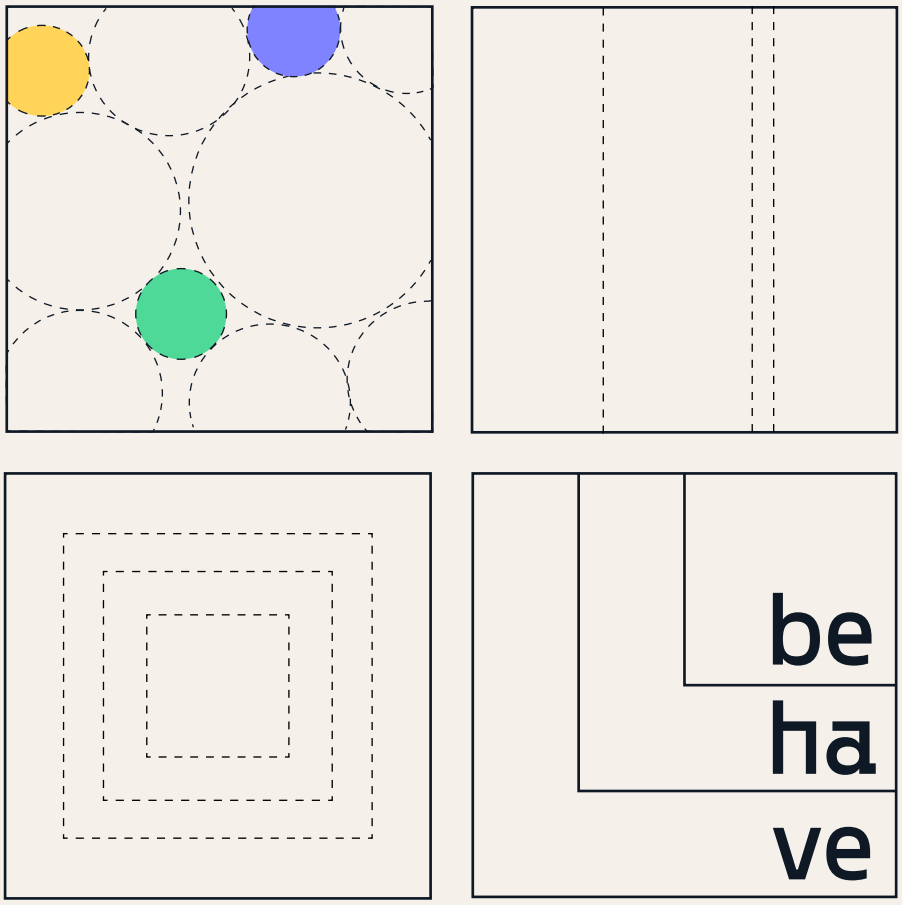
Sofia Cretaio



Mapping the commitment of Higher Education towards the Sustainable Development Goals

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Abstract

University campuses are wide and complex entities in which flows of people, activities, and spaces continuously interconnect, defining the campus' identity and giving life to scenarios in continuous transformation. Every tangible and intangible element of this system of relations contributes to the social, environmental, and economic impacts of the campus and its surroundings.
In such a complex context, where different actors engage at different levels, it is crucial to understand how universities are approaching and contributing to the achievement of the Sustainable Development Goals (SDGs). These goals should be seen as an opportunity and not as a drag; hence the need to develop a visualization tool to map the campus' sustainability and the community's perception of it.
A mapping approach could support the identification of gaps, the discovery and enhancement of already existing good practices, and the interpretation of new paths, for a more effective contribution to the 2030 Agenda.

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Introduction

How data visualization can support university campuses in the implementation and the achievement of the Sustainable Development Goals.

Every day the word 'sustainability' is heard or shown on the many interfaces people live with; the definition of 'something sustainable' is to be able to continue over some time. The concept of sustainability, at first so simple in its meaning, is also very wide and complex, often risking being used superficially and opportunistically. To ensure it does not happen, it is necessary to provide today's society with a series of elements, guidelines, and objectives that allow individuals to see sustainability from the right point of view. **But how can sustainability be visualized?** In 2015 the United Nations introduced the Sustainable Development Goals, 17 universal points that contain within them the missions to be implemented to improve the current cultural, economic, and social system. Each of these points focuses on a specific aspect, bringing greater clarity and going beyond the nexus of sustainability = environment / nature.

While, on one hand, a universal language that can be followed has been proposed, on the other, however, it is also necessary to understand how to achieve these objectives, what actions need to be taken and the effects they will have. Therefore, it is necessary to visualize how sustainability is sought. An effective approach is to define a state of the art of current scenario, to bring out the most salient or most critical aspects.

In the Systemic Design approach, the first necessary step to have full awareness and to define the state of the art of a specific environment is the holistic diagnosis, based on a wide and complex collection of data (Battistoni, Giraldo Nohra & Barbero, 2019). Depending on the context and on the actors involved, a series of topics are considered to guide the collection of quantitative and qualitative data. After the collection phase, the data are organized and translated into visual representations, usually inside a gigamap, crucial to understand the emerging priorities and the already existing interconnections. The final step of the holistic analysis is the interpretation of data, an essential phase to guide the identification of the pre-existing challenges, but also the future opportunities (Jones & Kijima, 2018). So, data visualization appears to be a useful tool to understand and interpret specific situations: this is due to the ability of visual representations to support the human's perception and ability to remember information and recognize patterns. Another strength of this approach is the level of accessibility it offers concerning the visualized content. Data language, made up of dots, lines, and graphs, is universal and able to be read and interpreted by a broader range of users. This is helpful when it comes to the SDGs that try to involve as many actors as possible and from different fields.

Among all the actors who are called to take part in the mission of the SDGs, Higher Education Institutions are certainly one of the most important. University campuses are not only containers of knowledge but the dynamics within them have a strong impact also in the industrial, research, and partnership fields; they are complex entities that can recognize the SDGs in different ways. Being able to map how the contribution occurs daily, and through which paths, can prove to be a very useful exercise for the campus itself. What this project aims at, is to define how the data visualization approach can help university campuses to improve the management of their resources and the implementation of strategies to ensure that their educational mission contributes to the achievement of sustainable goals.

The starting point of this project develops from the research program **QualENv - Change the Climate, co-funded by the Erasmus + Program of the European Union**. The program aims to improve the contribution of Latin American universities towards sustainable development, through environmental management of the various educational activities, plus the integration of strategies aimed at a more sustainable education (Istar, n.d.). To reach these results QualeENv aims to deliver tools and guides for impact analysis and SDGs mapping, and this is where this project finds its development. The identification of the main topics to be mapped inside the campus, the relationships between data and the SDGs, will guide to the final output: the design of a platform to allow universities mapping their contribution to the 2030 Agenda, helping in the identification of gaps, in the enhancement of already existing good practices, and in the interpretation of new paths.

Data visualization & sustainability

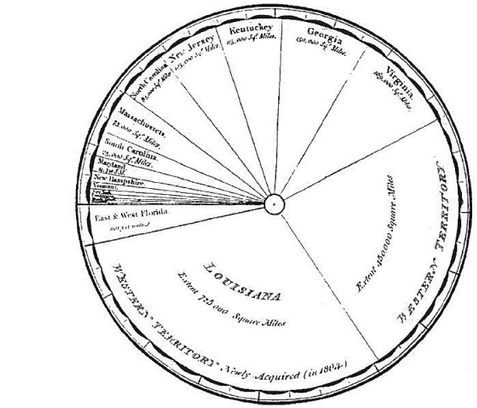
Data visualization & sustainability

1.1
Living in an era of information

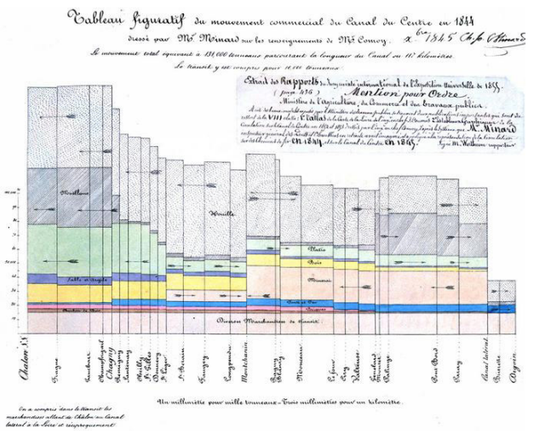
Every day, people are faced with thousands of information brought by scientific and technological improvements. This is one of the reasons why design of information has become one of the most significant disciplines of the contemporary age. Inside it, information design and data visualization contribute to the increase of the perceptibility of surrounding events but also to the creation of patterns within complex information. These two approaches have a strong educative and guiding side, still with an objective influence (Dur, 2014). Shortly, data visualization mission is to make more comprehensible the information that fulfill every aspect of life, transforming numbers and apparent chaos in a visual and less overwhelming shape.

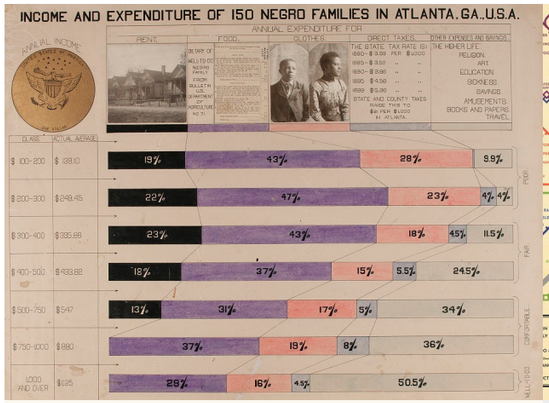
> **"Visualization of information ensures the ability to see events and connections between them in new and different ways and to reveal other invisible patterns"** (Dur, 2014)

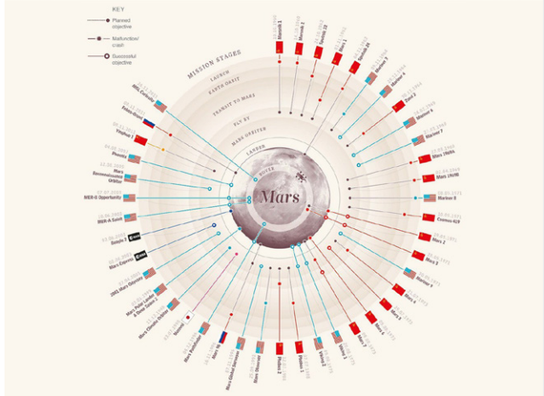
Even if similar in the approach, infographic and data visualization are two different things: while the first involves the creation of a story from a set of data, the second, which will be the main tool to guide this project, is a visualization of numeric values with charts, tables, and graphics, and a transformation of raw data information to visual presentations (Dur, 2014). As the definition states, the main aspect of this technique is to visualize data in a different way rather than texts, making comprehension more effective. Even if this approach is more recent in the design field, it has ancient roots in the scientific and computational fields. First examples of visual representations can be found already between the end of the XVIII century and the beginning of the XIX [Fig.1].

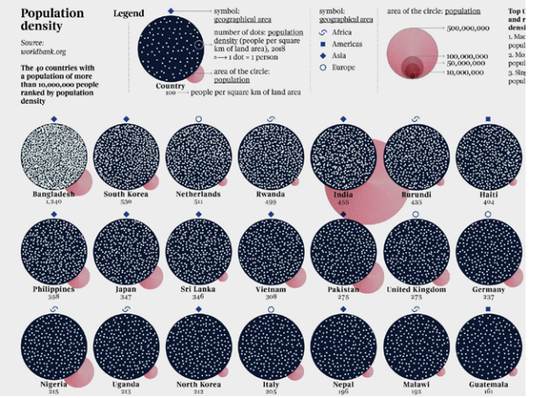


STATISTICAL REPRESENTATION of the UNITED STATES of AMERICA.









Evolution of data visualization charts
Fig. 1 - Statistical Representation of the United States of America, William Playfair, 1805
Fig. 2 - Tableau Graphique, Minard, 1844
Fig. 3 - The African American Experience, W.E.B. Du Bois, approx. 1900
Fig. 4 - Map of the London Underground, Charles Beck, 1933
Fig. 5 - Mission to Mars, Paul Butt, 2013
Fig. 6 - Population Density, Federica Fragapane, 2020

It was mainly during the '80 that the first modern classification of infographics emerged. One of the most famous classifications was created by Edward Tufte[1], 'the da Vinci of data', which identifies four graphical representations (Stabellini et al., 2017):

- → **Geographical maps**
- → **Time-series**
- → **Graphic representation of events and phenomena that develop in space-time**
- → **Relationships**

Then, the Big Data phenomenon came in the early 2000s, completely changing the way people work and interpret data. This new 'shape' of data introduced a new problem: among all these information which of them should be selected and communicated to the final users? This brought to the definition of data design, a discipline in which new languages combined with interactive interfaces allow data visualization to become more widespread and reader's friendly.

1.2
The role of design in data visualization

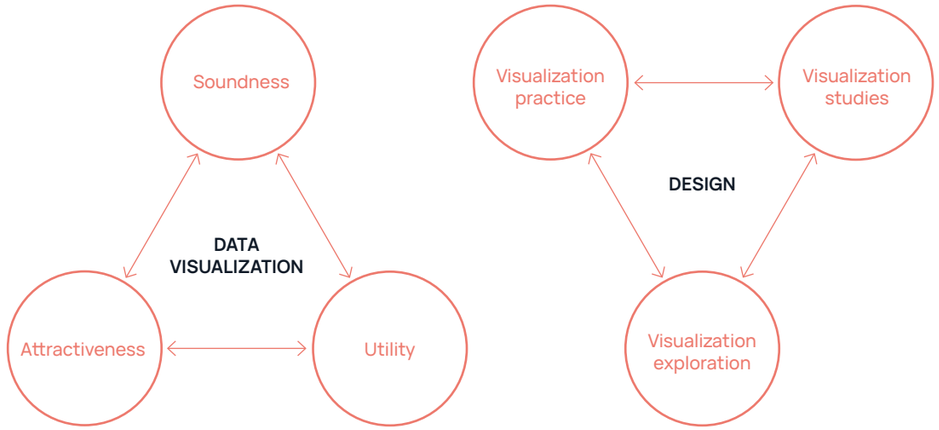
In the previous paragraph it has been stated the importance of information visualization because of its ability to transform complex and intangible information into accessible, visible, and palpable figures (Ciuccarelli & Ricci, 2008). It also emerged how this discipline has been always connected to science because of its origins. But nowadays, design disciplines are becoming more essential in this process. Design integrated in data visualization can be considered as a discipline that brings together practical and theoretical knowledge through different approaches like system design, user-centered design, or genius design[2]. Independently of the approach, the design process involves exploration, learning activities and constraints to develop new techniques to represent a given data set; it needs to consider three requirements [Graph.1]: utility, soundness, attractiveness (Moere & Purchase, 2011).

1 Is an American statistician and professor of political science and computer science. He is known for his writings on information design and for his pioneering role in the field of data visualization.

2 A design approach based solely on the wisdom and experience of the designers; their best judgment is used to make decisions as to what users want and design the product based on that judgment. User involvement, if it occurs, comes at the end of the process.

"A visual display of data should be simple enough to fit on the side of a van."

The Feynman-Tufte Principle



Graph. 1 - On the left, the three pillars for a balanced data visualization.
On the right, the three clusters in which design can influence data visualization.

1. **Utility** refers to functionality and usability and generally defines the effectiveness and efficiency of the visualization. This requirement is important as it guarantees objective comparison between different information.
2. **Soundness** is about the quality of the visualization managed by the algorithm. In other words, is about the effective functioning of the system that controls the visualization. The soundness should also allow other users to reproduce and/or improve the visual artifact.
3. **Attractiveness** can also be expressed as aesthetics, the beauty or appeal of the visualization. This requirement is not only about the visual form but also considers aspects like originality, innovation, novelty, and user experience. In addition, aesthetics can also refer to the used methodology or the structure of the visual solution.

Considering these requirements, Moere and Purchase provided a framework in which the role of design in information visualization is identified in three extremes [Graph. 1]: visualization practice, visualization studies and visualization exploration (Moere & Purchase, 2011).
The first extreme considers the business world, in which commercial enterprises and freelance designers create visualizations to be sold.
The second is oriented towards research activities to combine historical knowledge and application in computer science. Utility and soundness are the main requirements in this approach.

The third extreme is more practical but also more visionary: in this case the interest of the designer is oriented on the creation of innovative and provocative visual artifacts; the focus is on the attractiveness of the visualization. For this project the data representation will follow a mix between visualization studies and visualization exploration.

These theories support the idea of design being an inevitable part of the visualization process; the design discipline can enhance and should be integrated with the scientific tools that for decades have been considered the only ones able to create efficient artifacts.

1.3
Data visualization for a sustainable global approach

The actions of social, geographical, and economic environments can be translated into a huge amount of data, both qualitative and quantitative, that can work as a tool to read the trends of the current society. In this way it is possible to better understand what can be defined as sustainable or unsustainable, a distinction that now is more important than ever.

Without a context it would be impossible to extract observations from a series of data; the data itself would not have any meaning. The environment - considered as natural, industrial or individual - can be seen as the circumstance of visual artifacts under different point of view: for instance regarding climate, healthcare, and energy production and consumption (Stabellini et al., 2017). Representing this type of data can be an opportunity to discover and interpret everyday behaviors inside an individual's life but also inside organizations where the actions of a community can have a strong impact, both positive and negative. Big corporations, companies, but also institution like universities, need to become more aware of their role in following sustainable approaches. Data visualization can be a useful medium in the creation of new paths, the definition of new policies and the integration of new activities.

All the aspects that have been analyzed till now will be furtherly explored in the following chapters aiming at developing a mapping tool mainly focused on the implementation of the Sustainable Development Goals inside universities and Higher Education Systems.

2

The context

The context

2.1
Introducing the SDGs

The Sustainable Development Goals were introduced on the 25th September 2015, during the General Assembly of the United Nations, which involved 150 international leaders; the goal of this meeting was the definition of the Global Agenda for sustainable development[3] to be achieved by 2030 (Sustainable Development Goals, n.d.). The 17 Goals and the correspondent 169 targets represent a new approach by the United Nations to bring more awareness to the unsustainability of the actual development system.

To be precise, the SDGs are not something new: they are an extension of the eight Millennium Development Goals, defined in 2000, that the ONU engaged members committed to realize by 2015. However, the 17 Goals represent an evolution, as the concept of sustainability has been extended to include also the social and economic side, creating a more integrated vision.

The 2030 Agenda is an ambitious project that aims to complete complex actions like reducing poverty, fighting against inequalities and putting effort towards more sustainable consumption.

3 Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (Brundtland Report, 1987)
The definition of sustainable development was defined in the World Commission on Environment and Development's 1987 Brundtland report "Our Common Future".

Fig. 7 - Icons of the 17 UN SDGs

2.2
Universities and SDGs

The Sustainable Development Goals have universal validity, meaning that all countries must contribute to them; consequently, it is important that each entity inside a country - like private companies, public organizations, and universities - acts towards the fulfillment of these goals. The sustainable topic inside universities is not new; it was introduced around twenty years ago, but only recently campuses have started to realize how necessary it is to radically change their communication systems and the spread of knowledge about these themes. In an article for "Il Corriere della Sera" Eugenio Morello identifies eight reasons why sustainability can be a turning point to raise the social mission of campuses (Morello, 2019); among them, the role of universities as nodes of global networks able to connect cities and nations and to spread stronger values. On a global scale, the activity of the ISCN (International Sustainable Campus Network) has particular relevance; its mission is to provide an international forum to support higher education institutions in the exchange of information, ideas, and best practices for achieving sustainable campus operations and integrating sustainability in research and teaching (The International Sustainable Campus Network, n.d.). Currently, the network can count on 90 universities from over 30 countries.

In Italy, a similar activity is carried on by the RUS organization (Rete delle Università per lo Sviluppo sostenibile) that since 2015 has been grouping various universities in a unified network to spread the culture and the good practices of sustainability (RUS, n.d.). At the moment, 79 universities are participating.

"Universities should unlearn to be learning organizations themselves and be able to transcend the rigid disciplinary fences. This sounds like a pure utopia, but..."

Sonetti et al., 2020

Another point that can push Higher Education Institutions involves the students themselves, as representatives of a community in which is fundamental to adopt more sustainable and innovative approaches. In addition to this, universities should enable young people to acquire the competencies for citizens to live sustainably, at personal, professional, and community levels (Sonetti et al., 2020).

