDI is able to undertake such a broad range of innovative and impact-driven work. This journey is ongoing as the institute, the university and the world around it evolves.

Case studies: MSDI ESDGs initiatives

- Leave No One Behind
- Integration of the SDGs in a cross-faculty interdisciplinary Masters course

4.2.3 Sunway University

Environmental Sustainability is indelibly ingrained in the DNA of Sunway University. The university is part of an academic complex that is located on the rim of what was once a barren hole in an area of mined-out wasteland. Today, this rehabilitated mining hole is the center of Sunway City, a smart, digital city that is expanding by adopting sustainable urbanization practices. For example, a network of elevated walkways with a solar-paneled roof connects all parts of the township, an internal bus rapid transit system links the township to two key nodes of the mass transit systems of the Klang Valley, a rain-harvesting system has made the Sunway education complex self-sufficient in water, and urban farming ventures are starting up.

Sunway University was established in 2011, the culmination of an expansion and upgrading process that began with the establishment of Sunway College in 1986, and Sunway University College in 2004. Sunway University is the only non-profit university in Malaysia that is owned by a charity foundation, the Jeffrey Cheah Foundation (JCF). Jeffrey Cheah himself is, by instinct, a practitioner of Sustainable Development, and through experience, is a believer in that advancing educational access is the key driver to the development of a good society.

Sunway City was born from a vision to rehabilitate the land to become an ecologically-balanced city that is economically dynamic, socially progressive, culturally vibrant, and participatory in local governance. Today, it is an educational hub (e.g. Taylor's University and Monash University are also located in Sunway City) as well as home to the headquarters of many businesses that are technologically innovative and environmentally friendly (e.g. healthcare, recreation, digital).

The sustainability initiatives of Sunway University predated the adoption of the United Nations Sustainable Development Goals (SDGs) in 2015. Individual departments, of their own accord, saw the need for resource-use modifications that could help thwart, if not prevent, further environmental degradation. It banned polystyrene food containers in 2010 - seven years before a state-wide ban; and has had a recycling program in place since 2012.

In 2016, the formal incorporation of the SDGs into the mission of the Sunway Group gave Sunway University further impetus to institute a "second operating system" in its governance structure. The Sunway Smart Sustainable Campus Committee (SSCC) was set up in 2017 to brainstorm, innovate together and make recommendations to guide campus-wide policies and initiatives.

The SSCC comprises representatives from top management, the various shared services departments, academic schools and the student body. The inclusion of diverse representatives was deliberate - to form a consolidated force that will propel campus-wide green activities and initiatives. Inter-departmental collaboration and engagement with relevant stakeholders happened from the start, with discussions typically around identifying the best ways to implement operational and infrastructural adaptations and retrofits, and campus-wide messaging to influence behaviour change. Once launched, initiatives quickly become standard operating practices because of departmental champions who incrementally push for better outcomes while streamlining and fine-tuning processes.

In its first two years, the SSCC produced several campus initiatives. One example is the campus's solar energy project implemented in 2018 with the multiple objectives of generating energy savings; lowering dependence on the national carbon-intensive grid; and providing an educational and R&D platform for students and researchers. Sunway University invested over RM2 million in the current installed capacity of 600kWp and a payback period of 6 years from energy savings. This is the first step in an ongoing effort to fully transition to renewable energy in the long term.

In addition to this, Sunway University fully appreciates that education is one of the most important drivers of creating a sustainable future. It has therefore quickly become Malaysia's premier university focusing heavily on education for sustainable development. Notable achievements in this area include:

- The Jeffrey Sachs Center on Sustainable Development (JSC) was launched in 2016 as a regional center of excellence in research and education on sustainable development. In 2018, it launched its Master in Sustainable Development Management (MSDM) to empower individuals with the necessary skills to become pioneers in advancing sustainable development. JSC also conducts executive training programs customized for various industries including manufacturing, financial services and government. The MSDM will incorporate a fully online track in 2020 that will serve remote learners across Asia and Oceania.
- Sunway iLabs was set up in 2017 as an innovation hub to challenge students to undertake entrepreneurial and technologically-based approaches to generating products and services as solutions to real-life sustainable development challenges.
- The Future-cities Research Institute, launched in 2019, complements the work of JSC in developing sustainable urban environments, using Sunway City as a living lab. The institute focuses on urban challenges of pollution, traffic congestion, crime, public health and the digital divide.
- As of 2019, the Academic Standards and Quality department has redesigned the ministry-required compulsory undergraduate courses to have a dedicated focus on sustainable development.

- Sunway University was made host of the Sustainable Development Solutions Network Malaysia Chapter in 2019, a vehicle to convene and advance multi-party efforts in solving national SDG challenges. From late 2020, it will also host the SDSN-Asia headquarters, thus scaling-up to serve the wider Asian region.
- In the next 12 months, SDSN-Asia will also be the new host of the SDG Academy, a global knowledge hub that has, since 2014, been creating and curating free massive open online courses on sustainable development and offering them as a global public good.

Sunway University's alignment with the SDGs necessitate a sound strategy to position itself not just as an institution that embraces the SDGs, but one that graduates students with the knowledge and motivations to build careers grounded in sustainable development; and one that partners with policy-makers, businesses and civil society to be collective agents of meaningful change. After three years of attaining quick wins, the organization is now primed for a shift from being an incubation space for trying novel concepts locally, to translating the learnings for greater national and regional impact.

Paperless Event Registration App
An in-house QR Code Generating App has been created to enable paperless event registration

Paperless Marketing
Introduction of 'Zap' feature in university prospectus to reduce paper printing

F & B Vendors Say No to Plastic
Single-use plastic bottles have been removed from all cafeteria outlets and vending machines

F & B Vendors Say No to Straws
No single-use straws are given out on Sunway Campus

Last Straw Water Stations
Last Straw Campaign to reduce use of single-use plastic bottles on campus. Provision of water stations to reduce purchasing of bottle water

Orientation Gift
Sunway University and College provides all incoming students in 2019 a reusable water bottle as an orientation gift

Staff Green Living Practices
Staff are encouraged to adopt Green Living practices. Sunway Education Group has provided all staff a complimentary flask for reduction of single-use plastic on campus

Recycling and Waste Separation
Practicing waste separation between recycling waste and general waste

Responsible Fabric Waste Disposal
Responsible disposal of fabric at three permanent collection chutes. Donated fabric is repaired, pelletized for fuel, upcycled or donated for further use by Life Line Clothing Malaysia Sdn Bhd

Responsible Electronic Waste Disposal
Responsible disposal of eWaste and fluorescent tube lights at six permanent collection points for delivery to Meriahtek (M) Sdn Bhd, a department of Environment licensed eWaste treatment facility. The Sunway family is invited to drop off larger items twice a year at the loading bay

Figure 7: Sampling of ten smart and sustainable initiatives as a means of embracing and embedding culture of sustainability in the campus community

4.2.4 University of Pretoria

As a research-intensive university that is an integral part of society, the University of Pretoria focuses on developing people and creating knowledge to meet current and future societal needs. Working in the sustainable development arena and in alignment with the United Nations' Sustainable Development Goals (SDGs) flows naturally from our purpose, and this is given expression through our core functions of research, teaching & learning, and engagement.

Recognizing the importance of achieving the SDGs, and their inherent complexity, the University has been actively involved with the goals from their launch in 2015. The journey has entailed an array of activities, as we have sought to mobilize action, integrate and embed the work into the University's core functions, and create leverage for greater impact beyond the University's immediate scope of influence (see Figure 8).