In this context, the SDGs represent a support for university campuses to integrate the different facets of sustainable development. However, some risks are deriving from non-efficient management of these goals: in the actual state of the art, SDGs are often used as a branding tool to promote the 'green' identity of the university, or they are managed as a separate entity from the study plans, under the shape of workshops or extracurricular activities.

To avoid these kinds of approaches to prevail, vanishing the real objectives on which the SDGs were created, six ways, with which universities can include them, have been identified (Sonetti et al., 2020):

1. **Including** them in all the courses and research training
2. **Delivering training** on the SDGs to all the professors and staff
3. **Offering executive education** for external stakeholders, based on the goals
4. **Defending education policies** that support education for SDGs
5. **Involving students** in the co-creation of learning environments that sustain learning about SDGs
6. **Develop real-world collaborative projects** aiming for change

2.3
Italian universities

Regarding the Italian situation, a reporting initiative among the Education Working Group (EWG) of the Italian Network of Sustainable Campuses (RUS) identified eleven steps (Sonetti et al., 2020) in which sustainable education could become a reality inside the country. Two of these steps appeared to be particularly suited for the future development of the project:

- → **DRAW A MAP:** create a template in which each governing body can map the improvements around sustainability topics. The template must guarantee to the campus the ability to understand which goals pursue in a priority way and why. Campuses like Polytechnic of Turin and Milan are already pursuing similar activities whose goal is to understand how and where the university is obtaining positive results in comparison to the challenges promoted by the UN.
- → **GIVE A COMPASS:** supply a mapping toolbox to keep track of the commitment towards SDGs. In this case, the role of the Green Team[4] from the Polytechnic of Turin is strategic in orienting the University towards a better consciousness of social and environmental challenges.

These two steps are the starting point to introduce the key topics of Chapter 4, like the importance of keeping track of the progress achieved through the mapping and visualization of data.

2.4
The future role of universities

For universities the SDGs also are a holistic challenge as all disciplines and activities are affected (Idowu et al., 2020). As previously mentioned these goals are multidimensional and interconnect among them; for this reason, what it is important to understand, before acting practically, is that universities are not only collectors of knowledge, but also **microcosms of society** (De la Poza et al., 2021) that promote community engagement and relationships with external stakeholders, with a huge impact on the industry world. It is possible to summarize the role of universities under four voices: research, teaching, governance, and community; each one of these voices must find a way to include the SDGs even if it requires a complete renovation of the traditional concept of university.

4 A team of professors, students, administrative staff and researchers that encourages PoliTO in addressing environmental and social challenges.
Established in 2015, the team will guide the University towards the sustainability mission defined in the strategy plan Horizon 2020, to integrate global sustainability in all the facets of the academic institution.

2.5
The practice of sustainability reporting

There are many ways to communicate the contribution to improve or change the environment; one of the tools that are gradually becoming a prerequisite for organizations, companies, and public bodies is the practice of Sustainability Reporting (SR): a document, in a papery or digital format, generally drawn up once or twice a year, that collects information about the values, the mission, and the environmental, economic and social performances carried out by the author of the report for a transparent disclosure. Future objectives and strategies that will be implemented can also be presented inside.

The reasons why this type of publication is gaining ground are quite simple and shared:

- → It is a document that actors can draw up at will, with the information and data they deem most appropriate and most representative of their organization for the purpose to attract new stakeholders or reassure the existing ones
- → It is a document born to be outside-oriented. Information of public value are presented inside it and can be easily consulted even by users outside the organization, with the possibility of approaching new customers or partners

While this freedom in the realization process is positive, on the other hand, it also has some negative aspects: there is a risk that these reports are used as a tool to glorify the activities carried out by the organization, that could choose to 'hide' the actions in which sustainable principles have not been reached; furthermore, the freedom of customization can make it difficult, for external users, to compare same indicators in different reports.

There are currently two trends in sustainability reporting:

- → Annual reports drawn up according to the principles of CSR (Corporate Social Responsibility)
- → Sustainability reports structured based on GRI (Global Reporting Initiatives) standards

In any case, the lack of specific guidelines in this direction still makes the practice very varied and not enough interconnected.

As mentioned, sustainability reports can be shared by organizations through a printable and downloadable format, typically a PDF or an interactive PDF or, in some cases, they can offer ad hoc and interactive platforms. The interesting aspect of this type of communication is that it involves a slightly different type of communication than financial reports, which for a long time were the only type of report produced by companies. The topics are generally aimed at the reduction of emissions and energy, the use of renewable sources, the impact of transports, and the management of raw materials and wastes: many aspects therefore linked to environmental sustainability. However, following the introduction of the SDGs, the contents have also been oriented towards more social and governance aspects, including any data related to workers and company policies.Chapter 3 will be entirely dedicated to the analysis of case studies from the academic, industrial, and geographical world.

2.6
Sustainability reporting and universities

Universities have a twofold mission: provide students with new competencies to create a more sustainable society and reduce the environmental impact of their operations (Alonso-Almeida et al., 2015).

For this reason, the practice of SR in the university world is becoming more and more successful; these documents are useful both for promoting curricular and extra-curricular activities to future students, and for demonstrating to partners and stakeholders their contribution to social and environmental issues.

In particular, three objectives that legitimize the SR in universities can be identified (Alonso-Almeida et al., 2015):

1. **Assess Sustainable Development [Graph. 2]**
2. **Communicate sustainability efforts and progresses**
3. **Develop a tool for analysis among universities**

While the European Commission defines a series of guidelines[5] for sustainability reporting in corporations, the world of universities is still left with no indication about this practice. At the moment, the closest regulation is the **Research document n. 7 – Social reporting in universities**, promoted by the National Group for Social Reporting (GBS), which establishes that reports of social matter should provide stakeholders with a comprehensive portrayal of university activities and results and should consist of at least three sections (Nicolò et al., 2021):

1. **University identity**
2. **Reclassification of financial data**
3. **Social issue**

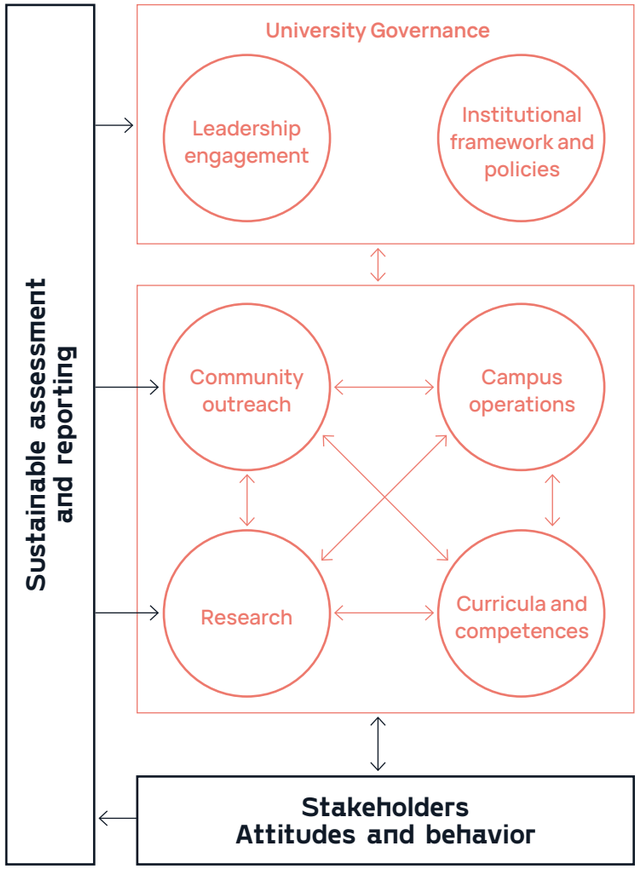
These three aspects are not sufficient to complete a sustainability report and need to be implemented in line with the targets introduced by the SDGs. According to many students, the SR practices are still in an embryonic stage both in terms of the number of universities reporting and the significance of the information provided to stakeholders (Nicolò et al., 2021).

The same students then proposed a series of solutions that could improve the current state of the art: many options involve the use of technological systems and digital innovations to overcome the limitations imposed by standard reporting formats. According to this vision, websites, whose interactivity can improve dialogue and engagement with students and stakeholders, take on particular importance.

5 Directive 2014/95/EUDirective 2014/95/EU – also called the Non-Financial Reporting Directive (NFRD) is a law defined by the European Commission that requires certain large companies to disclose information on the way they operate and manage social and environmental challenges. This helps companies to develop a responsible approach to business.
In June 2017 the European Commission published a list of guidelines to help companies disclose environmental and social information implemented in 2019 with additional guidelines about climate. related information.

Considering that all universities have a website, taking up the third objective previously mentioned, it is easy to think about the possibility to integrate a mapping tool for the analysis of campus performances within the website itself or via an external platform.

Relating to sustainability reporting, it is possible to analyze the rankings trend, a classification of universities that have shown particular commitment achieving sustainable practices. With respect to the SDGs, THE Impact Ranking is the most striking example.



Graph. 2 - Model for sustainable development in universities

CASE STUDY

THE Impact Rankings

The Times Higher Education Impact Rankings are global performance tables that assess universities against the United Nations' Sustainable Development Goals (SDGs) (Times Higher Education, n.d.).

Published once a year, the report collects and compares universities' performances under thirteen indicators referring to five different voices [Fig. 8]: teaching, research, citations, international outlook, and industry income. Some of the data are collected using a survey, others are collected directly from universities; for each SDG, a specific query has been created, narrowing the scope of the metric to publications relevant to that goal (Times Higher Education - THE, n.d.).
In 2020, 1.397 universities were included in the report, while in the 2019 edition only 450 applied to the ranking. This data shows how influential the THE's ratings are getting, not only for academics and managers but also for policy makers and businesses that want to involve universities in future projects.

Rankings like the THE are quick and easy-to-read tools that have been recognized as successful for multiple reasons: metrics powerfully attracts participants, visual comparisons are getting more sophisticated year by year, and comparing approaches tend to lead to effective dynamics of competition (Lim, 2021). However, the risk of this numerical classification is to reduce the commitment of a university in improving its environmental and social impact to a mere number, and to the hope of getting a higher place in the ranking. This is the main difference from the practice of sustainability reporting: here universities are required to show and describe how they were able to reach the results, without any kind of comparison if not the one made by the user's interpretation of information.

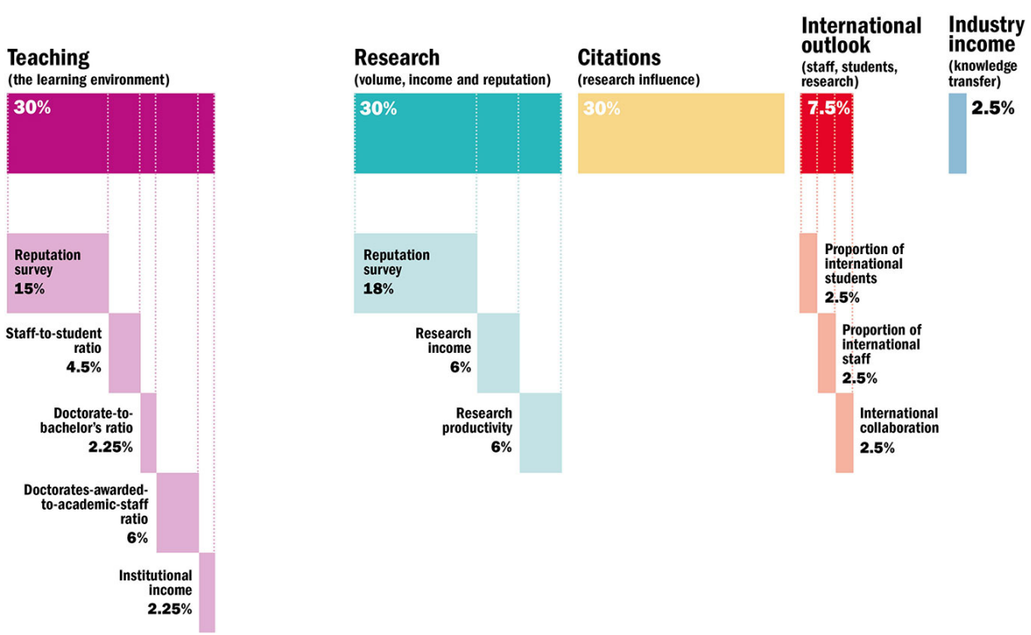
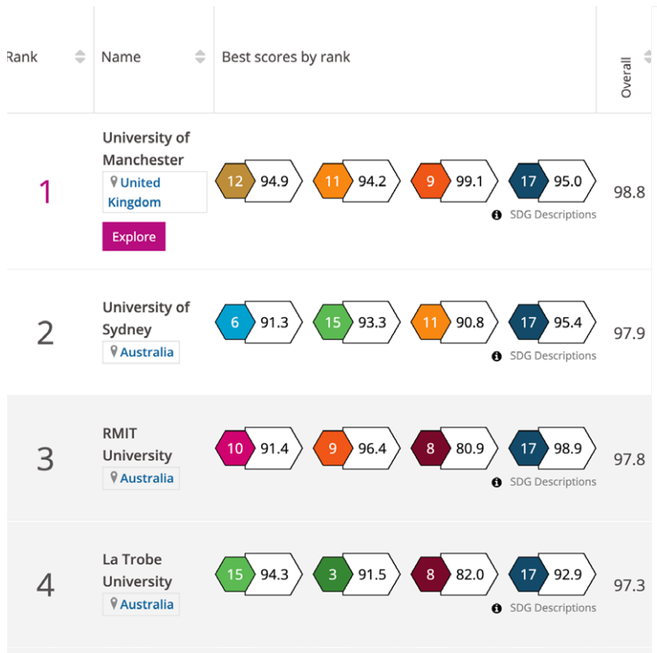


Fig. 8 - Methods of analysis of THE Impact Rankings 2020



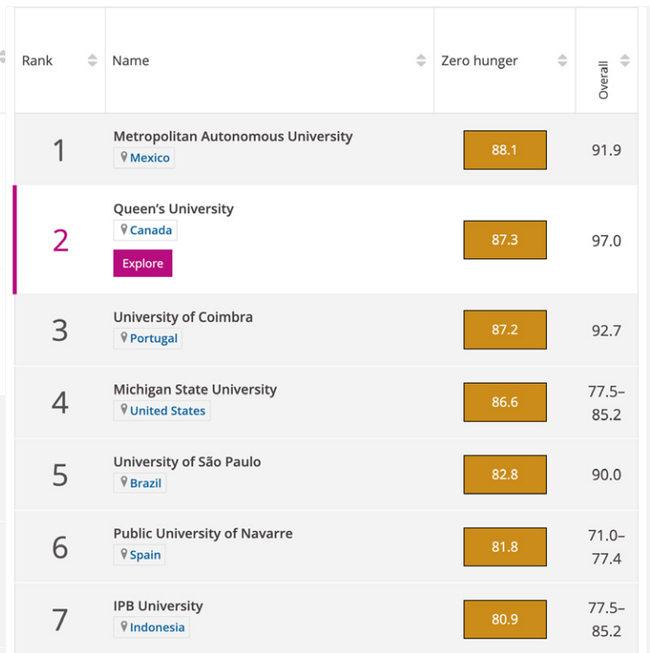


Fig. 9 - On the left, example of the overall rankings
On the right, rankings regarding the SDG 2 - Zero Hunger

2.7
Interactive Mapping Tools

Technological development and recent events related to the Covid-19 pandemic have made it clear how the digital world and the tools that allow access to it are an essential part of our daily life. By now, all large companies and public institutions have their website with which they communicate with their stakeholders. Digital interfaces have become the business card with which actors share to visitors their strategies, goals, and strengths. However, these interfaces are not just showcases in which display and sell products, they allow greater freedom during the user's navigation: he can choose how and when to consult specific information. The interesting aspect is therefore the interactivity that the user can experience, on more or less wide levels, in using these platforms. So, what makes digital interfaces so promising is not the speed or the greater precision with which information can be consulted, compared to analog supports, but the possibility to carry out new actions, introducing unexpected perspectives on the use of content (Mauri & Ciuccarelli, 2013).

The possibilities of creating digital and interactive contents also prove to be useful in the context of data visualization; the static representations of graphs often limit the possibilities of interpretation and comparison, moreover, the digital format allows the information to be updated much more easily, even in real-time, ensuring greater reliability and transparency of the information. Concerning these aspects, the combination of digital tools with sustainability reporting practices can create the basis for a new communicative approach.

However, the creation of digital interfaces for data mapping requires specific technical skills and a long and complex design process, both in terms of data collection and the construction of the interface itself. Not all companies and universities that are approaching sustainability reporting practices own skills and tools to create, and above all to maintain, this type of interfaces. For this reason, it becomes increasingly necessary to create shared platforms, in which each organization can take part, create its area and show public data and information representative of its commitment. In this way, new networks will emerge, and sharing and comparison of information will become central values.

Nowadays, multiple platforms that explore the concept of interactivity and open-source access to resources are being developed: in the field of data visualization, of particular interest is the Goal Tracker Platform, that uses data to map the contribution of countries to the SDGs; in the educational field, a promising activity is carried out by the LeNs Platform, a project that involves several universities around the world, including the Polytechnic of Milan and Turin; on this platform, the world of design seeks to bring users closer to new sustainability practices by offering free access to courses and good practices.

CASE STUDY

The Goal Tracker Platform

Goal Tracker is a digital platform that enables countries and their citizens to visually track the implementations of the SDGs and the related national policies (Goal Tracker Platform, n.d.).
Each country can participate in this platform, where complex data about sustainable development are represented in a tailored shape to offer a clear view of the information.

This platform offers the opportunity to explore data related to the SDGs, offering insights about geography, policies, and social tendencies. The visual representation helps users to understand existing gaps, with the possibility to download the data sources [Fig. 10].

Up today, South Africa, Colombia, Tanzania, and Sweden are participating in the project developing their data platform, collaborating with their statistics agencies and consulting sources like the United Nations, OECD, and the World Bank.

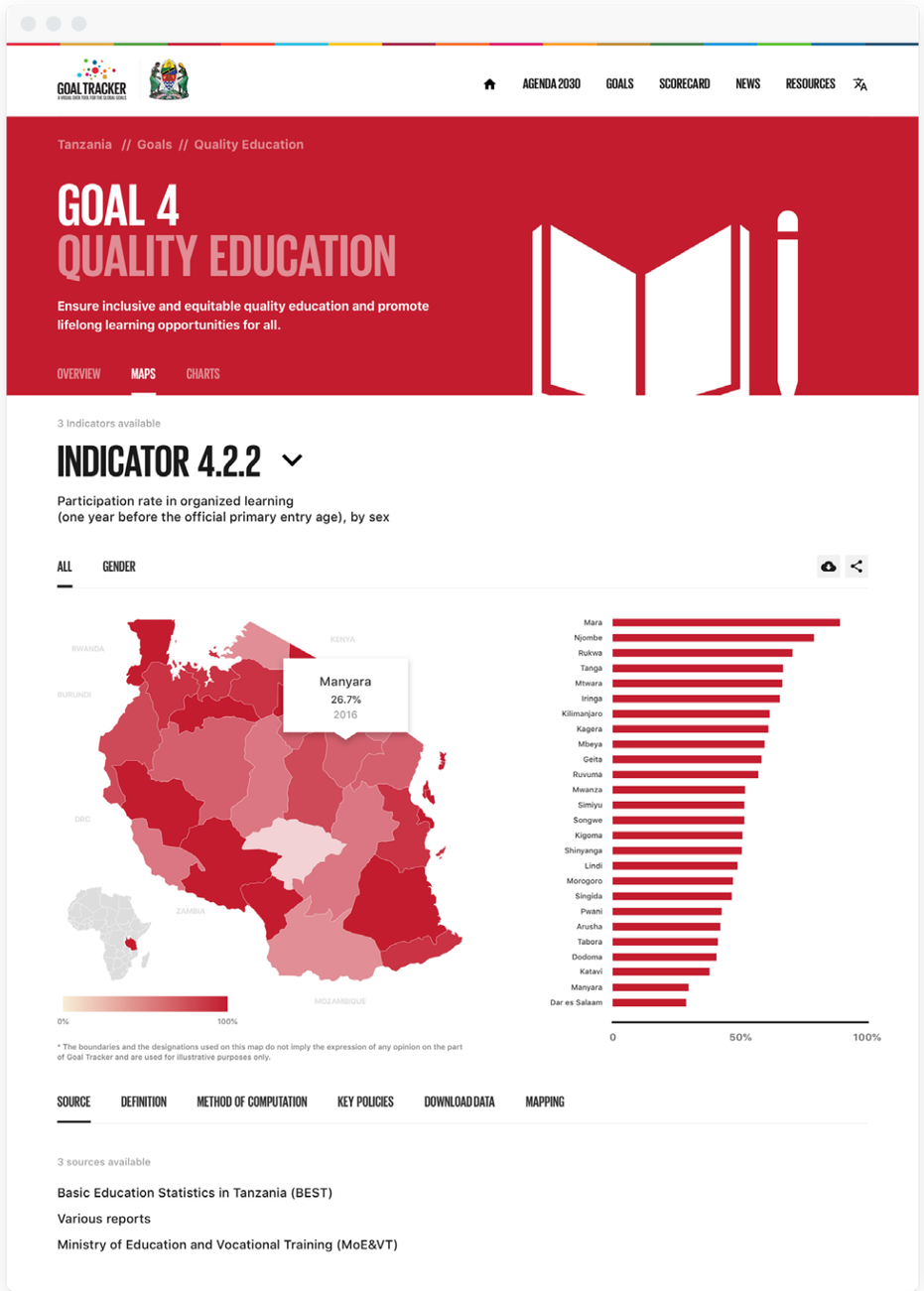


Fig. 10 - Mapping interface of the Goal Tracker Platform

CASE STUDY

LeNs – The Learning Network on Sustainability

LeNs is a multi-polar and international network of Higher Education Institutions, for curricula and life-long learning development capacity, focused on sustainability and System Design. The network is composed of 155 universities organized in 18 regional networks (LeNs Lab, n.d.). The project was firstly developed in the time-frame 2007-2010, supported by the Asian Link Program by the European Commission and it saw the involvement of seven Design universities from Europe and Asia. After a couple of years, in 2013, the project got amplified with **LeNSes** (the Learning Network on Sustainable energy system) involving European and African universities with the funds of the Edulink II program by the European Commission. The project was supposed to last three years but, thanks to its success, it is still working today, and it has evolved even more: the last step of this network of universities was the creation of **LeNSin** (the International Learning Network of networks on Sustainability), born in 2015 and supported by The European Commission and ERASMUS+; it involves 36 universities from Europe, Asia, Africa, South America and Central America (Vezzoli, n.d.).

Among the many outputs that these networks were able to realize during their years of activity, two are worthy of mention: **LeNSLab and LeNS Platform.**

LeNSLab is a network of laboratories for the development and diffusion of knowledge through collaboration with researchers, professors, designers, companies, organizations, education institutions, and students.
The laboratories offer support and consultancy for the development of products, services, and systems, focusing on the innovative and sustainable level of the proposed solutions.

The LeNs platform is a digital and interactive tool open to students and educators [Fig. 11]. The platform uses a learning-by-sharing approach to promote a new generation of designers capable to contribute to the creation of a sustainable society for everyone (LeNS International, n.d.).

The platform is organized in five areas: courses, contents, tools, projects, and study cases.

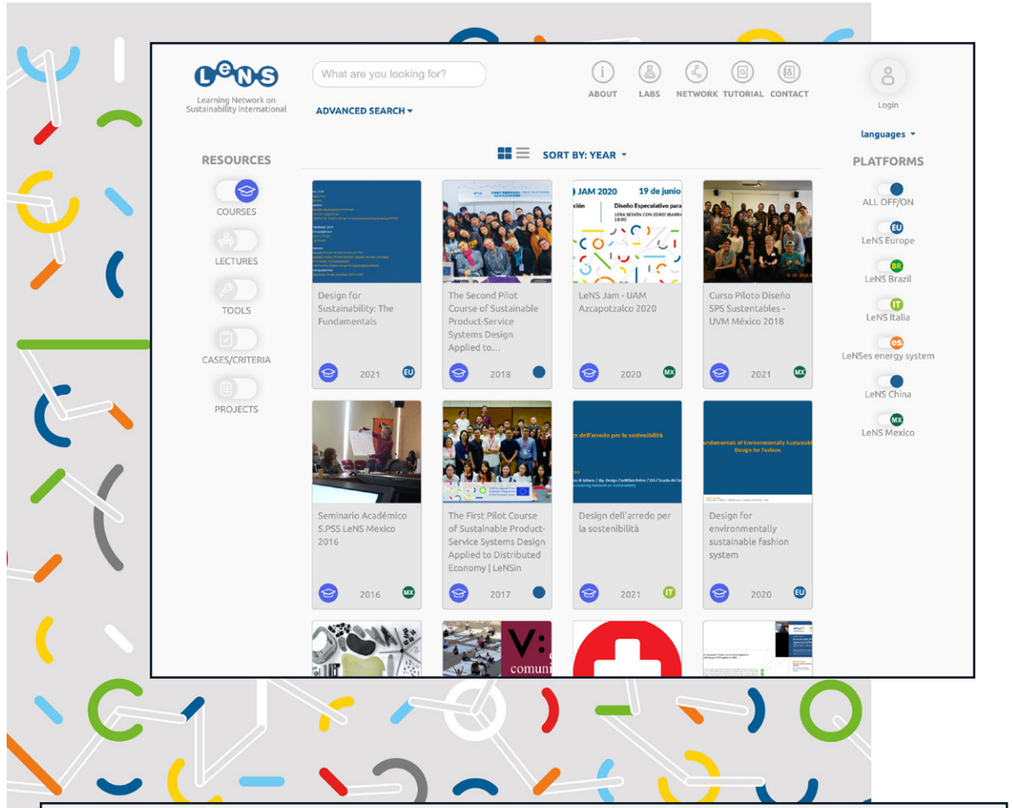
The 'Courses' and 'Contents' pages offer a wide variety of video lessons, slideshows, and written documents about Design for Sustainability, Sustainable Product-Service Systems, and Distributed Economies. All the sources are downloadable for free and can be modified according to the user's needs.
The platform also offers the 'Tools' section where the user can download different libraries and toolkits useful to orient design processes towards more socio-ethical and environmental approaches [Fig. 12]. Then there is the 'Project' section where users can upload their projects and receive feedback from teachers or from the Lens community. The last section is dedicated to 'Study cases' to offer inspirations and insights from best practices.

This platform is a clear example of how sustainability education can be spread via websites and interactive platforms; students and teachers will feel more involved and more aware of these practices, and this will push more institutions to join the existing networks.

2.8
Conclusions

In this chapter, it has been investigated the impact that the Sustainable Development Goals are having on entities like universities, which roles and activities are fundamental to shape new competencies and behaviors for a more sustainable society. To do so, different tools can be used, especially in the field of data visualization and reporting activities.

In the next chapter analysis of the state of the art of statics and dynamic reporting activities will be carried out, in order to understand which paths already exist and which ones are missing or need to be further developed.



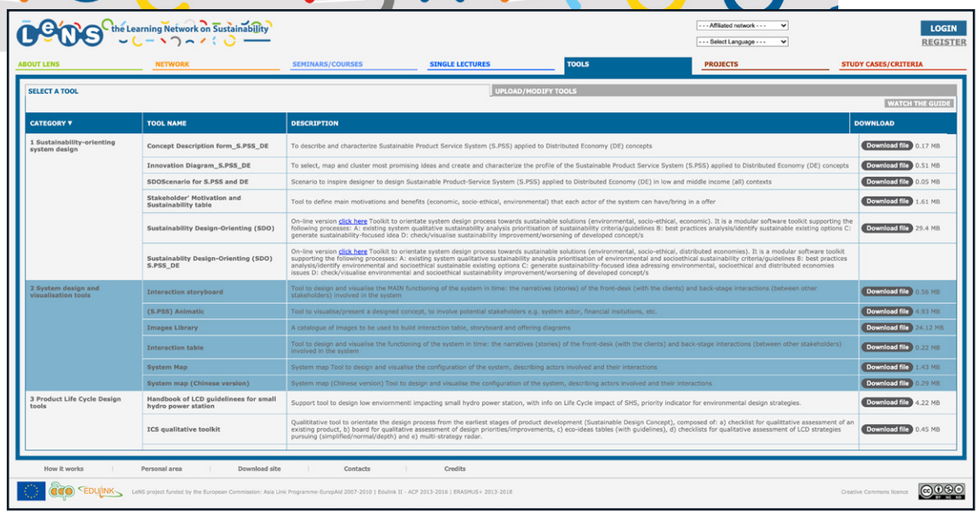


Fig. 11 - Homepage of the LeNs platform - Learning Network on Sustainability International
Fig. 12 - TOOLS section on the LeNses platform

3

Scenario analysis

3.1
A review of the state of the art

The study of the context allowed to understand which role universities cover in the dissemination of the SDGs and to improve their commitment. The analysis of the state of the art completes the research phase and lays the ground for the definition of the concept. Even if the focus of this project is on the academic field and its relationship with the SDGs, wider boundaries of the analysis have been settled, including examples from the corporate world and countries setting. Also, considering the interactive mapping interfaces as tools not fully adopted yet, both static and dynamic reports have been considered. The aim of this analysis is to investigate the complex structure of these case studies and understand how data visualization is helping in communicating the different information to the user.

Each of the 19 case studies has been analyzed under eight items:

1. Author
2. Typology
3. Link / Source
4. Main Goals
5. Resources & Services (only for dynamic platforms)
6. Typology of Data Viz
7. Efficacy of the source
8. Other info

Case studies

Static reports

1. PoliTO Sustainability Report 2019
2. University of Bologna on UN-SDG 2019
3. University of Gloucestershire 2018-2019
4. University of Manchester- SDGs Report 2019
5. Aalto Sustainability Report 2019
6. Lavazza Sustainability Report 2019
7. Ferrero Sustainability Report 2019
8. FCA Sustainability Report 2019
9. SDG Development Report 2020
10. The SDG Accord 2020

Dynamic reports

11. SDGs Global Dashboard
12. Green Growth Knowledge Platform
13. The Known SDGs
14. SDG Index & Dashboard
15. SDG Impact & Assessment Tool
16. SDG&Me
17. Aalto App
18. AWorld – Act Now
19. SDGs in Action

PoliTo Sustainability Report 2019

AUTHOR: Green Team Politecnico di Torino

TYPOLOGY: Annual Sustainability Report

LINK: campus-sostenibile.polito.it/it

MAIN GOALS

Show the positive effects of actions undertaken inside the Campus, in launching initiatives and providing solutions.

Highlight the significant contribution of the participation in the task forces organized by the Italian University Network for Sustainable Development (RUS).

Sharing of good practices, competencies, and experiences.

The report focuses on sustainability actions undertaken from 2017 to 2019 by the PoliTO community and coordinated by the Green Team.
The actions are reported and mapped on the guidelines defined for five action fields in the Programmatic Document for 2018-2020.

- → Energy and buildings
- → Mobility and transport
- → Urban outreach
- → Food, water, and waste
- → Communication

The SDGs mapping considers three main clusters: Teaching, Research, and Third Mission.

TYPOLOGY OF DATA VIZ

- → **Exploratory mapping**
- → **Research metrics**
  Data collection based on three inputs:
  1. Definitions and description of each SDG
  2. Abstract of five publications identified as the more pertinent to each SDG (according to Google Scholar)
  3. SDG definition and pertinent publications selected by the Green Team members
- → **Bubble Chart**
- → **Diagrams & Linear Graphs**
- → **Alluvial Diagram**
- → **Survey Results**

EFFICACY OF THE SOURCE

The report does not follow the vertical analysis of the SDGs; a section of the report is dedicated to the 17 goals, but the analysis is more oriented towards the perception inside the campus. The data visualization is multiform and shows the progress of the University in energy/ water consumption and self-sufficiency.

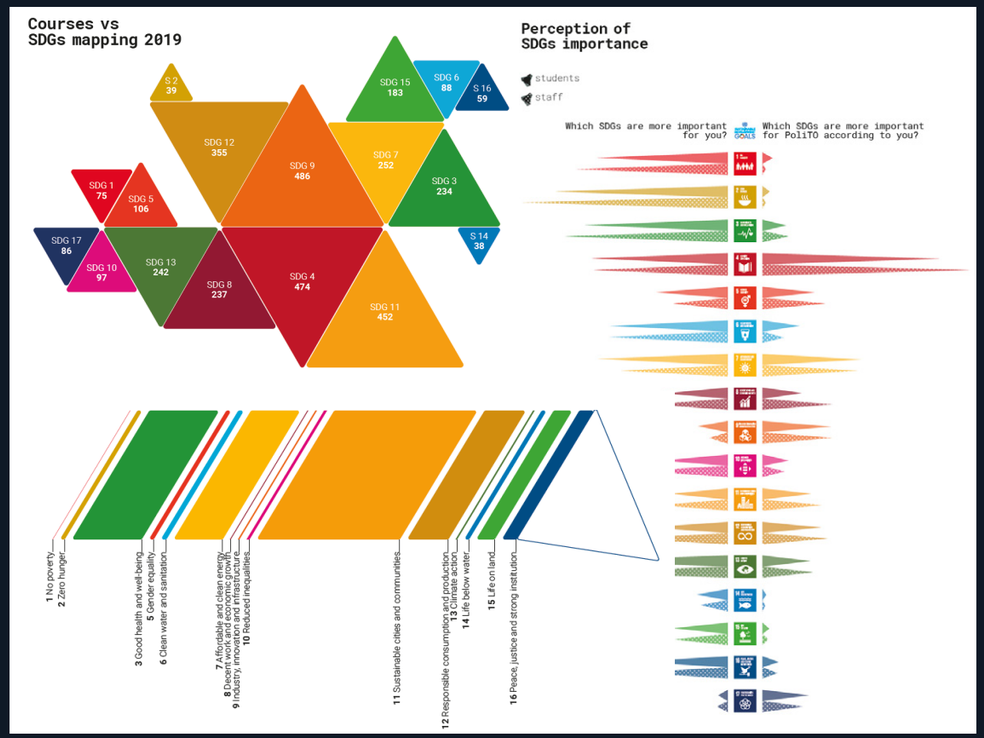
OTHER INFORMATION

A section of the report is dedicated to the theme of Energy Consumption (Primary Energy, Electricity, Thermal Energy) also considering the capacity of the Campus to produce electricity. The section considers the goals and the objectives about the buildings and facilities of the Campus, analyzing the results achieved both in the internal and external community of the Campus.

All the data collected regarding energy and water consumption are not counted or related to the SDGs but they are considered inside the sustainable path of the Polytechnic of Turin. It is also important to consider that part of the analysis of the SDGs is related to the perception of students and teachers. Usually, this aspect is less perceived inside the community living on the Campus.

In addition to the initiatives developed in each Green Team's action field, this report presents three cross-cutting initiatives:

- → Mapping activities of SDGs in University initiatives and scientific production and aimed at raising awareness on SDGs in the research environment
- → #myPoliTObottle campaign
- → Pilot study on ecological footprint, developed in 2017



University of Bologna on UN-SDG 2019

AUTHOR: University of Bologna

TYPOLOGY: Annual Sustainability Report

LINK: site.unibo.it/almagoals/en

MAIN GOALS

The University has integrated the 17 Goals in its mission and strategy, from the Strategic Plan to the many activities of the institution.

Since 2016, to systematically monitor the progress towards SDGs, the University has developed the Report on the UN Sustainable Development Goals. This public document provides a reading of the University's contribution in favor of the 17 SDGs.
In addition, the AlmaGoals website shows all the contributions and the commitment of the University of Bologna to the advancement of the United Nations 2030 Agenda, by presenting the information described in the report.

Each of the 17 Sustainable Development Goals is reported concerning the four dimensions carried on by the University:

- → Teaching
- → Research
- → Third mission
- → Institution

Data are collected using a set of metrics specifically formulated to match and integrate with the institutional documents adopted by the University of Bologna.

TYPOLOGY OF DATA VIZ

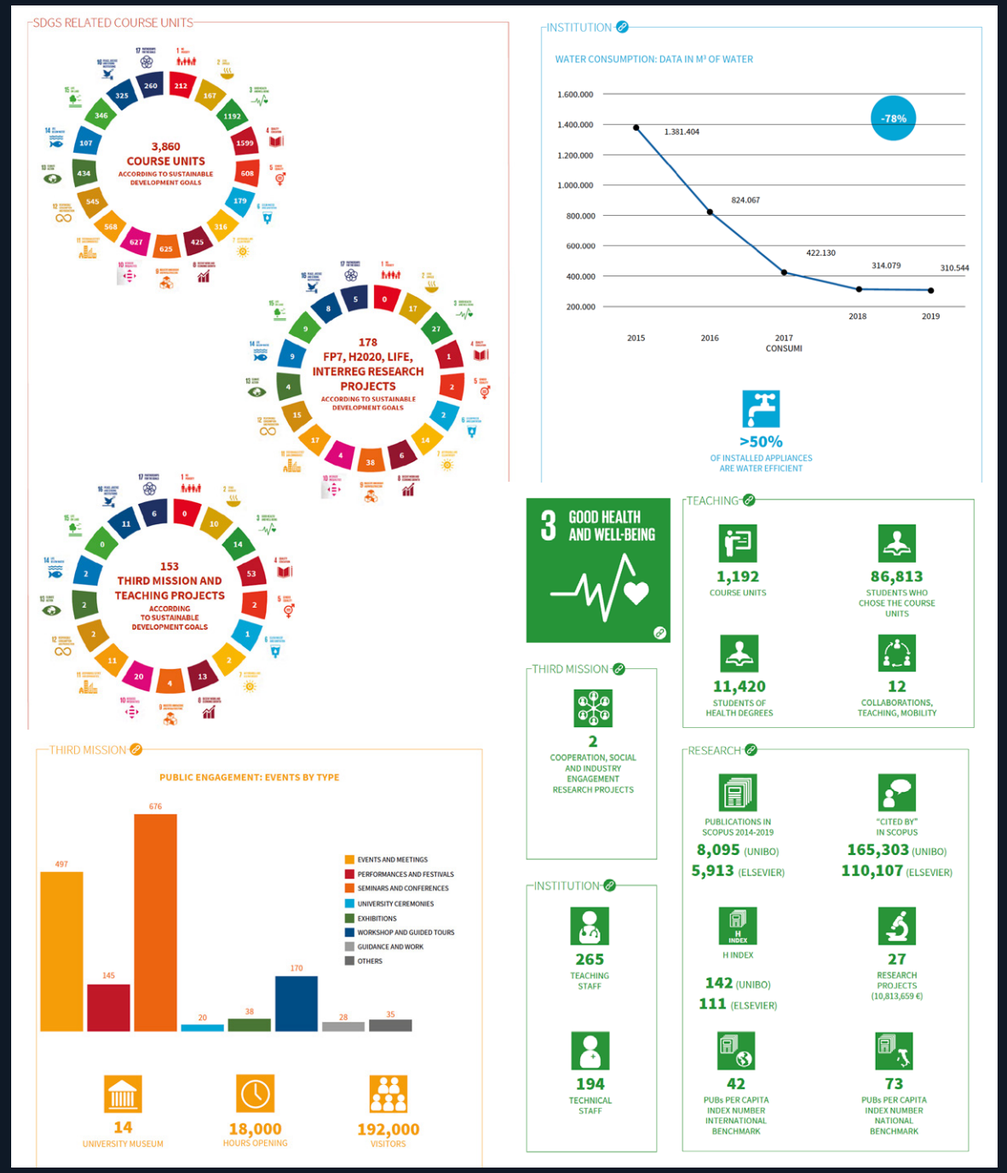
- → **Pie Chart**
- → **Bar Chart**
- → **Category numbers**

EFFICACY OF THE SOURCE

The report is full of information expressed synthetically. A lot of aspects are visualized through numbers that risk to remain without a real and useful interpretation for the user. There is a strong focus on the good practices and projects supported by the University.

OTHER INFORMATION

AlmaGoals website
On the web page, it is possible to have a look at University's projects, missions towards SDGs, and more specific information about the various actions related to the SDGs.



University of Gloucestershire 2018-2019

AUTHOR: University of Gloucestershire

TYPOLOGY: Annual Sustainability Report

LINK: sustainability.glos.ac.uk

MAIN GOALS

The report shares the sustainable impact through learning, research and partnerships, and the ongoing work to reduce the negative impacts of running the University. It covers the five goals of the Sustainability Strategy:

- → Leadership and Governance
- → Student Experience
- → Academic Innovation
- → Business Operation
- → Engagement and Partnership

This report offers an overall view of sustainable development and enables public scrutiny of the performance by stakeholders inside and outside the University. It is approved by University Executive and University Council and guides the annual planning and priority setting.
Its goal is to explain top risks and priority challenges, linked to the performance improvement targets of the University's externally audited Environmental Management System (EMS).