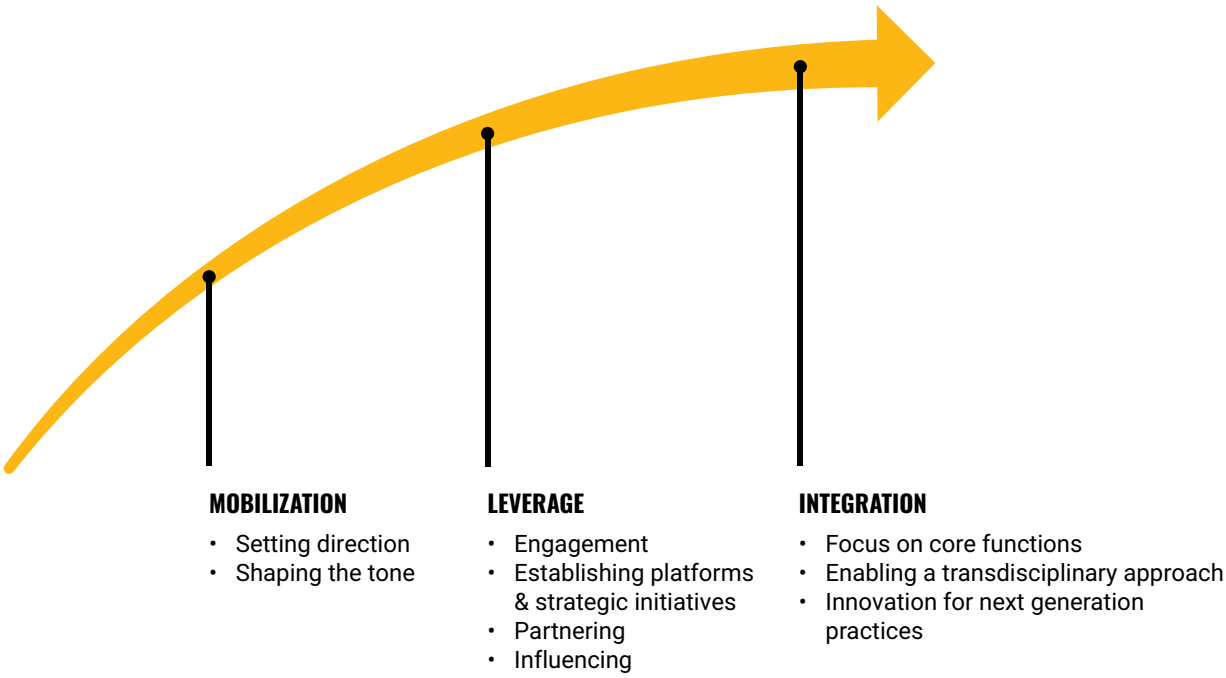


Figure 8: The University of Pretoria pathway to accelerating achievement of the SDGs

Mobilizing SDG action

Our focus on the SDGs is driven from the highest level, the University's Strategic Plan – 2025, which considers inter alia, strengthening the interface with, and contribution to society for social and economic upliftment; partnering and collaborating at multiple levels to enhance impact; and strengthening focus on sustainable development. This direction is congruent with the fundamental pillars of the SDGs – People, Planet, Prosperity, Peace and Partnership.

To support its direction, the University has outlined a set of guiding principles that shape the tone across the institution and enable deep engagement with the SDGs. These include nurturing transdisciplinarity, collaboration and innovation; embracing diversity and inclusivity; and ensuring ongoing relevance of our work and offerings, in line with changing societal needs. Various multi-stakeholder governance structures and processes have been put in place to support relevance, transparency, integrity and accountability within the University.

Integrating and embedding

Integrating sustainability and SDG related knowledge and practices into the work of the faculties is central to developing people and shaping intellectual leaders with a social conscience and global outlook. This work also seeks a positive societal impact on social and economic development.

Having identified SDG and related work relevant to their areas, a wide array of activities has been undertaken across the institution. These include aligning teaching activities to the SDGs; embedding community engagement modules into academic programs; research activities contributing to achieving the SDGs – focused on addressing community and public sector needs; community outreach initiatives; various training and short courses to public sector entities on governance and sustainability-related matters; public lectures; and enabling open access to learning materials.

The University embedded a transdisciplinary approach into its philosophy as a key means to address the complex challenges underpinning and associated with achieving the SDGs. Transdisciplinarity is formalized through the identification of Institutional Research Themes that deal with complexity and have the attention of the University leadership. Additionally, Communities of Practice are established and encouraged in various areas of research.

Innovations in the academic program for next generation practices have included enhancing community-based learning experiences, using innovative audience interaction technologies, and the agile shift to virtual teaching during the COVID-19 pandemic.

Generating leverage for greater impact

The ongoing process of integrating and embedding provides a foundation for generating and applying leverage for greater impact. A myriad of leverage activities covering the spectrum of the SDGs are being undertaken along the lines of engagement, establishing platforms and strategic initiatives, partnering with academic and non-academic stakeholders and networks, and influencing policy and practices at local, national, regional and continental levels. Notably, the University of Pretoria has developed and launched three transdisciplinary collaborative platforms (Future Africa, the Javett Art Centre and the Engineering 4.0 development) to drive partnerships, and is currently working on a fourth platform – Innovation Africa@UP.

A few examples of the University's leadership role include hosting the South African SDG Hub, which collects and tags South African open access research on the SDGs; hosting the United Nations' Academic Impact Hub for SDG 2; being a champion for the United Nations' Principles for Responsible Management Education (PRME); and active collaboration in the African Research Universities Alliance (ARUA) on issues such as food security and food system transformation.

The work has led to the University receiving various awards for sustainable development related issues, and a favorable ranking in the Times Higher Education Impact Rankings and the recent UniRank Listing.

Going forward

The University of Pretoria will continue to pursue the path outlined. We continually seek to learn from our experiences and from those of others. We believe that the iterative cycle of integrated thinking, doing, learning and reporting will increase coherence of action, and will continue to enhance our contribution to achieving a better world.

ANNEX A: ACRONYMS & TERMINOLOGY

Notes on terminology

Some common university-related terms are used differently in different parts of the world. Below are notes on how we used them in this guide to avoid confusion.

Course	Because the term "course" has different usages in different regions,[3] we will use the following terms instead: • Unit: a semester-long unit of studies (also referred to as "subject" and "module") • Program: A collection of units that make a degree program
Faculty	The term "faculty" can mean (1) a division of the university and/or (2) academic/teaching personnel in different parts of the world. We therefore use the following terminology to distinguish between the two, respectively: • Faculty/school • Faculty members
University	Throughout this guide, the term "university" is used as a shorthand to cover a range of tertiary educational institutions, including higher education institutions, colleges, vocational training schools, and so on.