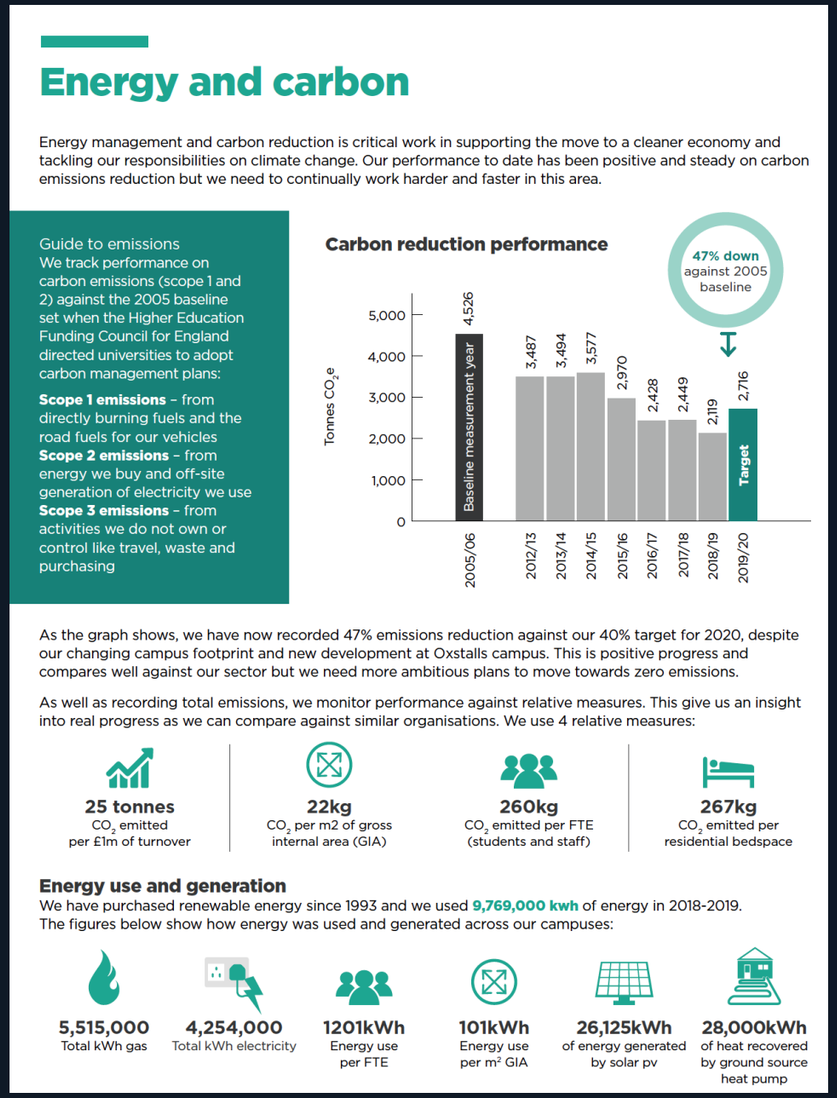
The report also shows the important material impact the University can have through integrating sustainability into students' development and academic activities.

TYPOLOGY OF DATA VIZ

- → **Bar Chart**
- → **Pie Chart**
- → **Progress Table**
- → **Survey % category results**
- → **Textual description**

EFFICACY OF THE SOURCE

The report does not follow the vertical analysis of the 17 SDGs, offering a different approach from other academic reports; in this way, the University can focus the reader's attention on the activities that are considered the most deserving of a mention and then, in the conclusion, see how these aspects impact specific SDGs. The information collected are mainly expressed in a textual way, combining sometimes charts and tables to monitor the Campus's progress in its environmental impact, also considering settled goals.



Energy and carbon

Energy management and carbon reduction is critical work in supporting the move to a cleaner economy and tackling our responsibilities on climate change. Our performance to date has been positive and steady on carbon emissions reduction but we need to continually work harder and faster in this area.

Guide to emissions
We track performance on carbon emissions (scope 1 and 2) against the 2005 baseline set when the Higher Education Funding Council for England directed universities to adopt carbon management plans:

Scope 1 emissions – from directly burning fuels and the road fuels for our vehicles
Scope 2 emissions – from energy we buy and off-site generation of electricity we use
Scope 3 emissions – from activities we do not own or control like travel, waste and purchasing

Carbon reduction performance

47% down against 2005 baseline

As the graph shows, we have now recorded 47% emissions reduction against our 40% target for 2020, despite our changing campus footprint and new development at Oxstalls campus. This is positive progress and compares well against our sector but we need more ambitious plans to move towards zero emissions.

As well as recording total emissions, we monitor performance against relative measures. This give us an insight into real progress as we can compare against similar organisations. We use 4 relative measures:

25 tonnes CO_2 emitted per £1m of turnover

22kg CO_2 per m2 of gross internal area (GIA)

260kg CO_2 emitted per FTE (students and staff)

267kg CO_2 emitted per residential bedspace

Energy use and generation
We have purchased renewable energy since 1993 and we used **9,769,000 kwh** of energy in 2018-2019.
The figures below show how energy was used and generated across our campuses:

5,515,000 Total kWh gas

4,254,000 Total kWh electricity

1201kWh Energy use per FTE

101kWh Energy use per m^2 GIA

26,125kWh of energy generated by solar pv

28,000kWh of heat recovered by ground source heat pump

OTHER INFORMATION

A section of the report is dedicated to the theme of Energy and Carbon, analyzing the Campus effort to reduce the carbon footprint and the actions towards a cleaner economy.

The Campus tracks performances on carbon emission, based on settled goals in order to understand how the progress is moving. There is also an analysis of energy use and energy generation through renewable sources

University of Manchester – SDGs Report 2019

AUTHOR: University of Manchester

TYPOLOGY: Annual Sustainability Report

LINK: manchester.ac.uk

MAIN GOALS

The report is aimed at a wide range of local, national, and international audiences across the public, private, NGO (Non-Governative Organizations), policy, and education sectors.

This report communicates the range of activities The University of Manchester engages in and that contribute to the United Nations' Sustainable Development Goals (SDGs).

The first stage of this report is a comprehensive data collection process to identify initiatives across the University.
Four main dimensions map the SDGs:

- → Research
- → Public engagement
- → Learning Students
- → Operations

TYPOLOGY OF DATA VIZ

- → **Research metrics**
  Based on titles, keywords, and abstracts of publications in the Scopus2 Database using three different lists of keywords for the SDGs:

  1. The SDSN keyword list compiled by Monash University and SDSN Australia/Pacific3
  2. The Elsevier methodology
  3. A 'homegrown' keyword list
- → **Textual description of good practices / projects / initiatives**
- → **Category numbers**
- → **Contribution mapping**

EFFICACY OF THE SOURCE

The information collected inside the report are very detailed in the description of activities and projects active inside the Campus. Quantitative data are fewer and represented in a really simple and synthetic way (without the use of graphs, only with icons and numbers).

Research institute	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Cancer Research UK Manchester Institute			■						■								■
Cathie Marsh Institute for Social Research	■		■		■			■	■	■	■						■
Dalton Nuclear Institute							■		■				■				■
Data Science Institute			■				■		■		■						■
Digital Futures			■						■		■						■
Global Development Institute	■	■	■	■	■			■	■	■	■			■	■	■	■
Henry Royce Institute							■		■		■						■
Humanitarian and Conflict Response Institute	■	■	■			■			■	■	■					■	■
John Rylands Research Institute			■	■	■				■		■					■	■
Lydia Becker Institute of Immunology and Inflammation			■						■								■
Manchester China Institute									■		■						■
Manchester Environmental Research Institute						■	■		■		■	■	■	■	■		■
Manchester Institute for Collaborative Research on Ageing			■						■		■						■
Manchester Institute of Biotechnology		■	■				■		■								■
Manchester Institute of Innovation Research									■		■						■
Manchester Urban Institute	■		■	■	■			■	■	■	■	■	■	■	■		■
National Graphene Institute		■	■			■	■		■	■	■	■					■
Photon Science Institute			■				■		■								■
Policy@Manchester	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Sustainable Consumption Institute									■		■	■	■	■	■		■
Thomas Ashton Institute			■		■			■	■	■	■						■
Work and Equalities Institute	■				■			■	■	■	■					■	■
Research beacons	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Advanced materials			■			■	■		■				■				■
Cancer			■				■		■				■				■
Energy							■		■		■	■	■	■	■		■
Global inequalities	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■
Industrial biotechnology		■	■			■	■		■		■	■	■	■	■		■

Aalto Sustainability Report 2019

AUTHOR: University of Aalto

TYPOLOGY: Annual Sustainability Report

LINK: aalto.fi/en

MAIN GOALS

The document reports on Aalto University's work to support sustainable development and responsibility, through research, teaching, and societal impact activities. It also focuses on the environmental effects of Aalto University's Campus and how actions play an indirect role in those effects.

The data have been subdivided into three main categories:

- → Teaching & Researching
- → Societal Impact
- → Environmental Impact of Campuses

TYPOLOGY OF DATA VIZ

- → **Pie Chart**
- → **Bar Chart**
- → **Two Axes Graphs**

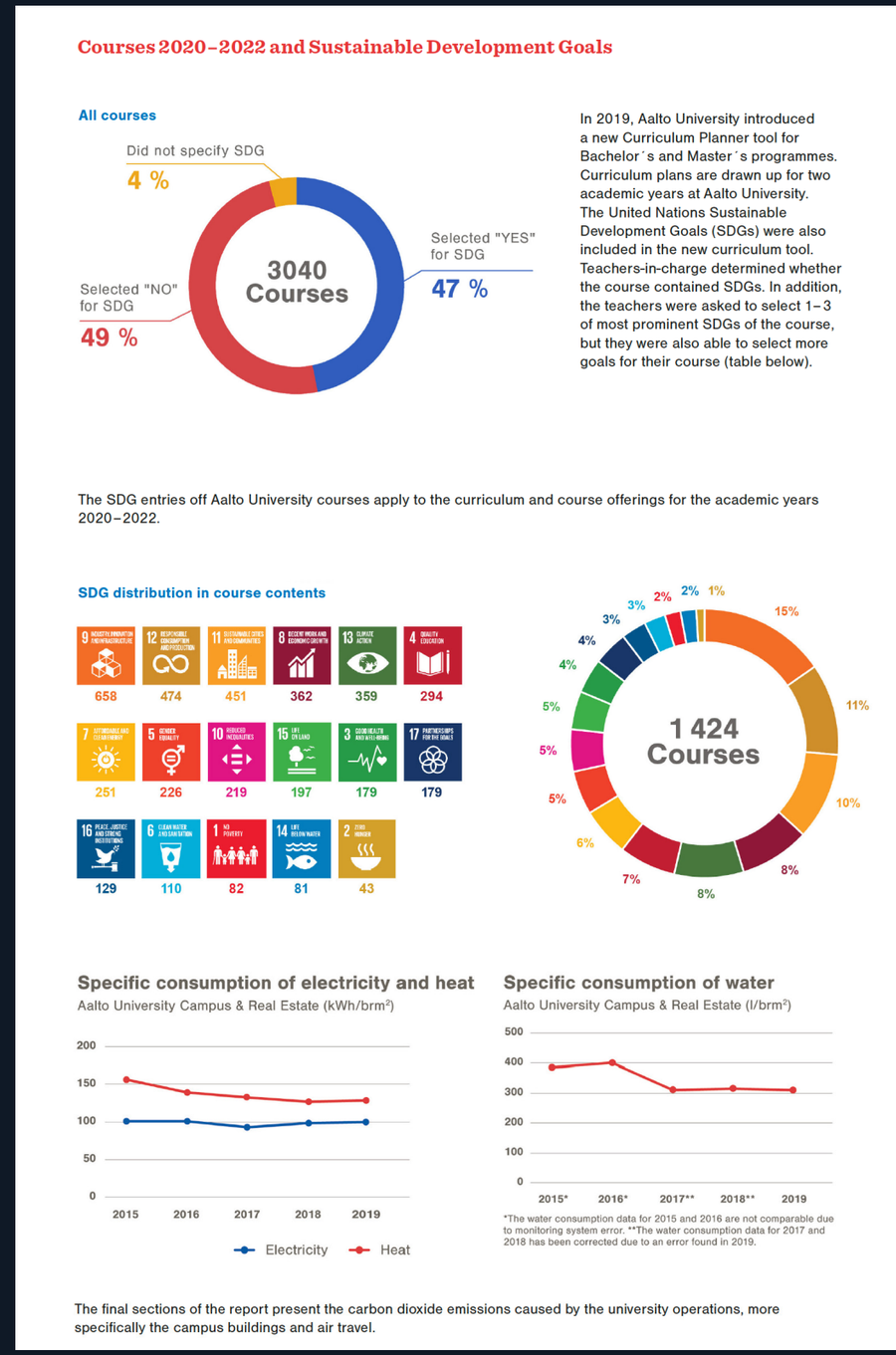
EFFICACY OF THE SOURCE

Not a lot of data visualization inside the report but it is still clear and it is focused on the effort the Campus is making towards SDGs.

OTHER INFORMATION

AaltoSDG Mobile App for students, employees, and partners to make more sustainable choices every day.

Data Visualization is focused on the user's achievement of different actions linked to the various SDGs.



Lavazza Sustainability Report 2019

AUTHOR: Lavazza

TYPOLOGY: Annual Sustainability Report

LINK: lavazzagroup.com/it

MAIN GOALS

The purpose of the report is to illustrate how Lavazza Group is pursuing its commitment towards the SDGs in all the aspects of the coffee value chain. The Company has identified four priority goals (SDGs 5-8-12-13) and ten impacted goals.

The report is based on four principles:

- → Stakeholder Inclusiveness
- → Sustainability Context
- → Materiality
- → Completeness

TYPOLOGY OF DATA VIZ

- → **Bar Chart**
- → **Mapping**
- → **Textual description**
- → **Progress Tables**
- → **Line Chart**
- → **Pie Chart**
- → **Materiality Matrix**

EFFICACY OF THE SOURCE

An interesting aspect of the report is the decision to analyze the Company's impact under three principles of SDGs:

- → Priority Goals: that guide their sustainability programs
- → Impacted Goals: indirectly impacted by the priority goals
- → Tool Goals: cross-cutting goals enabling all others to be realized

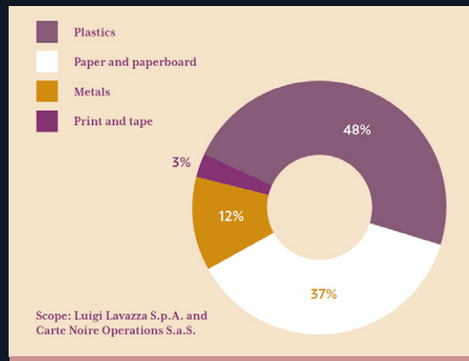
In total, the SDGs considered by the Company are 14, identified after an analysis applied to their business models and activities. The four main goals are analyzed vertically, focusing per each goal on the elements that contribute to its reaching. The data are very detailed, even if visualized using traditional graphic representation and they are deeply analyzed also considering the progress over the years.

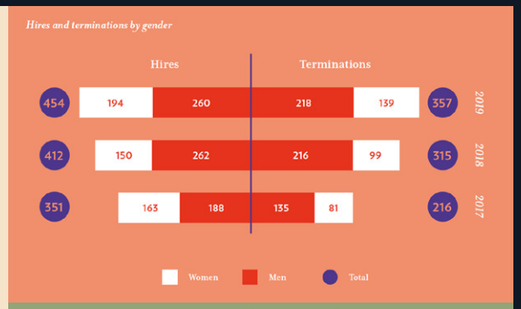
OTHER INFORMATION

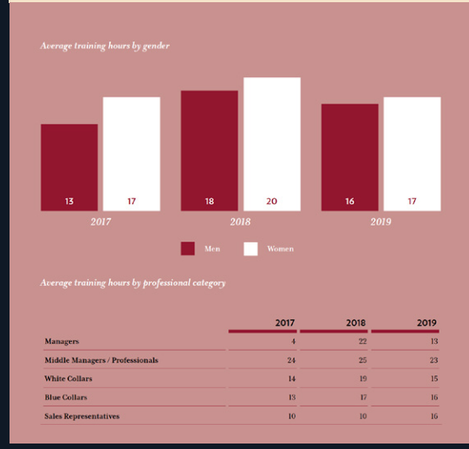
The sustainability report is part of a larger commitment of the Company that together with the Municipality of Turin, has developed from 2018: 'TOward2030. What are you doing?' is a series of initiatives to engage the community to be more aware of sustainability topics.

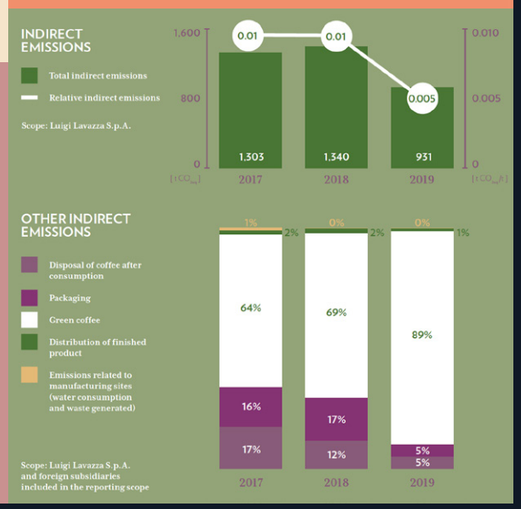
In addition to the 17 Goals, Lavazza developed Goal Zero to spread awareness and engage its audience. The Company strongly believes in the commitment towards the SDGs and also considers fundamental that everyone understands what they are about. With this goal they have created a series of campaigns oriented to all their relevant stakeholders:

- → Employees
- → Suppliers & Customers
- → Local Community
- → Organizations
- → Youth Networks & Universities









Ferrero Sustainability Report 2019

AUTHOR: Ferrero Group

TYPOLOGY: Annual Sustainability Report

LINK: ferrerosustainability.com

MAIN GOALS

Ferrero has started reporting about its contribution to sustainability since 2011, choosing every year a focus theme; 2019 was the year of "We care for the better". The main goal was to improve the Company's commitment towards four objectives:

- → Protect the environment
- → Ingredients sustainably sourced
- → Promote responsible consumption
- → Empower people

For this reason, the information collected wants to analyze challenges, actions, and visions for the future. The contents are defined thanks to a materiality analysis: the aim is to identify and assess the relative importance of key sustainability topics regarding their impact and relevance for the stakeholders.

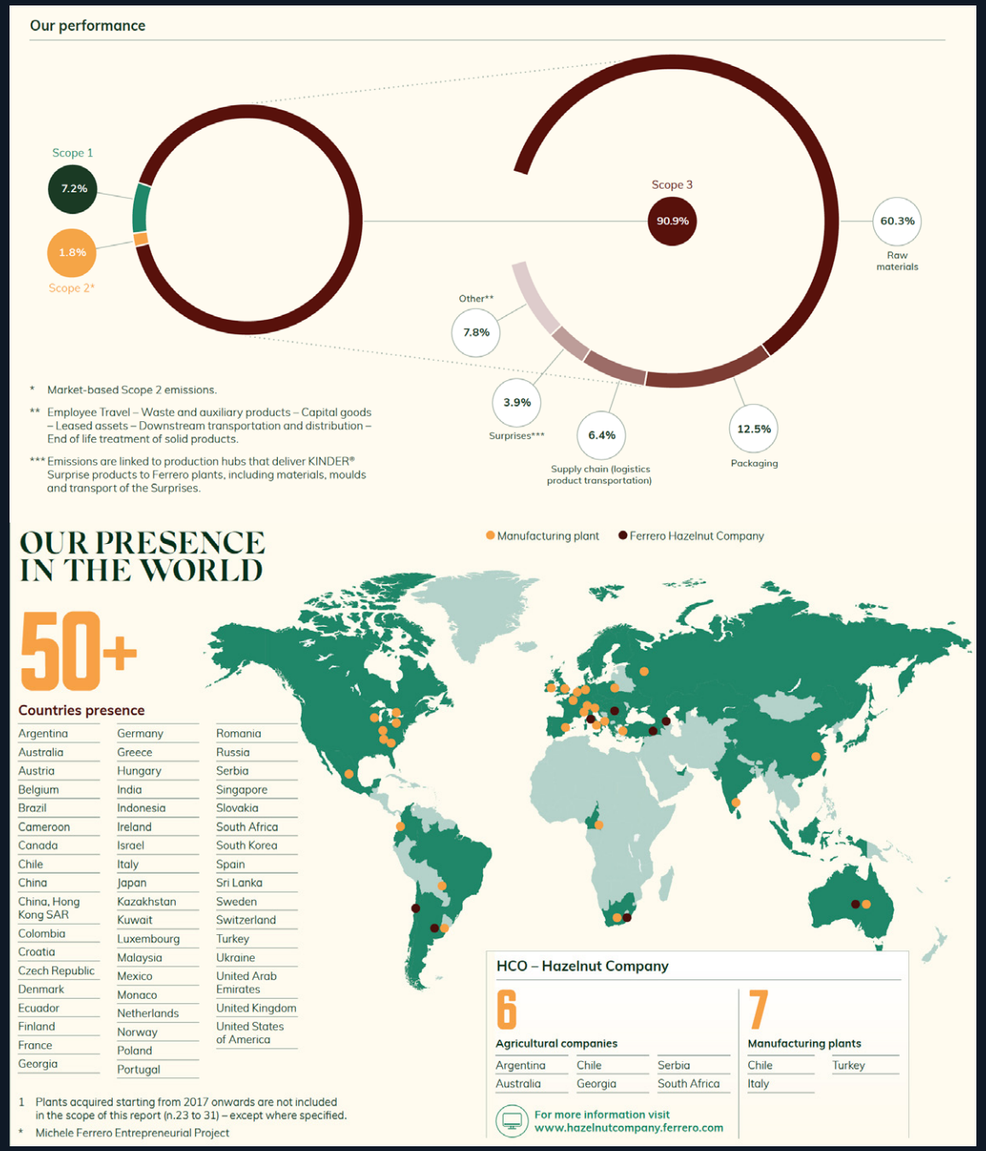
TYPOLOGY OF DATA VIZ

- → **Mapping**
- → **Textual description**
- → **Progress Tables**
- → **Pie Chart**
- → **Materiality Matrix**

EFFICACY OF THE SOURCE

In this report not all the 17 SDGs are analyzed; there is a selection of the ones that are more connected to the strategy of the Company. In this case, Ferrero identified three clusters of SDGs, the ones aligned with the strategy (SDGs 1-4-12-13), the ones that are supported by the Company's activities (SDGs 3-7-8-14-15), and the ones that enable the strategy (SDG 17).

The report is very detailed, with a lot of information, both qualitative and quantitative; the information follow a structure based on the four objectives of the Company, however, there are no indications of which data contributes the most to the SDGs identified as primary.



FCA Sustainability Report 2019

AUTHOR: Stellantis (ex FCA)

TYPOLOGY: Annual Report

LINK: stellantis.com

MAIN GOALS

In the second chapter (Business Model and Value Chain) the report introduces the main SDGs that the Company is taking into account with the related activities.

As the Company is aware of how emerging trends, evolving consumer attitudes and regulatory requirements influence their products and their development, FCA tries to follow the concept of circular economy in the different steps of the business model.

Emerging trends, evolving consumer attitudes and regulatory requirements are taken into consideration through the entire analysis.

TYPOLOGY OF DATA VIZ

→ **Bar Chart**

→ **Pie Chart**

EFFICACY OF THE SOURCE

Inside the report, some boxes help the reader to visualize how the Company has reached different goals for different SDGs. The visualization of data is mainly managed using numbers and icons. It is immediate, but it is not so easy to compare data together and in respect to previous years.

SDG Development Report 2020

AUTHOR: Cambridge University Press
Sustainable Development Solution Network – Bertelsmann Stiftung

TYPOLOGY: Annual SDGs Report

LINK: sdgindex.org

MAIN GOALS

The Sustainable Development Report 2020 (SDR2020) presents and aggregates data on country performances towards the SDGs. It is not an official SDG monitoring tool, but it complements efforts of national statistical offices and international organizations to collect data on SDG indicators.

The SDR2020 presents data from official sources (United Nations, World Bank) as well as from non-official sources (research institutions and non-governmental organizations).

The report summarizes countries' current performance and trends concerning the 17 SDGs. In 2020 the report included data, from 166 countries, that can help understand pre-crisis vulnerabilities and challenges, which partly explain why so many countries were ill-prepared to respond to Covid-19.

EFFICACY OF THE SOURCE

The report offers a wide but also very detailed visualization of all the countries and their effort towards SDGs. Even if some tables are more complex than others in terms of readability and immediate comprehension, they are still effective.

TYPOLOGY OF DATA VIZ

→ **Progress Indicator**

→ **The SDG Dashboards**
The SDG Dashboards highlight the strengths and weaknesses of each country about each of the 17 SDGs. Dashboard ratings are based on data for the two indicators under each goal for which the country performs worst.

→ **Absolute SDG performance gaps in G20 countries**
To illustrate the importance of G20 countries by showing estimated absolute SDG performance gaps (in %) for each goal, to complement the per-capita analysis in the SDG Index and Dashboards. Absolute SDG performance gaps emphasize the importance of the G20 countries in the post-Covid-19 recovery.

→ **Methods Summary and Data Tables**

→ **Country Profiles**

OTHER INFORMATION

Owing to slight changes in the indicator selection, the 2020 rankings and scores are not comparable with the results of last year. It was not possible to estimate changes in performance on the SDG Index using the SDR2020 indicators.

Figure 12

2020 SDG dashboards (levels and trends) by United Nations sub-regions and income groups

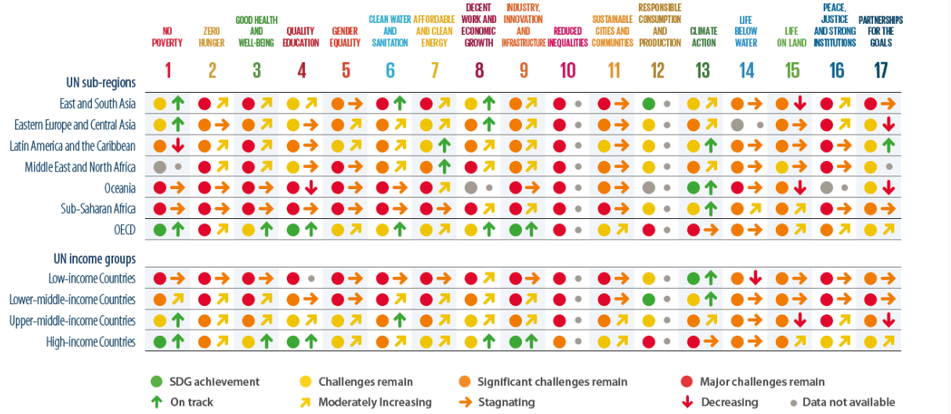


Table 3

Absolute SDG performance gaps in 2020 (%)

Country	SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG14	SDG15	SDG16	SDG17	Spillovers
Argentina	0.1	0.5	0.3	0.2	0.3	0.4	0.2	0.8	0.7	0.7	0.2	0.8	0.7	0.7	0.6	0.6	0.4	0.4
Australia	0.0	0.3	0.0	0.0	0.2	0.0	0.1	0.3	0.1	0.2	0.2	1.2	2.5	0.4	0.3	0.1	0.3	1.4
Brazil	1.8	2.2	1.8	2.3	2.0	1.1	0.6	3.3	2.3	4.6	1.7	3.6	1.4	2.0	2.9	3.3	1.5	0.9
Canada	0.0	0.4	0.1	0.0	0.2	0.2	0.1	0.3	0.2	0.2	0.2	1.5	2.1	0.5	0.5	0.2	0.4	2.2
China	1.8	10.5	11.7	5.4	10.7	17.2	20.1	10.3	10.5	16.0	13.5	13.7	17.2	23.2	18.7	18.2	22.8	12.4
Germany	0.0	0.8	0.2	0.1	0.6	0.5	0.3	0.7	0.2	0.4	0.4	3.3	3.7	1.3	0.6	0.5	0.5	5.3
France	0.0	0.6	0.2	0.0	0.3	0.3	0.1	0.8	0.2	0.3	0.3	2.3	2.0	0.7	0.6	0.6	0.6	4.7
United Kingdom	0.0	0.7	0.2	0.1	0.3	0.2	0.2	0.7	0.2	0.5	0.2	2.6	3.2	0.8	0.5	0.4	0.9	4.8
Indonesia	4.1	3.7	4.1	1.8	3.2	3.5	3.3	3.8	4.3	5.1	3.6	2.7	2.2	3.6	4.9	2.6	4.2	1.0
India	21.8	23.8	24.5	17.3	29.2	23.1	19.7	14.0	21.5	17.6	27.2	8.8	5.2	16.6	22.0	18.7	20.8	2.5
Italy	0.1	0.6	0.2	0.1	0.5	0.4	0.2	0.7	0.3	0.6	0.7	1.9	1.5	1.0	0.4	0.5	0.7	2.8
Japan	0.1	1.0	0.3	0.0	1.6	0.7	0.4	0.9	0.3	0.8	1.2	3.3	4.7	2.0	1.4	0.4	1.2	6.3
Korea, Rep.	0.0	0.3	0.2	0.1	0.5	0.5	0.2	0.4	0.0	0.2	0.4	1.2	2.1	0.7	0.8	0.4	0.7	2.4
Mexico	1.0	1.7	1.0	0.0	0.9	1.0	0.8	1.9	1.8	2.9	0.9	2.0	1.6	1.1	2.2	2.1	1.5	1.0
Russian Federation	0.0	2.3	1.4	0.6	1.5	1.6	0.6	1.7	1.3	2.0	1.0	2.7	4.0	2.3	1.6	2.5	1.3	4.7
Saudi Arabia	0.1	0.5	0.3	0.1	0.6	0.7	0.2	0.6	0.3	0.4	0.8	1.0	1.7	0.5	0.6	0.4	0.3	1.3
Turkey	0.0	1.0	0.6	0.1	1.4	0.8	0.4	1.5	0.9	1.5	1.0	1.3	1.1	1.5	1.3	1.0	0.7	0.8
United States	0.2	3.5	1.5	0.1	2.6	2.1	1.0	2.8	0.5	5.0	1.4	12.5	16.3	3.9	4.3	2.9	3.0	20.0
South Africa	1.8	0.7	1.2	0.9	0.3	0.7	0.6	1.3	0.7	1.7	0.5	0.9	1.4	0.7	0.8	1.0	0.4	0.7
European Union	0.3	4.6	1.5	1.1	3.1	2.6	1.4	4.7	2.1	3.1	2.7	14.7	14.6	6.1	2.9	3.1	4.7	23.5
Total G20	33.30	57.80	50.80	30.20	58.70	56.30	49.70	49.20	47.60	62.40	56.80	74.70	81.90	66.30	66.30	57.90	65.10	86.30

>20% 10-20% 2-10% 0-2%

Source: Authors' analysis

The SDG Accord 2020

AUTHOR: SDG Accord

TYPOLOGY: Annual Report

LINK: sustainabilityexchange.ac.uk

MAIN GOALS

The SDG Accord, launched in 2017, is an international initiative developed by Global Alliance to allow the tertiary education sector to demonstrate its commitment to meeting the SDGs and sharing best practices. It is a partnership initiative, endorsed by the UN's Higher Education Sustainability Initiatives and many other global partners.

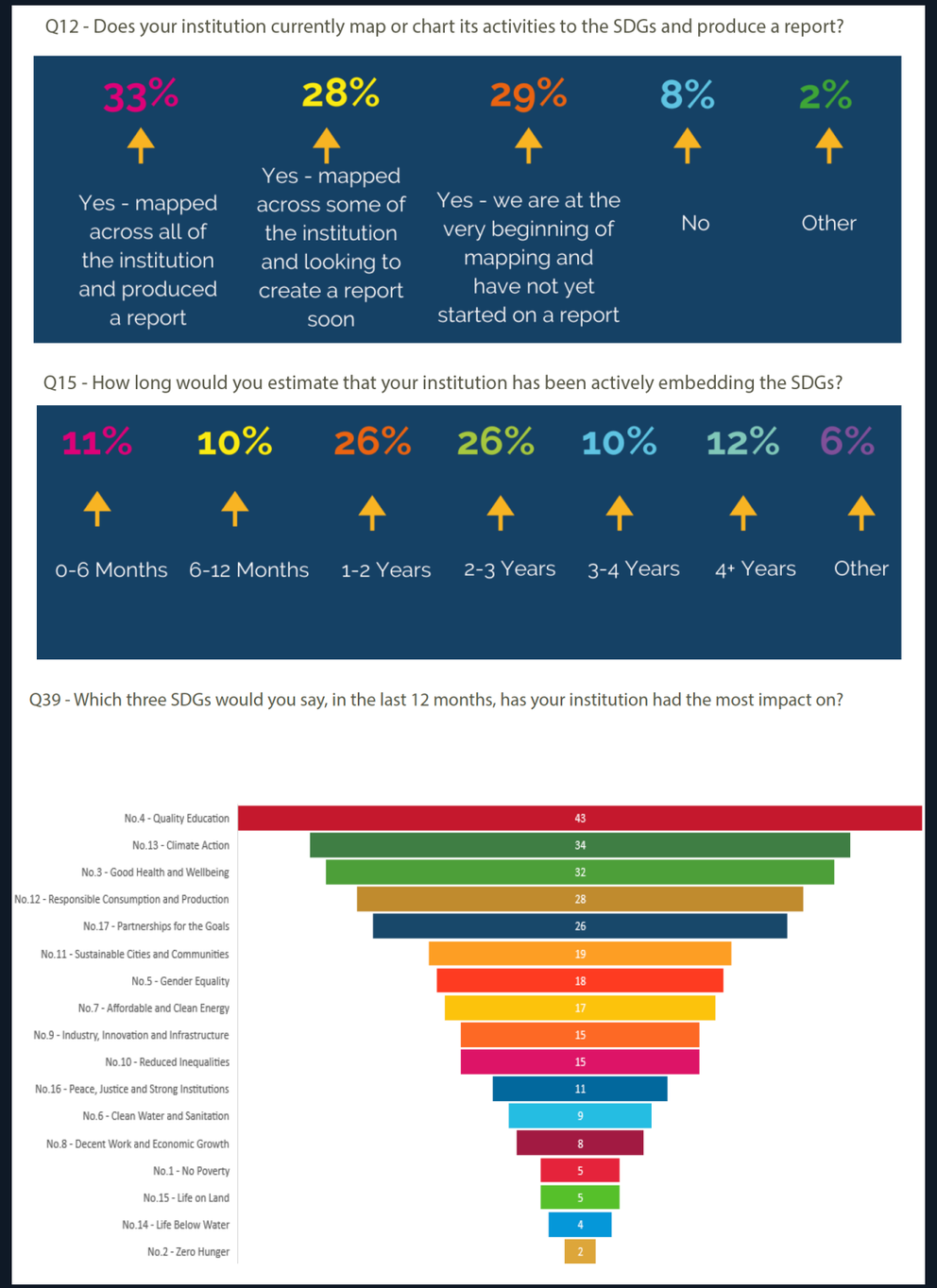
The SDG Accord provides a platform to focus on the role that education has in delivering the SDGs. This activity is presented in an Annual Report, based on an online survey, to be used by the UN, governments, and businesses.

TYPOLOGY OF DATA VIZ

- → **Bar Chart**
- → **Results of the survey expressed in %**
- → **Textual description**

EFFICACY OF THE SOURCE

The report is mainly focused on showing the perception of the SDGs from different universities around the world. The data visualization is really simple and based on showing the different percentages of the survey results. A big part of the report is based on a textual description of the collected information. More qualitative than quantitative approach.



SDGs Global Dashboard

AUTHOR: iTech - Mission

TYPOLOGY: Data Driven Dashboard

LINK: http://www.sdgsdashboard.org/

MAIN GOALS:

Tracking and monitoring of SDGs to enable actors like governments, policy decision makers, researchers and academician to perform easy analysis via data visualizations and tools for exploring data from global sources.

RESOURCES & SERVICES

- → Data from the UN Statistics Division (UNSD SDG Global Database)
- → Explore trends over time
- → Monitoring & Tracking
- → Links to National statistical office data and government database
- → Citizens' vote

TYPOLOGY OF DATA VIZ:

- → **World Map**
  Selection of different topics (electric waste, domestic consumption…).
  A gradient color shows how each region of the world fulfills the choosen topic.
- → **Country Pages**
  List of all countries divided by continent. The selection of one country redirects to a new page where it is possible to see all the single SDGs and the specific targets related to them (difficult to understand if the data refers to the chosen country or to the total).
- → **Charts**
  Six different types of data visualization: Line – Column – Pie – Bar - Tree Map – Table.
- → **Bubble Chart / Rank Chart**
  Chart with two axes. An automatic animation dynamically shows how data about the topic changed over the years (from 1991 to 2019).
  Possibility to switch to a rank chart and to choose specific countries.
  Each bubble represents a different country (use of different colors).
- → **Monitoring**

EFFICACY OF THE SOURCE

The dashboard is extremely slow in loading. It is difficult to browse among the different SDGs (not so immediate to the users what they have to do to browse).

The left bar with all the SDGs seems not related to the visualized data. The first impression is to have the possibility to choose to visualize data depending on the SDG that will be selected, but it opens a deepening description of the goals.

OTHER INFORMATION

Users can request to be notified when data are updated or when suggested data are included in the dashboard.

Citizens' vote: allows to identify the six most important issues. Users can see how their priorities compare with others and view priorities around the world. Votes are recorded with the user's gender, age, education level and location.

Green Growth Knowledge Platform

AUTHOR: Institute for Global Environments Strategies (IGES)

TYPOLOGY: Web Tool for SDG Interlinkages and Data Visualization

LINK: sdginterlinkages.iges.jp

MAIN GOALS

Identify the causal links between SDG targets based on literature review and on the results from relevant international consultation processes on SDGs indicators. It is based on the user's selection of nine Asian countries, goals, and targets.

Enable the user to visualize interlinkages and explore indicator-level data.

Compare SDG targets among countries.

The goal is to minimize conflicts, avoid trade-offs, and seek synergies.

RESOURCES & SERVICES

- → Visualize interlinkages between targets, goals, countries
- → Explore time-series data
- → Compare indicator-specific data / target-specific interlinkages among countries
- → Free download of data and charts
- → Real-time indicators

TYPOLOGY OF DATA VIZ

- → **Interlinkages**
  Links that can be between goals, between a goal and relevant targets, or between targets. Interlinkages include direct relations between two targets or indirect relations that connect two targets via a third target or more intermediate ones. A causal link also has a direction pointing from the cause to the effect.

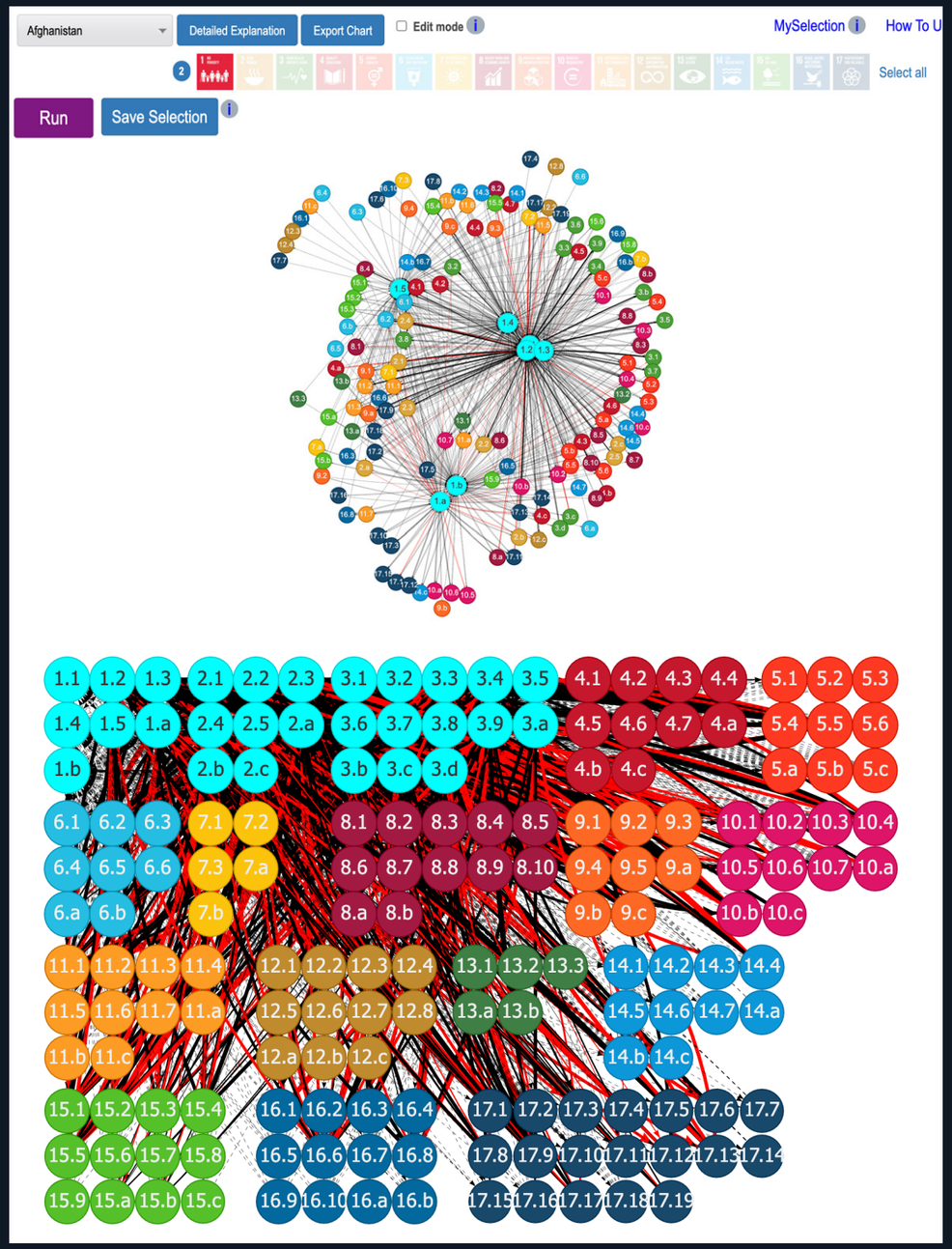
EFFICACY OF THE SOURCE

The interface is easy to understand. A lot of control is given to the user in personalizing the visualization, depending on his needs.