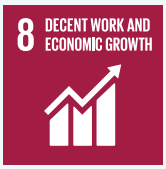
Acronyms

ESD	Education for Sustainable Development
ESDGs	Education for the SDGs
MOOC	Massive Open Online Course
PRME	Principles for Responsible Management Education
SDGs	Sustainable Development Goals
SDSN	Sustainable Development Solutions Network
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

3. https://en.wikipedia.org/wiki/Course_(education) (last accessed August 6, 2020)

ANNEX B: ESDG-RELATED SDGS AND TARGETS

The following SDGs and targets recognize the importance of new knowledge and skills to achieving the targets.

SDG	Target
	4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development
	8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small-and medium-sized enterprises, including through access to financial services
	12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning 13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities
	16.a Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime
	17.9 Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation

ANNEX C: SELECTED RESOURCES

There is a huge number of online resources relating to ESDGs – and its precursor, ESD – and this number is growing daily. To help universities navigate this sea of information, this annex provides links to some of the key resources to support the implementation of ESDGs in universities.

C.1 General references

- SDSN Australia/Pacific (2017) *Getting started with the SDGs in universities: A guide for universities, higher education institutions, and the academic sector.* Australia, New Zealand and Pacific Edition. Sustainable Development Solutions Network – Australia/Pacific, Melbourne.
- UNESCO (2017) *Education for Sustainable Development Goals: Learning objectives*. UNESCO, Paris.
- UNESCO (2014) *Roadmap for Implementing the Global Action Programme on Education for Sustainable Development*. UNESCO, Paris.
- HOCH-N (2019) *Sustainability Governance at Higher Education Institutions* (beta version) [English version]. Sustainability at Higher Education Institutions: develop – network – report (HOCHN), Berlin.
- PRME (2020) *Blueprint for SDG integration into curriculum, research and partnerships*. Principles for Responsible Management Education, New York.
- Verhoef, L & Bossert, M (2019) *The University Campus as a Living Lab for Sustainability: A Practitioner's Guide and Handbook*. Delft University of Technology, Hochschule für Technik Stuttgart.
- Several publications from the Elsevier World Sustainability Series, edited by Walter Leal Filho, contain many case studies on ESDG-related topics. Recent examples include *Universities as Living Labs for Sustainable Development*, *Sustainability on University Campuses: Learning, Skills Building and Best Practices*, and *Implementing Sustainability in the Curriculum of Universities*.

C.2 Case study collections

- Accelerating Education for the SDGs: Case study website contains all the case studies referenced in this guide.
- The International Conferences on Sustainable Development has, for the past few years, included sessions devoted to the role of universities in implementing the SDGs, including through education. Papers presented can be found in the Conference proceedings: 2019, 2018, 2017
- PRiMEtime Blog shares best practices from PRME participants on how to mainstream sustainability and responsible leadership into management education globally.
- International Sustainable Campus Network (ISCN) Sustainable Campus Best Practice reports: *2018 WEF-ISCN Report: Educating with Purpose* and 2017 WEF-ISCN Report: Educating for Sustainability.

- Several publications from the Elsevier World Sustainability Series, edited by Walter Leal Filho, contain many case studies on ESDG-related topics. Recent examples include *Universities as Living Labs for Sustainable Development*, *Sustainability on University Campuses: Learning, Skills Building and Best Practices*, and Implementing Sustainability in the Curriculum of Universities.

C.3 Online resources & tools

- SDSN's SDG Academy creates and curates free massive open online courses and educational materials on sustainable development and the SDGs.
- Digital Learning for Sustainable Development is a collection of online resources and online courses from Hamburg University of Applied Sciences relating to the introduction of the SDGs into higher education teaching.
- Campus as a living lab provides general guidance, tools, resources and support for helping transform campuses into test-beds of sustainability.
- SDG Impact Assessment Tool is a free online learning tool that guides users, including teachers and students, to undertake an assessment of how an activity, organization or innovation affects the SDGs, and then visualize the results.
- Sulitest is an online test tool for measuring sustainability literacy. The tool is designed so that higher education institutions can aggregate results across different student cohorts, for example for measuring progress and monitoring and reporting.

C.4 Global networks and programs

- SDG Academy – Community of Practice is creating a community of higher education institutions, NGOs, for-profit businesses, and relevant government entities dedicated to advancing education for sustainable development through peer learning and the sharing of best practices, customized resource development, and opportunities for research and thought leadership.
- SDSN Youth – SDG Students Program is a global network of student hubs, where students can come together to learn about, engage with, and take action on the SDGs.
- Principles for Responsible Management Education (PRME) is a UN-supported initiative that works with business schools around the world to equip business students with the understanding and ability to contribute to achieving the SDGs.
- AIM2Flourish, from Case Western Reserve University, is a program that supports management schools to teach students about the SDGs through a professor-facilitated curriculum focusing on positive business impact. Students use the SDGs as a lens to research an organization, interview a business leader or social entrepreneur, then write and publish positive business innovation stories.