Two types of interlinkages visualization: default circles (messy effect) or grid (clear effect).

OTHER INFORMATION

Identifying the causal relations between relevant SDG targets is a challenging task. Existing knowledge and literature in this area is limited due to the short history of this new research field; most of the existing works have been developed since 2015, right before or after the adoption of the SDGs in September 2015.



The Known SDGs

AUTHOR: European Commission

TYPOLOGY: Web Platform

LINK: knowsdgs.jrc.ec.europa.eu

MAIN GOALS

A platform that provides tools to support the evidence-based implementation of the SDGs, with a focus on policy mapping, interlinkages, European Commission (EC) models, and consumer footprint calculator.

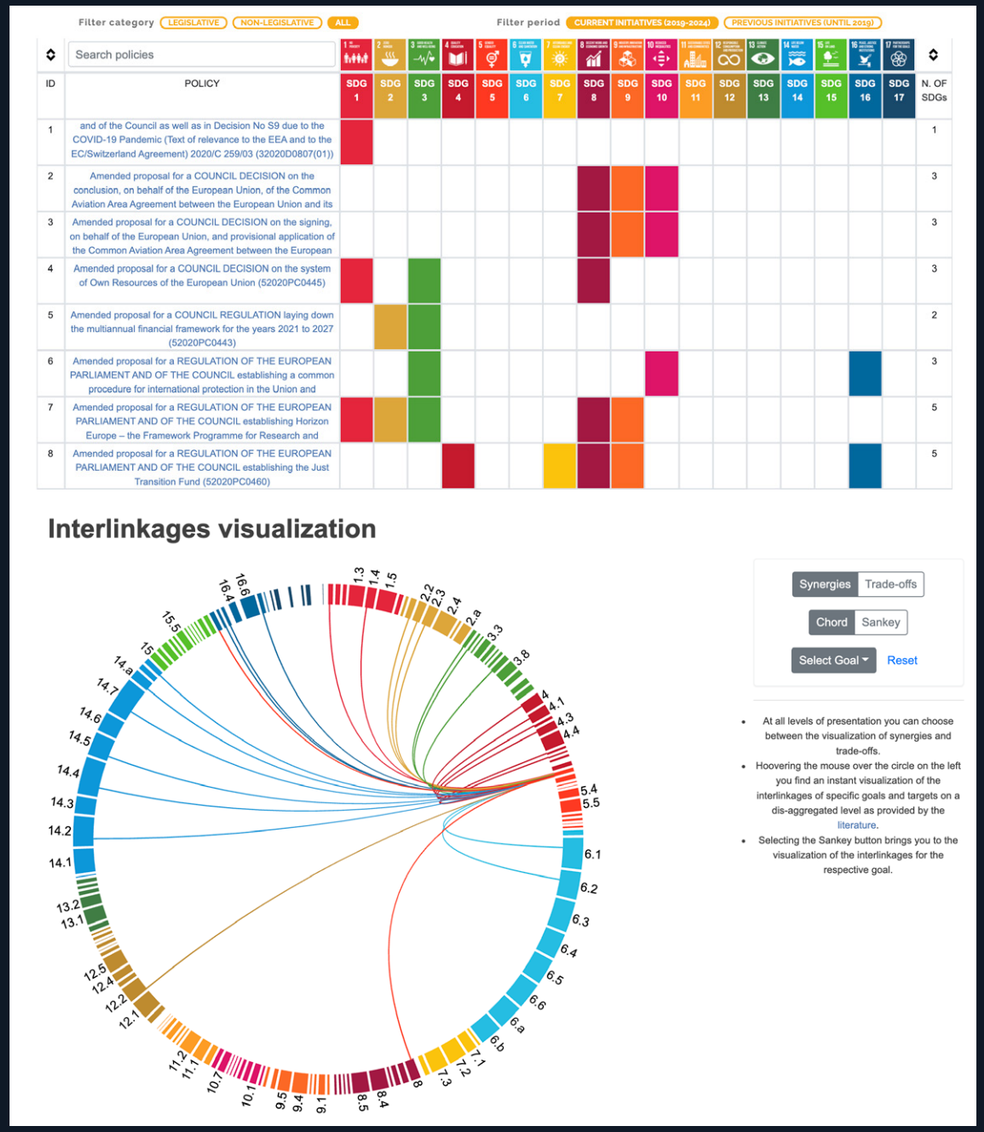
- → **SDGs Interlinkages:** let the user see and understand for which interlinkages there is a strong agreement in the literature. Offer an integrated development framework. Identify synergies and complementarities among different SDGs and targets.
- → **SDGs Policy Mapping:** understand how individual policies relate to the SDGs.
- → **EC Model SDGs:** for each goal, the mapping provides the list of models that can contribute to it. More specifically, which targets the models address, and if they are able to measure through indicators the progress to the achievement of the goals.

TYPOLOGY OF DATA VIZ

- → **Chord Diagram**
  It gives an overview of the existing interlinkages. No possibilities for the user to select specific linkages and obtain more information
- → **Sankey Diagram / Alluvian Diagram**
  To visualize the links between publications regarding one specific SDG (left column) and other publications related to other SDGs and targets (right column).
  The different thicknesses probably refer to the amount of publication related to the link, but it is impossible to find this information in the interface.
- → **Bar Chart**
- → **Comparison Table**

EFFICACY OF THE SOURCE

The platform is still in the development phase, so the user cannot interact too much with the data to be visualized. The navigation is simple and offers a good starting point of analysis for policy makers.



RESOURCES & SERVICES

- → Based on the UN Open SDG Data
- → Visualize interlinkages between targets & goals
- → Highlight interlinkages between policies, in order to strengthen the policy coherence for sustainable development
- → Recognize cross-cutting policies, the most influential ones, with a strong connection to the SDGs

SDG Index & Dashboard

AUTHOR: European Commission

TYPOLOGY: Web Dashboard and Index

LINK: dashboards.sdgindex.org

MAIN GOALS

The SDG Index and Dashboards summarize countries' current performance and trends concerning the 17 SDGs.

The dashboard is the online version of the annual European Commission Sustainable Development Report.

RESOURCES & SERVICES

- → Summarize countries' current performance and trends about the SDGs
- → Rankings and scores

TYPOLOGY OF DATA VIZ

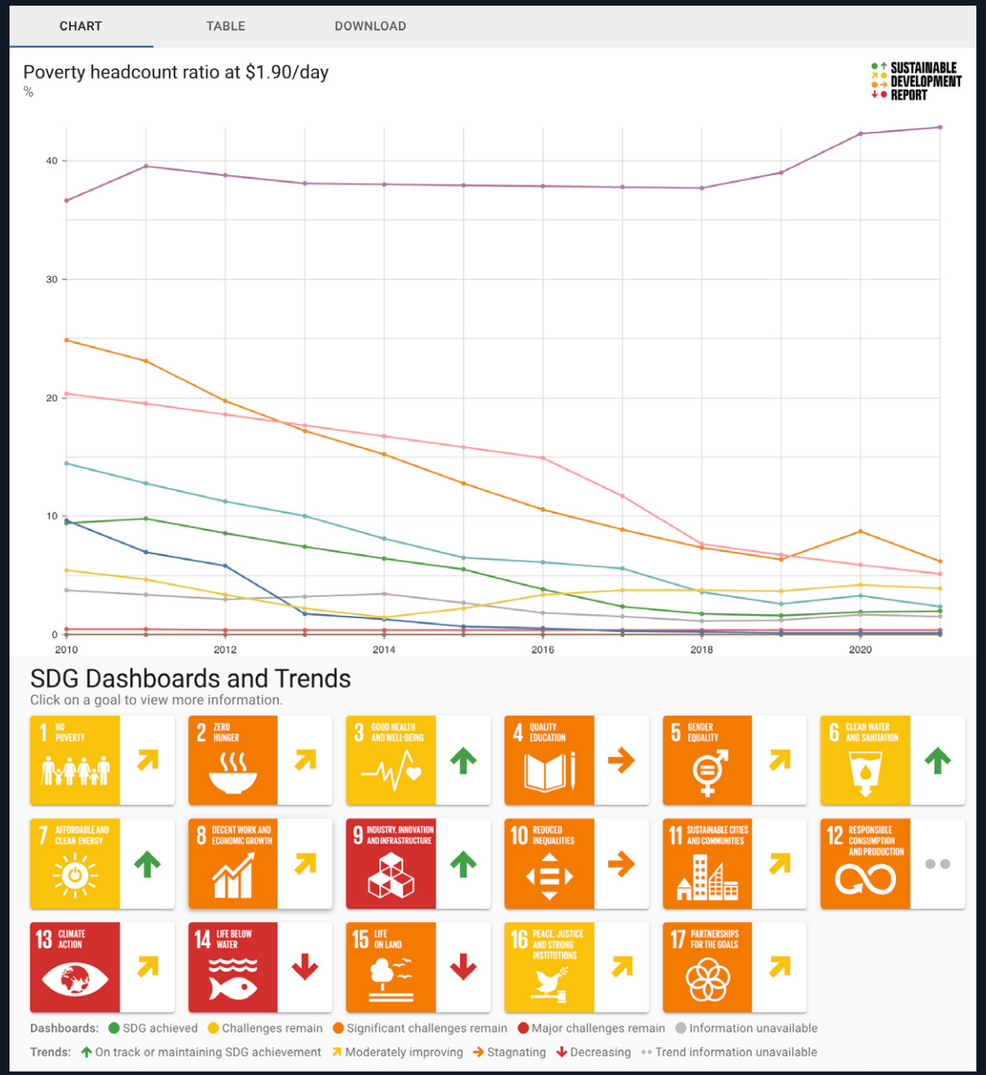
- → **Rankings**
  Different rankings of the 193 UN Member States are represented.

  Overall ranking: countries are ranked by their overall score that measures a country's total progress towards achieving all 17 SDGs. Score 100 indicates that all SDGs have been achieved.

  Spillovers Index: countries are ranked by their spillover score along four dimensions: environmental, economy & finance, social, and security.
  Higher score = the country can cause more positive and fewer negative spillover effects.

- → **Interactive Map**
  Shows the overall score of the specific SDGs on a map; the user can have a wider view of how countries are following the progress (thanks to the use of gradients).

- → **Data Explorer**



EFFICACY OF THE SOURCE

The indicators side is efficient thanks to the use of basic and common colors and symbols.

The data explorer section is useful for those who want to collect as many information as possible, as it is really detailed; it also offers links to other data collection sources.

OTHER INFORMATION

- → Key Messages: a summary section about the main topics included in the static report
- → Country Profiles
- → Download section

SDG Impact & Assessment tool

AUTHOR: Gothenburg Centre for Sustainable Development in collab with SDSN Northern Europe and Mistra carbon Exit

TYPOLOGY: Online learning tool

LINK: sdgimpactassessmenttool.org

MAIN GOALS

Help Academias and other businesses to describe their impact on the SDGs. The goal is to raise the level of awareness about Agenda 2030 and increase users' contributions to sustainable development. The tool is based on the users' knowledge in order to understand if the impact on the goals is positive, negative or if there is a lack of knowledge.

Stimulate the user to get a better understanding of the complexity of SDGs.

TYPOLOGY OF DATA VIZ

→ **Waffle Chart**
For each SDG a square indicates the user's personal impact according to five levels: Direct positive - Indirect positive - No impact - Indirect negative - Direct negative.

RESOURCES & SERVICES

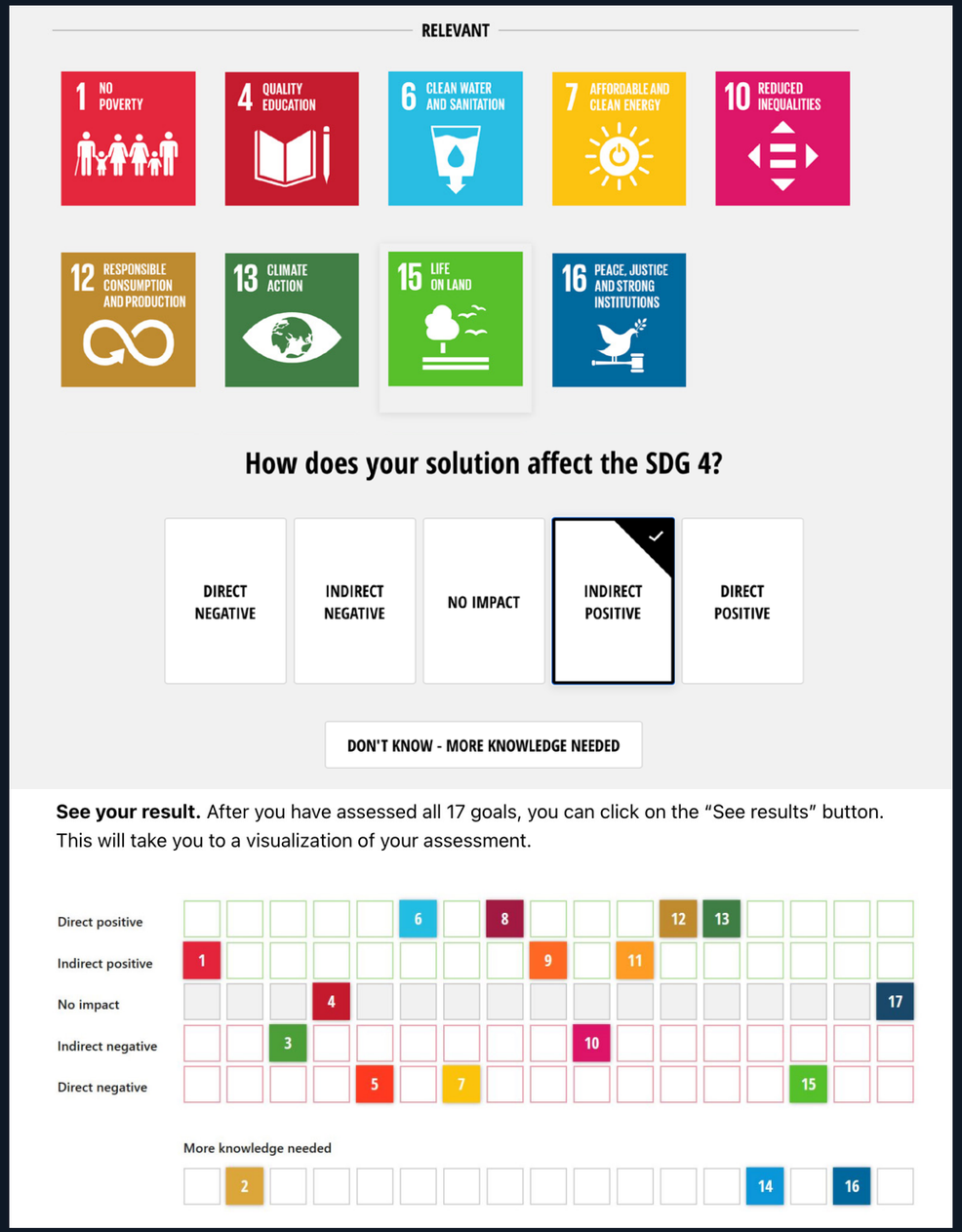
→ Visualize the results from a self-assessment, regarding activities, organizations, or innovations impacting the SDGs

→ A free tool for teachers, academics, companies, agencies, civil organizations, ...

→ Identify opportunities (positive impacts), risks (negative impacts), and knowledge gaps

EFFICACY OF THE SOURCE

The tool offers a qualitative assessment of the user's impact over the SDGs. The approach is innovative if compared to the other platforms but it is risky as the user has the ability to evaluate its impact solely on his personal experience, without other references. The results obtained cannot be compared, as each user uses his own evaluation method.



SDG&Me

AUTHOR: Eurostat

TYPOLOGY: Interactive Publication

LINK: ec.europa.eu

MAIN GOALS

SDG&Me is an interactive publication to better understand and evaluate the countries' situation.

The dataset is based on six countries of the EU27 (Austria, Belgium, Bulgaria,

TYPOLOGY OF DATA VIZ

→ **Area Chart**

→ **Histogram**

→ **Line Graph**

RESOURCES & SERVICES

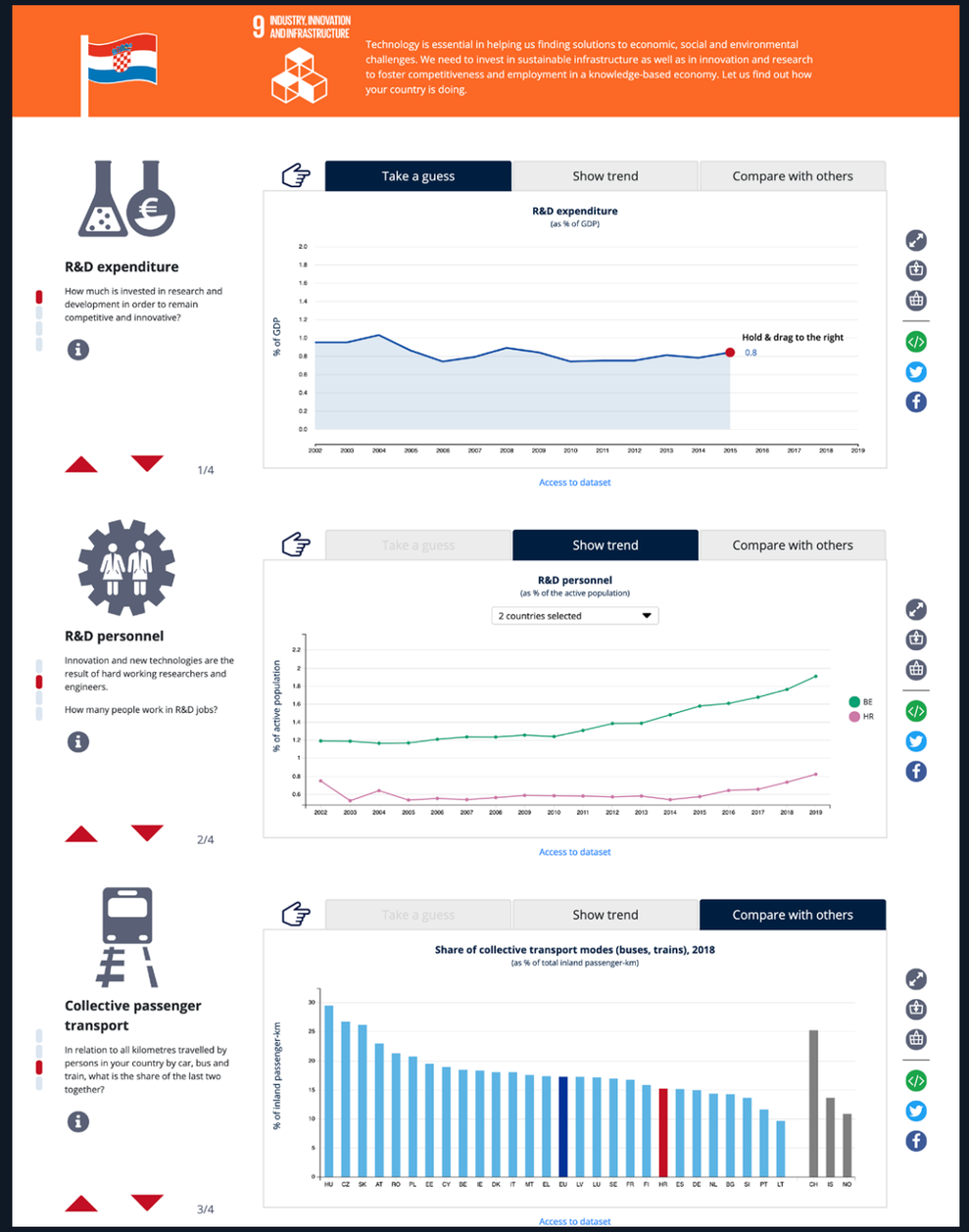
→ Provide statistics

→ Explore trends

→ Compare countries

EFFICACY OF THE SOURCE

The graphic representations are quite simple and intuitive, even if they are not very varied. The user is free to browse the different topics even if not all of them are complete with the three categories of analysis offered by the platform. An interesting aspect of the platform is the possibility for the user to try to predict the trend of the indicator in recent years and then compare the response with the actual results. It is a way to make the users understand how aware they are about the country's trend.