C.5 SDG-related measurement and reporting frameworks

- Official UN SDG indicators: In late 2019, the UN approved a qualitative assessment method for measuring SDG indicator 4.7.1, the "Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment." While the methodology is aimed at country-wide reporting, it includes ESDGs in the tertiary sector.
- Sustainability Tracking, Assessment & Rating System (STARS): A program of the Association for the Advancement of Sustainability in Higher Education (AASHE), STARS provides a self-reporting framework to measure institutions' sustainability performance across different areas of operation, including ESDG-related areas, such as curriculum and campus engagement. AASHE recently released a publication [52] outlining how STARS institutions' impact on the SDGs.
- Times Higher Education (THE) Impact Rankings: Published for the first time in 2019, the Rankings aim to measure universities' success in delivering the SDGs. Compulsory indicator 17.iv, added for the 2020 rankings, is specifically on Education for the SDGs [53].
- SDG Accord: The Accord has developed a qualitative self-assessment survey for signatories to capture institutional integration, contribution and impact on the SDGs across all areas of the university, including areas relating to ESDGs.
- PRME Sharing Information on Progress (SIP) Reports: PRME SIP reports aim to communicate business school progress in implementing the PRME principles through academic activities, curricula, and organizational practices. Many reports now integrate the SDGs [54].
- The SDG Dashboard: The Dashboard is a reporting, visualization, and data analytics tool developed by Saint Joseph's University for PRME and other global business schools to showcase their contributions towards advancing the SDGs, including through teaching.
- Indicator system of university social responsibility: A detailed indicator system developed by PRME Latin America and the Caribbean Chapter to quantitatively measure business school contributions to social responsibility and the SDGs, including through education.
- Sulitest: An online test tool for measuring sustainability literacy. The tool is designed so that higher education institutions can aggregate results across different student cohorts, for example for measuring progress and monitoring and reporting.
- Existing institutional reporting: Universities may already be reporting on indicators relevant to learning & teaching for the SDGs through their existing reporting processes - such as annual reports, sustainability reports, diversity and inclusion reporting processes, and so on.

C.6 University SDG-related commitments

Below are examples of university commitments and declarations that include ESDGs elements. While all these commitments call for universities to support and advance the SDGs through their research, teaching, operations and public role, they differ somewhat in their focus, their compliance and reporting requirements, the support they offer for implementation, and their regional focus. Institutions can choose among the various frameworks based on which is most aligned to their needs.

- University Commitment to the SDGs, led by SDSN Australia, New Zealand and Pacific
- SDG Accord, by the Global Alliance of university and college sustainability networks
- Declaration on University Global Engagement, a joint effort from the UN Institute for Training Research and the Association of Public & Land-grant Universities
- Declaration on the role of Universities in the implementation of the UN SDGs, Initiated by the Big Tent Consortium, a global network of universities and their community partners
- ISCN Sustainable Campus Charter 2018, by the International Sustainable Campus Network
- University Global Coalition, which builds on the Declaration on University Global Engagement

ANNEX D: SDSN PROGRAMS SUPPORTING ESDGS AT UNIVERSITIES

D.1 SDG Academy

The SDG Academy is the flagship education initiative of SDSN, with the mandate of creating and curating the best available educational content on sustainable development and making it available as a global public good. Since 2014, the SDG Academy has created 30 courses, which have reached approximately 300,000 learners from more than 190 countries. Delivered as MOOCs and curated resources, its content is available for a diverse global audience. Learners include students, researchers, professionals, policymakers, organizations, and other interested members of the public.

The SDG Academy's global faculty comprises leading experts in sustainable development who believe in the power of sharing knowledge to improve the lives of everyone. All courses are pitched at an introductory Master's level and most are multi-faculty, drawing instructors from different geographies, perspectives, and traditions, with a mix of academicians and practitioners. They assume no prior knowledge of the issues discussed, but expect that by the time a course is completed, learners will gain extensive knowledge and understanding of some of the most complex and pressing global challenges of our times.

Its current program offering includes the University Partnership Program (UPP), which gives support to select SDSN member universities to build capacity and support faculty in improving the quality of teaching of sustainable development and related topics. To date, over 20 universities in 16 countries have participated. Additionally, the SDG Library houses over 1,200 lecture videos available as stand-alone teaching resources to fill a critical interdisciplinary gap in sustainability content for undergraduate and graduate classrooms. Moreover, the Global Master's in Development Practice (MDP) is a global association of 36 universities that share a global curriculum on teaching development practice. Forthcoming projects include an Online SDG Encyclopedia and an online Master's Program in Sustainable Development.

D.2 SDSN Youth

SDSN Youth educates young people about the SDGs and the Paris Agreement, and provides opportunities for them to pioneer innovative solutions to achieve the goals. With a membership of more than 1000 organizations, ranging from student associations, youth-led and youth-focused organizations and other institutions dedicated to youth empowerment in over 85 countries, SDSN Youth creates platforms for young people to connect and contribute to regional and national pathways for the implementation of the SDGs and the Paris Agreement.

Member organizations have expertise in one or more areas related to sustainable development and commit a substantial amount of their own work towards finding and/or implementing solutions for sustainable development. SDSN Youth hosts and participates in various events focused on youth empowerment and the advancement of the SDGs. Its representatives facilitate workshops and seminars and partake in high-level conferences and summits around the world, including the Vatican Youth Symposium, The Youth Assembly, World Youth Day, and many more. With over 400+ speeches and presentations given, the program ensures that youth are included in the conversation, policy-making, and solution-based initiatives necessary to achieve the 2030 Agenda.

SDSN Youth's current program offerings include:

- Global Schools Program, which provides the necessary tools and resources for schools and teachers to educate their students on the SDGs, particularly focused on grade levels K-12;
- Youth Solutions Program, which promotes and offers support to innovative projects tackling the world's toughest challenges around the SDGs, all led by young professionals and students;
- Local Pathways Fellowship, which is a training program and peer-to-peer learning network that provides young urban innovators with the tools to design and implement programs that champion local pathways to sustainable development by exchanging knowledge and ideas with leading urban development experts, grassroots organizers, and academics; and
- SDG Students Program, which creates spaces on university campuses where students with no prior experience or engagements with the SDGs can come together to learn about, engage with, take action on the SDGs, and ultimately carry the importance of sustainability into their future work upon graduation.

REFERENCES

1. SDSN Australia/Pacific (2017). Getting started with the SDGs in universities: A guide for universities, higher education institutions, and the academic sector. Australia, New Zealand and Pacific Edition, Sustainable Development Solutions Network – Australia/Pacific, Melbourne http://ap-unsdsn.org/university-sdg-guide/ (Last accessed: May 8, 2020).
2. WMO (2019) United In Science. Retrieved from https://public.wmo.int/en/resources/united_in_science. (Last accessed: May 8, 2020).
3. United Nations (UN) General Assembly (2015). Transforming our world: The 2030 Agenda for Sustainable Development, A/RES/70/1 (21 October) www.refworld.org/docid/57b6e3e44.html. (Last accessed: May 8, 2020).
4. Sachs, J.D., et al. (2019), Six Transformations to achieve the Sustainable Development Goals. Nature Sustainability, 2019. 2(9): p. 805-814.
5. UNESCO (2017) Global Education Monitoring Report 2017/18: Accountability in education: Meeting our commitments, UNESCO, Paris, France. https://unesdoc.unesco.org/ark:/48223/pf0000259338 (Last accessed: May 8, 2020).
6. UNESCO (2015) Rethinking education: Towards a common good?, UNESCO, Paris, France. https://unesdoc.unesco.org/ark:/48223/pf0000232555 (Last accessed: May 8, 2020).
7. UNESCO (2017) Education for Sustainable Development Goals: Learning objectives, UNESCO, Paris, France. https://unesdoc.unesco.org/ark:/48223/pf0000247444 (Last accessed: May 8, 2020).
8. UNESCO (2014) Roadmap for Implementing the Global Action Programme on Education for Sustainable Development, UNESCO, Paris, France https://unesdoc.unesco.org/ark:/48223/pf0000230514. (Last accessed: May 8, 2020).
9. Levi, L. and B. Rothstein (2018) Universities must lead on Sustainable Development Goals. World University News, 9 November 2018.
10. UNESCO (2018) Progress on education for sustainable development and global citizenship education. UNESCO, Paris, France. https://unesdoc.unesco.org/ark:/48223/pf0000266176 (Last accessed: May 8, 2020).
11. International Labour Organization (2016) SDG Note: Skills for employment, ILO Decent Work for SDGs Note Series, ILO: Geneva. http://www.ilo.ch/wcmsp5/groups/public/---dgreports/---integration/documents/genericdocument/wcms_561756.pdf (Last accessed: May 8, 2020).
12. Apostolopoulos, N., et al. (2018) Entrepreneurship and The Sustainable Development Goals. https://books.emeraldinsight.com/resources/pdfs/chapters/9781787563766-TYPE23-NR2.pdf. Contemporary Issues in Entrepreneurship Research, 2018. 8.
13. Breidlid, A. and R. Krøvel (2020) Indigenous Knowledges and the Sustainable Development Agenda. Routledge.
14. Scharmer, O. (2018) Education is the kindling of a flame: How to reinvent the 21st-century university. Huffpost, 8 January 2018, https://www.huffpost.com/entry/education-is-the-kindling-of-a-flame-how-to-reinvent_b_5a4ffec5e4b0ee59d41c0a9f. 2018.