Aalto App

AUTHOR: Aalto University

TYPOLOGY: Mobile App

LINK: aalto.fi/en

MAIN GOALS

Inspire and guide Aalto University students, employees, and partners to make more sustainable choices. The app offers information about SDGs and actions that help to understand how to achieve them.

Each month new actions are presented to the user, offering him the possibilities to learn and tackle good practices in his everyday life. The various themes also highlight Aalto's fields of research.

At the same time, the application demonstrates how Aalto University research, teaching, and events can support international work to achieve sustainable development goals on a local level.

RESOURCES & SERVICES

→ Daily actions/Challenges/Quizzes

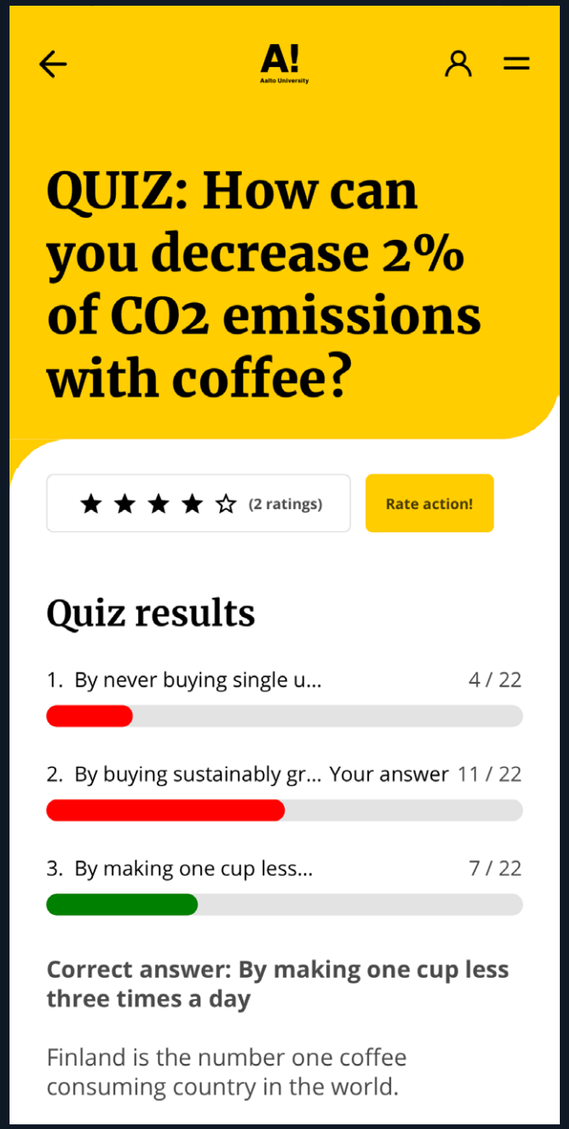
→ Informative links

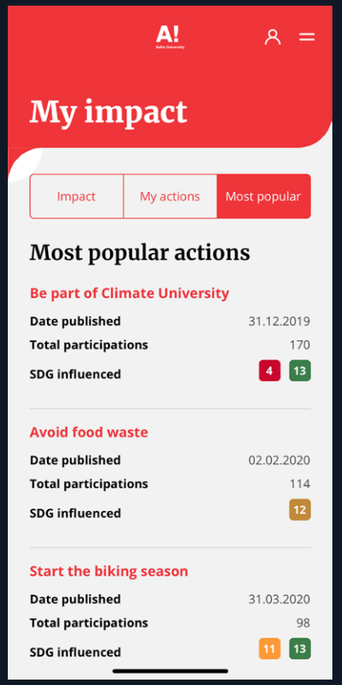
TYPOLOGY OF DATA VIZ

The app mainly offer qualitative information that are displayed via texts or simple lists of participants. Data visualizations are not used inside this app.

EFFICACY OF THE SOURCE

The app offers a detailed explanation of each SDG also linking good practises, news from the world and suggesting actions that the user can participate to be a part of the change. However, the app is more an informative tool and the user interaction is very limited.





AWorld – Act Now

AUTHOR: AWorld

TYPOLOGY: Mobile App

LINK: site.aworld.org

MAIN GOALS

'Weaving sustainability into everyday life'.

AWorld is a mobile app that supports the United Nations campaign for individual actions on climate change and sustainability. Inside the app the user is involved in daily actions, tips & quiz and short sustainability pills (in video or audio format).

The app follows a gamification approach, challenging the users in changing or improving their daily habits in exchange of points and level upgrades. The app also offers the possibility to create teams or challenges in order to let users feel even more engaged in the activities.
The goal is to show how, even with small actions, it is possible to contribute to the achievement of the SDGs.

RESOURCES & SERVICES

- → Video-lessons and podcast about sustainability topics & SDGs
- → Daily suggestions
- → Challenges
- → Personal Impact indicators
- → News & Events about sustainability

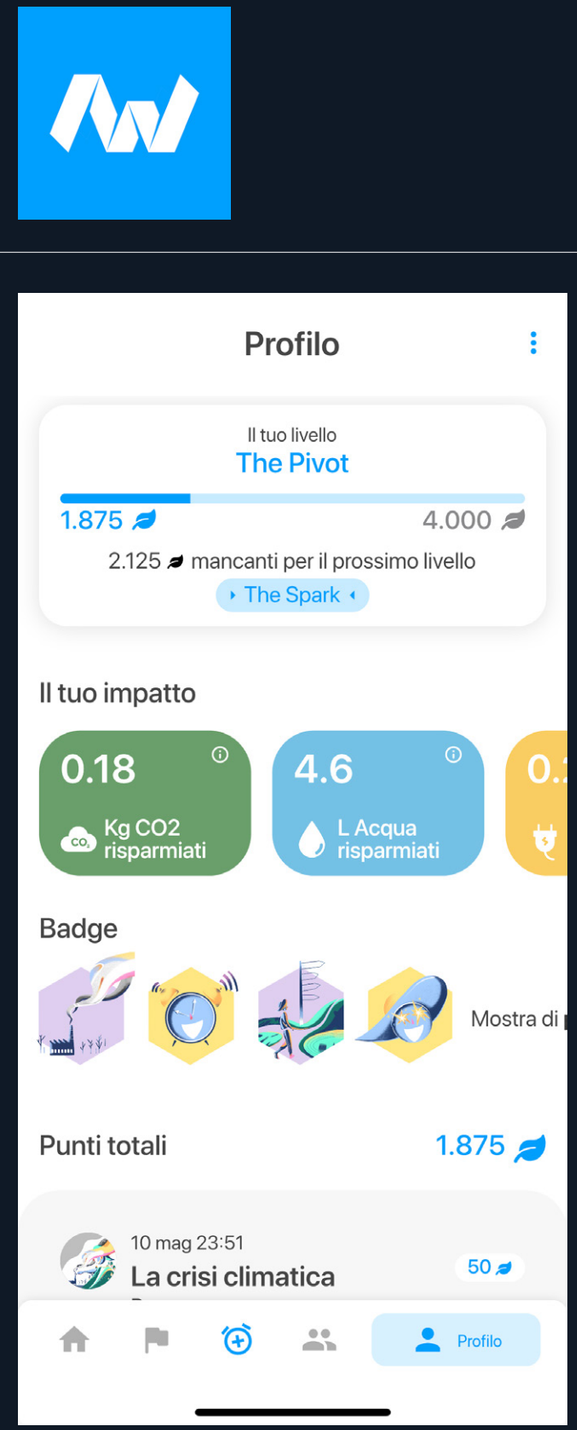
TYPOLOGY OF DATA VIZ

- → **Bar Chart**
- → **Progress Bar**

EFFICACY OF THE SOURCE

This app has a different structure and goal if compared to the previous case studies, but it is interesting the level of engagement that it creates with the final user. It is more focused on the individual perception and commitment to the sustainable goals, which is an aspect that most of the time lacks in university campuses: how their community can contribute to the goals?

The contents of the app are very friendly and reachable even for beginners, new to the world of SDGs and sustainability.



SDGs in Action

AUTHOR: GSMA & Project Everyone

TYPOLOGY: Mobile App

LINK: sdgsinaction.com

MAIN GOALS

The SDGs in Action app has been developed to highlight the Sustainable Development Goals. It offers insights about each goal, including targets, explanatory videos, key facts and figures, and suggestions on how to achieve them. It also offers news and updates about the different goals around the world. The app has three main functions:

- → Browse actions
- → Join in actions
- → Create actions

RESOURCES & SERVICES

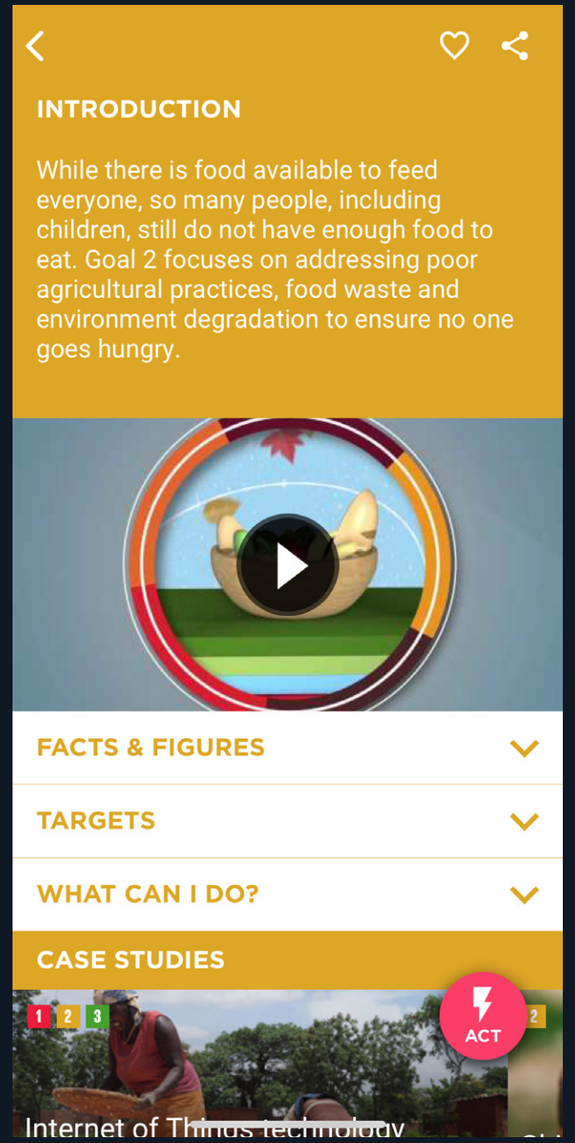
- → Actions for each SDGs
- → News and updates on achievements

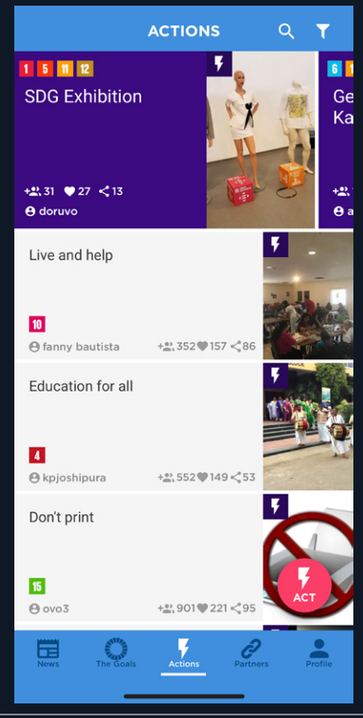
TYPOLOGY OF DATA VIZ

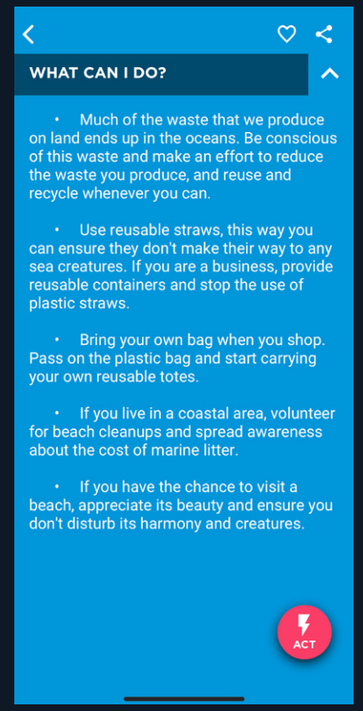
- → **Good practises**
- → **Daily actions**
- → **Events & N° of participants**

EFFICACY OF THE SOURCE

This application does not offer data visualization on the different SDGs but is an informative app on recent events related to sustainable development. It offers a textual overview of the 17 Goals, and proposes a series of actions that users can take to make a contribution. The user can see how many other people have taken part in an action and in turn create new ones. It is a useful app for keeping up to date on the goals but the level of user interaction and involvement remains quite low.







3.2

Case studies comparison

The analysis of each case study has been useful to understand different approaches in mapping the commitment towards the SDGs and sustainability in general. Dynamic and static sources have highlighted different focuses and goals, showing differences depending on the author's identity (academic, corporate, governmental). To better understand which are the common elements, the aspects that could be enhanced even more, and those that are not useful in designing the mapping platform, all the data have been collected inside a summary table [Tab. 1]. The information inside the table have been organized under different themes and categories in order to create a common language among all the sources. Organizing the information makes it easier to start understanding which are the common elements and which ones can be considered a support for the definition of the project guidelines.

The table is divided into five main clusters, each one of them divided into different categories. The main clusters are:

1. Structure
2. User & Engagement
3. SDGs
4. Energy & Consumption
5. Methodology

1. STRUCTURE

The first category is focused on the elements that define the structure of the source: the typology of it, the goals, the topics involved, and the final aim.

Category

STATIC
everything that can be viewed in a static way by the user (usually a pdf document or a webpage)

DYNAMIC
real-time tools or interfaces that involve actions from the user to search, visualize and compare data

Typology
The information are shared under the shape of

ANNUAL REPORT
a document provided annually to give shareholders and other interested people information about the company's activities and performances

DATA DRIVEN DASHBOARD
an information management tool that visually tracks, analyzes and displays KPIs, metrics, and key data points to monitor SDGs targets and other topics

WEB TOOL
a digital interface that enables the research and the analysis of data

MOBILE APP
an application that offers the user access to news, information, and personal data/scores

Type of contents → **TRENDS**
STATISTICS
GOOD PRACTICES
PROJECTS & CHALLENGES
...

Goals → What are the main goals to reach through the case study? After a first analysis of all the goals of the different case studies, they have been summarized in ten final goals:

1. **Tracking and monitoring SDGs** to make the user aware / keep track of the progress and the performance
2. **Enable public scrutiny** on the performances – commitment – strategy by stakeholders (already involved and potential ones)
3. **Share insights** about actions undertaken inside the institution/company and their outcomes
4. **Evaluate countries' situation regarding SDGs** (living and working conditions, education, climate change, innovation)
5. **Identify emerging trends**, the evolution of user/ consumer attitudes, regulatory requirements
6. **Identify interlinkages among all the SDGs** to reach a sustainability framework through a systemic perspective
7. **Organize knowledge** on policies, methods, and data to implement SDGs
8. **Gain knowledge and become aware** of how campus' actions play a role in environmental effects
9. **Raise the level of awareness about SDGs** and sustainable development by directly involving the user in the creation of new habits and good practices
10. **Increase integration of sustainability issues** into the business processes

2. USER & ENGAGEMENT

A first clusterization has been made considering some general categories in which is possible to identify the users of the different case studies. Specific identification of the users has also been made to make more evident potential differences or similitudes among different cases.

User →

- **AUTHORITIES** people or entities with administrative or political power and control → GOVERNMENTS, POLICY MAKERS, ...
- **PUBLIC INSTITUTIONS** entities established by a government or a municipality → ACADEMIC INSTITUTIONS, RESEARCH INSTITUTIONS, ...
- **PRIVATE ORGANIZATIONS** agencies, corporations, businesses, partnerships → INVESTORS, COMPANIES, ...
- **COMMUNITIES** small groups of people with common interests and goals that work and collaborate → STUDENTS, EMPLOYEES, FRIENDS, RESEARCH TEAMS, ...
- **SINGLE USER** person that, for personal or work interest, is interested in consulting the case study report → STUDENT, TEACHER, RESEARCHER or everyone if the target is not defined

Scope → What is the aim of the source? This category helps in understanding how engagement can vary.
INFORMATIVE
EDUCATIVE
COMPARATIVE
GAMIFIED APPROACH

Level of engagement → **HIGH - MEDIUM -LOW**

3. CONNECTION TO THE SDGS

The third category is focused on SDGs and how they are integrated inside the different case studies.

SDGs Focus

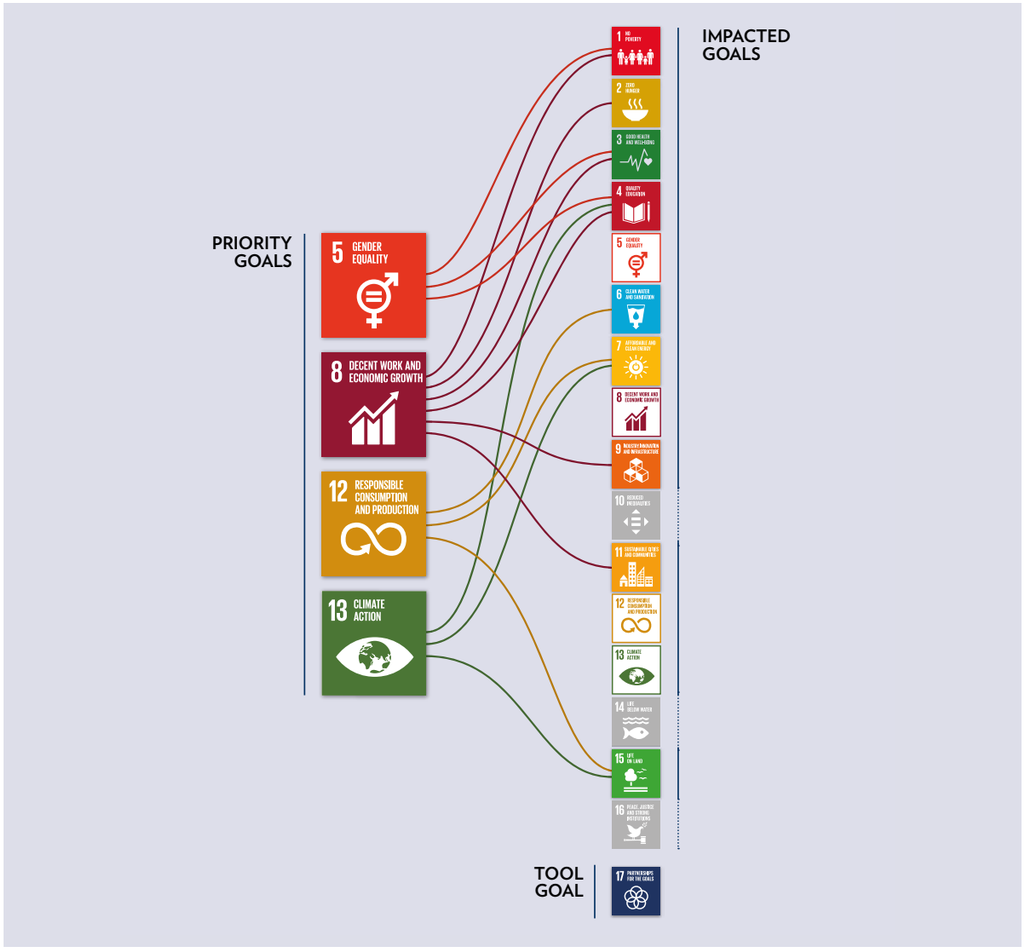
SDGs FOCUS
The source in the analysis is structured along the 17 SDGs, dedicating a section to each goal and focusing on the aspects that contribute to the implementation of it

SUSTAINABILITY FOCUS
The focus is on the different aspects and actions undertaken by the company / institution. The correlation between these elements and the SDGs can appear in different ways (identifying the priority goals, summarizing the results into their correspondent goals, ...)