15. Networking to Integrate SDG Target 4.7 and Social and emotional learning into Educational Materials (NISSEM) (2018). NISSEM Position Paper 2.0, NISSEM organising committee. https://www.sdg4education2030.org/networking-integrate-sdg-target-47-and-social-and-emotional-learning-educational-materials-nissem-september-2018. (Last accessed: May 8, 2020).
16. Sulitest (2006). Sulitest Architecture and Tags V2. http://www.sulitest.aleaur.com/files/source/Sulitest%20V2%20-%20Architecture%20and%20tags.pdf (Last accessed: May 8, 2020).
17. PRME (2016). Management education and the Sustainable Development Goals: Transforming education to act responsibly and find opportunities. Principles for Responsible Management Education (PRME), New York, USA. https://www.unprme.org/resource-docs/SDGBrochurePrint.pdf (Last accessed: May 8, 2020).
18. Wilson, D. (2019) Exploring the Intersection between Engineering and Sustainability Education. Sustainability, 2019. 11.
19. Noveck, B. and R. Glover (2019) Today's Problems, Yesterday's Toolkit. Australia and New Zealand School of Government. Available at: https://www.anzsog.edu.au/preview-documents/publications-and-brochures/5425-today-s-problems-yesterday-s-toolkit/file (Last accessed: May 8, 2020).
20. Lubchenco, J., et al. (2015) Sustainability rooted in science. Nature Geoscience, 2015. 8: p. 741-745.
21. Madden, D.L., M. McLean, and G.L. Horton (2018) Preparing medical graduates for the health effects of climate change: an Australasian collaboration. Medical Journal of Australia, 2018. 208(7): p. 291.
22. Albareda-Tiana, S., et al. (2019) Implementing Pedagogical Approaches for ESD in Initial Teacher Training at Spanish Universities. Sustainability, 2019. 11(18).
23. Eriksson, E., et al. (2016) Sustainable development for ICT engineering students: "What's in it for me?". In: Mazijn, Bernard (ed.), (pp. 165-172). Brugge, Belgium: Instituut vóór Duurzame Ontwikkeling vzw. 2016.
24. Cottafava, D., G. Cavaglia, and L. Corazza (2019) Education of sustainable development goals through students' active engagement A transformative learning experience. Sustainability Accounting Management and Policy Journal, 2019. 10(3): p. 521-544.
25. International Council for Science (ICSU) (2017) A guide to SDG interactions: From science to implementation [D.J. Griggs, M. Nilsson, A. Stevance, D. McCollum (eds)]. ICSU, Paris, France. https://www.sei.org/publications/a-guide-to-sdg-interactions-from-science-to-implementation/ (Last accessed: May 8, 2020).
26. Leal Filho, W., et al. (2020), Universities as Living Labs for Sustainable Development: Supporting the Implementation of the Sustainable Development Goals. World Sustainability Series, Springer International Publishing. 2020.
27. Verhoef, L. and M. Bossert (2019), The University Campus as a Living Lab for Sustainability: A Practitioner's Guide and Handbook. Delft University of Technology, Hochschule für Technik Stuttgart, Stuttgart, Germany.

28. UNESCO MGIEP (2017) Rethinking schooling for the 21st Century: The state of education for peace, sustainable development and global citizenship in Asia. Mahatma Gandhi Institute of Education for Peace and Sustainable Development, New Delhi, India. https://unesdoc.unesco.org/ark:/48223/pf0000260568. (Last accessed: May 8, 2020)
29. SDG Academy. The age of sustainable development MOOC. https://sdgacademy.org/course/the-age-of-sustainable-development/ (Last accessed: May 8, 2020).
30. Ipsos (2017) Pathways to Progress Global Youth Survey 2017 - Economic Prospects & Expectations. Ipsos Goalkeepers Global Youth Outlook Poll. https://www.ipsos.com/sites/default/files/2017-04/Pathways_to_Progress_Global_Youth_Survey_2017.pdf (Last .accessed: May 8, 2020).
31. Lam, K.-J. and D. Blakeley (2018) Challenges, Impacts and Benefits of Increased Youth Participation in Sustainable Development in Australia: Supplementary report for SDSN Youth Australia/Pacific Senate Inquiry Submission. SDSN Youth Australia/Pacific, Melbourne, VIC Australia.
32. Omisore, A.G., et al. (2017) Awareness and Knowledge of the Sustainable Development Goals in a University Community in Southwestern Nigeria. Ethiop J Health Sci, 2017. 27(6): p. 669-676.
33. Shehu, M. and H. Shehu (2018) Knowledge, Attitude and Perception About Sustainable Development Goals (SDGs) Among Clinical Medical Students of Bingham University Teaching Hospital, Jos. Journal of Health and Environmental Research, 2018. 4(4): p. 130-134.
34. Yamane, T. (2019) SDGs Awareness Survey of Hiroshima University Students. Center for the Study of International Cooperation in Education, Hiroshima University. https://ir.lib.hiroshima-u.ac.jp/en/list/recent_addition/item/48196.
35. Laloux, F. (2014) Reinventing organizations: A guide to creating organizations inspired by the next stage in human consciousness. Nelson Parker, 2014.
36. Waddell, S. (2019) Achieving transformational change. Integration and Implementation Insights. March 5, 2019. https://i2insights.org/2019/03/05/transformational-change/ (Last accessed: May 8, 2020).
37. Kotter, J.P. (2012), Accelerate! https://hbr.org/2012/11/accelerate (Last accessed: May 8, 2020). Harvard Business Review, November 2012.
38. Purcell, W.M., H.A. Hendriksen, and J.D. Spengler (2019), Universities as the engine of transformational sustainability toward delivering the Sustainable Development Goals: "living labs" for sustainability. International Journal of Sustainability Education, 20, 8, 1343- 1357. https://www.emeraldinsight.com/doi/full/10.1108/IJSHE-02-2019-0103, https://doi.org/10.1108/IJSHE-02-2019-0103
39. Heifetz, R.A. and M. Linsky (2002), Leadership on the Line: Staying Alive through the Dangers of Leading. Boston, Mass: Harvard Business School Press.
40. itdUPM. Innovative collaboration model: The experience of itdUPM. http://www.itd.upm.es/a-collaboration-model-for-the-innovation-in-sustainable-development/ (Last accessed: May 8, 2020).

41. Kotter, J.P. (1996) Leading Change. Boston, Mass. Harvard Business School Press.
42. itdUPM. Máster en Estrategias y Tecnologías para el Desarrollo. Título oficial universitario. Universidad Politécnica de Madrid, Madrid, Spain. http://www.itd.upm.es/masteretd/ (Last accessed: May 8, 2020).
43. Mazorra, J., et al. (2016) Using the Project Based Learning (PBL) Methodology to Assure a Holistic and Experiential Learning on a Master's Degree on Technology for Human Development and Cooperation. International Journal of Engineering Education, 2016. 32(5): p. 2204-2217.
44. itdUPM. Alianza Shire. Energy access to refugees and host communities. http://www.itd.upm.es/alianzashire/. (Last accessed May 8, 2020).
45. itdUPM. Cátedra IBERDROLA para los Objetivos de Desarrollo Sostenible. http://www.itd.upm.es/catedraods/ (Last accessed: May 8, 2020).
46. Climate-KIC. https://www.climate-kic.org/ (Last accessed: May 8, 2020).
47. UPM (2015). Seminarios UPM: Tecnología e Innovación para los Objetivos de Desarrollo Sostenible. Universidad Politécnica de Madrid, Madrid, Spain. https://www.upm.es/Investigacion/difusion/SeminariosUPM. (Last accessed: May 8, 2020).
48. Mazzucato, M. (2018), MISSIONS. Mission-Oriented Research & Innovation in the European Union: A problem-solving approach to fuel innovation-led growth. Directorate-General for Research and Innovation, European Commission, Publications Office of the European Union. https://ec.europa.eu/info/sites/info/files/mazzucato_report_2018.pdf (Last accessed: May 8, 2020).
49. Mazzucato, M. (2019) GOVERNING MISSIONS. Governing Missions in the European Union. Directorate-General for Research and Innovation, European Commission, Publications Office of the European Union. https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/governing-missions-report.pdf. (Last accessed: May 8, 2020).
50. European Commission. Horizon Europe - the next research and innovation framework programme. https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en (Last accessed: May 8, 2020).
51. Kanter, R.M. (2013) Three Things that Actually Motivate Employees. October 23, 2013. https://hbr.org/2013/10/three-things-that-actually-motivate-employees (Last accessed: May 8, 2020). Harvard Business Review, 2013.
52. AASHE (2020) STARS Aligned: Using the Sustainability Tracking Assessment & Rating System to Report on Contributions to the U.N. Sustainable Development Goals. Association for the Advancement of Sustainability in Higher Education: Philadelphia, PA, USA. http://aashe.informz.net/aashe/pages/2020_STARS_SDG_Publication. (Last accessed: June 19, 2020).
53. THE (2019) Times Higher Education (THE) University Impact Rankings 2020 metrics, https://www.timeshighereducation.com/files/university-impact-rankings-2020-metrics.pdf (Last accessed: May 8, 2020).
54. PRME (2019) PRiMEtime in Review – Good Practices in Responsible Management Education (part 2 of 2). Principles for Responsible Management Education (PRME), United Nations Global Compact. https://primetime.unprme.org/category/by-theme/reporting-by-theme/ (Last accessed: May 8, 2020).