SDGs selection method

If the source is not focused on the SDGs, how the collected data are considered? Does the source still consider all the 17 goals or only some of them? How are they selected?

PRIORITY GOALS (based on the business/ institution strategy & vision)
ACTIONS WITH STRONGER IMPACT ON SDGs
EDUCATION and COMMUNITY AWARENESS



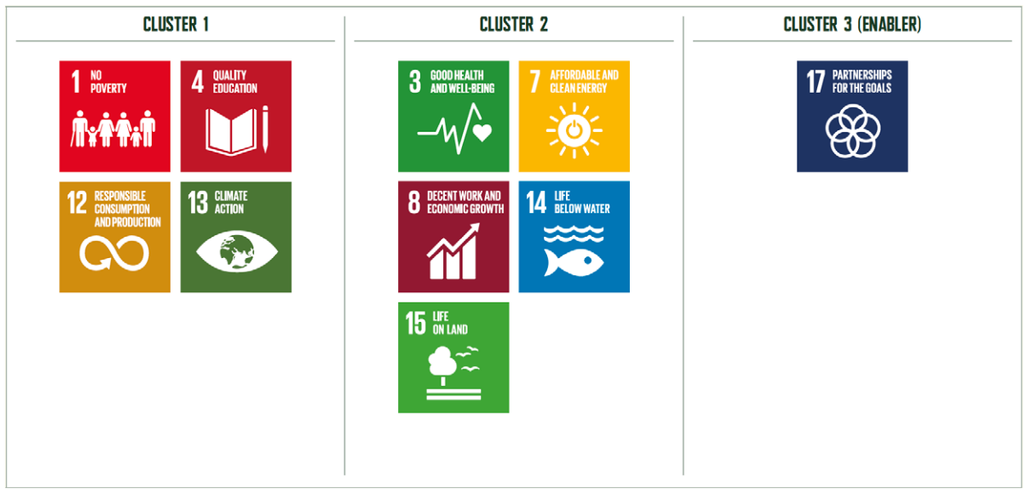


Fig. 13 - Assessment of priority goals, Lavazza - Sustainability Report 2019
Fig. 14 - Priority clusters, Ferrero - Sustainability Report 2019

4. ENERGY CONSUMPTION

In this section, information about energy, heat, and water consumption are taken into consideration. How these aspects are considered inside the reports? Do they have a direct connection with the SDGs?

Topics → If the source includes data about energy/water/heat consumption, which specific information are collected around the topics?

ENERGY USE AND GENERATION
CARBON FOOTPRINT
RECYCLING PROGRAMS FOR UNIVERSITY WASTE
WATER CONSUMPTION
...

Inclusion in the SDGs → To understand if energy and consumptions topics are somehow included in the SDGs analysis of the case study. Three levels have been identified:

1. **NOT INCLUDED (No)**
2. **ALL INCLUDED (Yes)**
3. **PARTLY INCLUDED (Partially)**

Connection with the SDGs → If the topics are included in the SDGs analysis, how do they relate to them?

GOOD PRACTISES
PROJECTS & CHALLENGES
PROGRESS ANALYSIS OVER THE YEARS
(charts, graphs, percentages)

5. METHODOLOGY

This last category is dedicated in the understanding of the various methods of selecting, analyzing and presenting data.
Which are the common analysis criteria?

Materiality Matrix → To identify priority goals. It is a tool mainly used in sustainability reporting by big companies to identify key sustainability topics for stakeholders and for the company itself

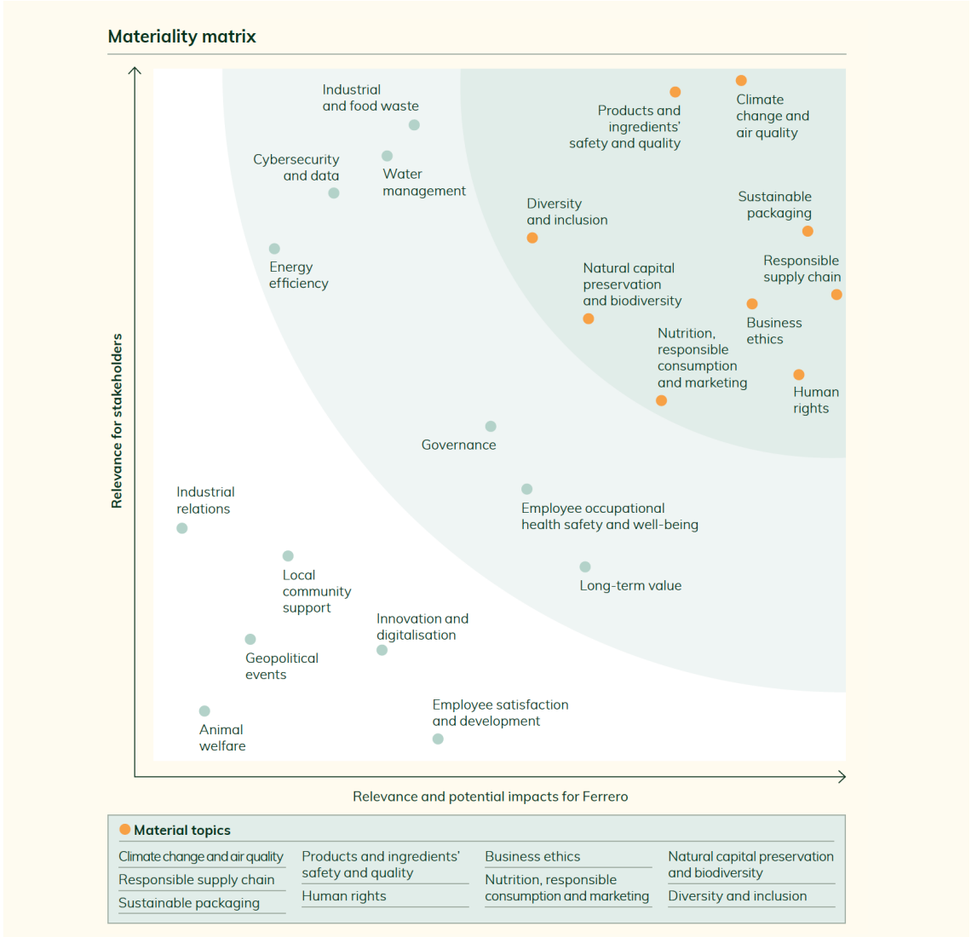


Fig. 15 - Materiality Matrix, Ferrero - Sustainability Report 2019

While the corporate field shares the use of a materiality matrix to define the boundaries of sustainability reporting, the academic field is more inhomogeneous: each university follows a different approach for the collection of data and the clustering of the contents. Here are some examples of representative methodology approaches used:

University of Bologna →

DIRECT and INDIRECT impact of the SDGs in the study courses

DATA COLLECTION based on:
Data Warehouse
Surveys by the coordinators
Content analysis of research projects
Scopus queries.

Aalto University →

PUBLICATIONS
Retrieved from the Aalto Research Information System

ENVIRONMENTAL IMPACT
Information collected through the Facility Management Systems

COURSE UNITS
Retrieved with a Curriculum Audit

ACTIONS OF THE CAMPUS
How they play an indirect role in the environmental impacts of the campus

University of Gloucestershire →

ENVIRONMENTAL MANAGEMENT SYSTEM targets performance.
The report is built around different topics and, at the end, there is a summary of the contribution to the SDGs with more impact

University of Manchester →

RESEARCH METRICS
Based on titles + keywords + abstract considering three different lists:
1. Elsevier methodology
2. SDSN Keyword list
3. 'Homegrown' keywords list

TEACHING METRICS
Using a curriculum audit to define:
DIRECT IMPACT (if the unit allows students to understand how to tackle the goals)
INDIRECT IMPACT (if the unit covers a general area relating to the SDGs, helping to understand the basis and building the knowledge)

RESEARCH IMPACTS
N° of published researches that can be related to the topic
N° of publications
Level of citations impact (in number)
N° of research that had an output in the research field
Contribution to the Nation (%)

LEARNING & STUDENTS
Study programs and opportunities
N° of student engagement
N° of units/courses on a subject

PUBLIC ENGAGEMENT ACTIVITY
Case studies/platforms/campaigns/ events (a list of them, not specific numbers, more descriptive)

QUALITATIVE ANALYSIS
Review of the relevant university websites
Staff surveys
Consultation with managers
Input from staff with expertise
Curriculum audit

Case studies
Summary table

		CASE STUDY	STRUCTURE				USER & ENGAGEMENT				SDGs	SDGs		ENERGY/WATER CONSUMPTION			METHODOLOGY
			Category	Typology	Goals	Type of contents	Scope	User		Level of engagement		Focus	SDGs selection method	Nº SDGs	Contents	Included SDGs	Conection with SDGs	Analysis Criteria
WORLD & COUNTRIES	1	SDGs Global Dashboard	Dynamic	Data Driven Dashboard	1 - 5	• Statistics • Trends • Monitoring & Tracking • Citizen Vote	Informative Comparative	• Authorities • Public Institutions • Big Organizations	Governments, Policy Makers	MEDIUM				17	• Renewable Energy • Energy intensity level • Energy/financial aspects • Water / Population • Water Efficiency / Management ...	Yes	Progress analysis/Results achieved in each country	/
									Researchers, Academicians	HIGH	• Lots of information from global sources in one place. Detailed targets and topics • the user get notified when data are updated or when suggested data are included in the dashboard • thanks to the vote the users can see how						
	2	Green Growth Knowledge Platform	Dynamic	Web Tool	6	• Interlinkages • Monitoring & Tracking • Comparing tool	Informative	• Authorities • Public Institutions	Policy Makers, Researchers	LOW	Information based on unverified and little in-depth interlinkages. Difficult to verify them			17	/	No	/	• Identification of the interlinkages between SDG targets based on causalities through literature review; • Selection of the indicators with trackable data for selected countries based mainly on the Global SDG Indicators; • Quantification of the identified causal relations between relevant SDG targets based on the correlation coefficients [-1, 1]
	3	The Known SDG	Dynamic	Web Tool	6 - 7	• EU policies & relation to the SDGs • Interlinkages • Modelling tools	Informative	• Authorities • Public Institutions	Policy Makers, Researchers	LOW to MEDIUM	Depending if the user is more interested in the Policies section (medium engagement) or in the interlinkages/modelling tools (low engagement)			17	/	No	/	The attribution of SDGs to each document has been performed in an automated way. The entry point is the target-level. Relevant SDG targets were identified through the detection of specifically designed keywords. The detected keywords were then aggregated to the target-level. The mapping is based on the information available in MIDAS and collected through workshops, questionnaires and surveys
	4	SDG Index and Dashboard	Dynamic	Data Driven Dashboard	1 - 4	• Trends • Monitoring & Tracking • Rankings and Scores	Informative Comparative	• Authorities • Public Institutions • Big Organizations	Governments	HIGH	Useful to understand how the country is positioned compared to others			17	CO2 emissions embodied in imports / fossil fuel exports Electronic waste Production-based SO2 emissions ...	Yes	Progress analysis/Results achieved in each country	Indicator Selection: 1 - Global relevance and applicability to a broad range of country settings 2 - Statistical adequacy 3 - Timeliness 4 - Data quality 5 - Coverage
	5	SDG Development Report 2020	Static	Annual Report - Dashboard Index					Researchers, Academicians, Policy Makers	MEDIUM				17				
	6	SDG&Me	Dynamic	Web Tool	1 - 4 - 5	• Statistics • Trends • Comparison among countries • Test user's knowledge	Informative Comparative	Public Institutions Single user	Researcher, Academicians,	LOW	Few information and not so much detailed			17	Renewable energy / in transport Energy consumption in households Energy dependency Greenhouse Gas emissions CO2 Emissions	Yes	Progress analysis in each country	Data based on the Eurostat Database
									Students	MEDIUM	The user can be involved in the topic by "taking a guess" over the trends of some sub-sets of the SDGs indicators						
ACADEMIC	7	SDG Report 2019 - University of Manchester	Static	Annual Report	1 - 2	• Activities and projects • Monitoring & Tracking	Informative	• Public Institutions • Big organizations • Single User	Investors, Partners, Researchers	MEDIUM to HIGH				17	Electric vehicles Partnerships with local suppliers Reduction of carbon emissions	Yes	Operational section of the report: Good practises and Projects promoted inside the Campus	• Research (data from Aalto Current Research Information System + Aaltodoc publication archive) • Public Engagement • Learning Students (data from curriculum and course offer / teachers interviews) • Operations
									Students, Teachers, University Staff	LOW to MEDIUM	LOW → Campus performances / Educative / Academic factors MEDIUM → Life on the Campus, Services,						
	8	Aalto Sustainability Report 2019	Static	Annual Report	1 - 2 - 8	• Monitoring & Tracking • Comparison	Informative	• Public Institutions • Big organizations • Single User	Investors, Partners, Researchers	MEDIUM to HIGH	MEDIUM → Good practises / Projects HIGH → Performances / Sustainability actions		EDUCATION and COMMUNITY AWARENESS	17	The environmental effects of the campus (contents): • Good practises & project • Studies & Researches • Waste production analysis • Consumption of electricity/heat/water progresses over the years	No	/	• Teaching & Researching • Societal Impact • Environmental Impact of Campuses Heat/water/electricity: collected form facility management systems Waste data collected from the wastd management suplliers' database
									Students, Teachers, University Staff	LOW to MEDIUM	LOW → Campus performances / Educative / Academic factors MEDIUM → Life on the Campus, Services, Events (more social impact)						
	9	Aalto App	Dynamic	Mobile App	9	• Monthly actions/Challenges/Quizzes • SDG Data bank • User and Community impact • Rating and feeback	Educative Gamified approach	Small communities Single user	Students, Teachers, Campus Staff	HIGH	Personal progress chart that allows the user to be self aware of his contribution. This give the user a sense of satisfaction or disappointment depending on his effort to reach the challenges			17	Some monthly challenges involve the user into energy and water saving good practises	Yes	Good practises	/
	10	University of Bologna on UN SDG 2019	Static	Annual Report	1 - 2	• Good practises	Informative	• Public Institutions • Big organizations • Single User	Investors, Partners, Researchers	MEDIUM	It's less focused on the improvement of performances during the years			17	Carbon footprint Emission vehicles Recycling program for University waste Water consumption	Yes	Good practises Third Mission Institution	• Teaching • Research • Third Mission • institution
									Students, Teachers, University Staff	LOW to MEDIUM	LOW → Campus performances / Educative / Academic factors MEDIUM → Life on the Campus, Services, Events (more social impact)						
	11	University of Gloucestershire 2018-2019	Static Dynamic	Annual Report	1 - 2 - 8	• Monitoring & Tracking • Sustainability projects and events • Students engagement and communities • Partnerships and collaborations	Informative	• Public Institutions • Big organizations • Single User	Investors, Partners, Researchers	MEDIUM to HIGH			ACTIONS WITH STRONGER IMPACT ON SDGs	6	• Energy and carbon reduction • Energy use and generation • Resource use	Partially	Results achieved	• Leasership and Governance • Student Experience • Academic Innovation • Business Operation Engagement and Partnership
									Students, Teachers, University Staff	MEDIUM	The report highlights some actions and projects carried out by the Campus that the student could not know about						
	12	The SDG Accord 2020	Static	Annual Report	1 - 3	• SDGs Impact Percentages • Institutions' SDGs Activities • Trends & Change of focus • Key findings	Informative	• Public Institutions • Big organizations • Single User	Universities, Partners, Governments Students, Academics, Professional staff, Local communities	MEDIUM	It can inspire other univeristies and academic institutions to take part in the Accord and improve their sustainable effort			17	/	No	/	Online survey focus on collecting universities' progress around: • Education • Research • Leadership • Operational • Engagement activities
	13	PoliTO Sustainability Report 2019	Static	Annual Report	1 - 2 - 8	• Monitoring & Tracking • Campus initiatives, projects • Students and staff engagement / community aspects • Communication • Networks and rankings	Informative	• Public Institutions • Big organizations • Single User	Investors, Partners, Researchers	MEDIUM to HIGH			EDUCATION and COMMUNITY AWARENESS	17	• Ecological footprint exercise • Water/energy consumption • Electricity self-production • Campus water initiatives • Campus waste • Mobility in Campus	No	/	• Energy and Buildings • Mobility and Transport • Urban Outreach • Food, water and waste • Communication • Education (SDGs) • Research (SDGs)
									Students, Teachers, University Staff	MEDIUM	The report highlights some actions and projects carried out by the Campus that the student could not know about						
PERSONAL ACHIEVEMENT	14	SDG Impact and Assessment Tool	Dynamic	Web Tool	9	• Identify opportunities, risks and knowledge gaps • Monitoring & Tracking	Educative	• Public Institutions • Big organizations • Single User	Companies, Agencies, Civil organisations	LOW	The "self-assessment" approach is risky if the user is not motivated enough and also it's difficult to measure the self-impact of an action			17	/	No	/	• Community Awareness The platform works on a self-assessment 5 steps criteria Results: Direct / Indirect positive - No impact Direct / Indirect negative - More knowledge needed
	15	Aworld - Act Now	Dynamic	Mobile App	9	• Good practises • Daily actions • Quiz	Educative Gamified approach	• Small communities • Single user	Friends,Family, Colleagues, Students,...	HIGH	Each completed action enable the user to collect a certain amount of point (leaf in this case). The higher the n° of points collected the higher the level of awareness and positive impact the user will reach			17	Daily actions to reduce carbon footprint, save energy, ...	Yes	Good practises	Higher range of points for actions that have a stronger and positive impact on the environment or on a more sustainable life (and viceversa)
	16	SDGs in Action	Dynamic	Mobile App	5 - 9	• Good practises • Daily Actions • Create actions and events	Informative - Educative Social/Community approach	• Big institutions • Small communities • Single user		MEDIUM	Receive notifications about that goal. Find actions and events near you that you can join to support the goals. The ability to create Actions you're planning in your area, and invite others to join.			17	News about renewable energy, water consumption Daily actions to reduce carbon footprint, save energy, ...	Yes	Good practises Projects & Challenges	/
BUSINESS	17	FCA Sustainability Report	Static	Annual Report	5	• Rating and rankings on performances • Environmental, social and governance indicators	Informative	• Public Institutions • Big organizations • Single User	Investors, Partners, Suppliers	HIGH	Very detailed and descriptive about every process (production, distribution, ...) involved in the industry		ACTIONS WITH STRONGER IMPACT ON SDGs	17	Environmental and Climate Impact	Yes	Progress analysis/Results achieved in each country	MATERIALITY ANALYSIS • Business Operations • Employees, Customer & Society • Environmental and Climate Impact • Technology Innovation
									Regulators, Employees & Staff	LOW							
	18	Lavazza Sustainability Report 2019	Static	Annual report	2 - 3 - 10	• Performance and progress indicators • Activities and Good practises	Informative	• Public Institutions • Big organizations • Single User	Consumer associations, Investors, Partners,	HIGH			PRIORITY GOALS	4	Energy/water/heat consumption Progress over the years Percentages related to sustainability actions	Yes	The analysis of the environmental impact / energy consumption /... are part of two of the Priority Goals identified by the Company: SDGs 12-13 So this aspects is a big part of the report	MATERIALITY ANALYSIS • Stakeholder Inclusiveness • Sustainability Context • Materiality • Completeness
									Employees, Distributors, Regulators	MEDIUM	A big part of the report is focused on projects, good practises of the Company that can increase the sense of community among all the people that work in Lavazza						
	19	Ferrero Sustainability Report 2019	Static	Annual Report	1 - 2 - 3	• Performance indicators • Behaviours and Good practises • Supply Chain detection	Informative	• Public Institutions • Big organizations • Single User	Consumer associations, Investors, Partners,	HIGH			PRIORITY GOALS	10	Protect the environent section: Energy Water stewardship Waste management	No	/	MATERIALITY ANALYSIS to identify and assess the relative importance of key sustainability topics (in terms of value creation and relevance to stakeholders) MATERIALITY MATRIX

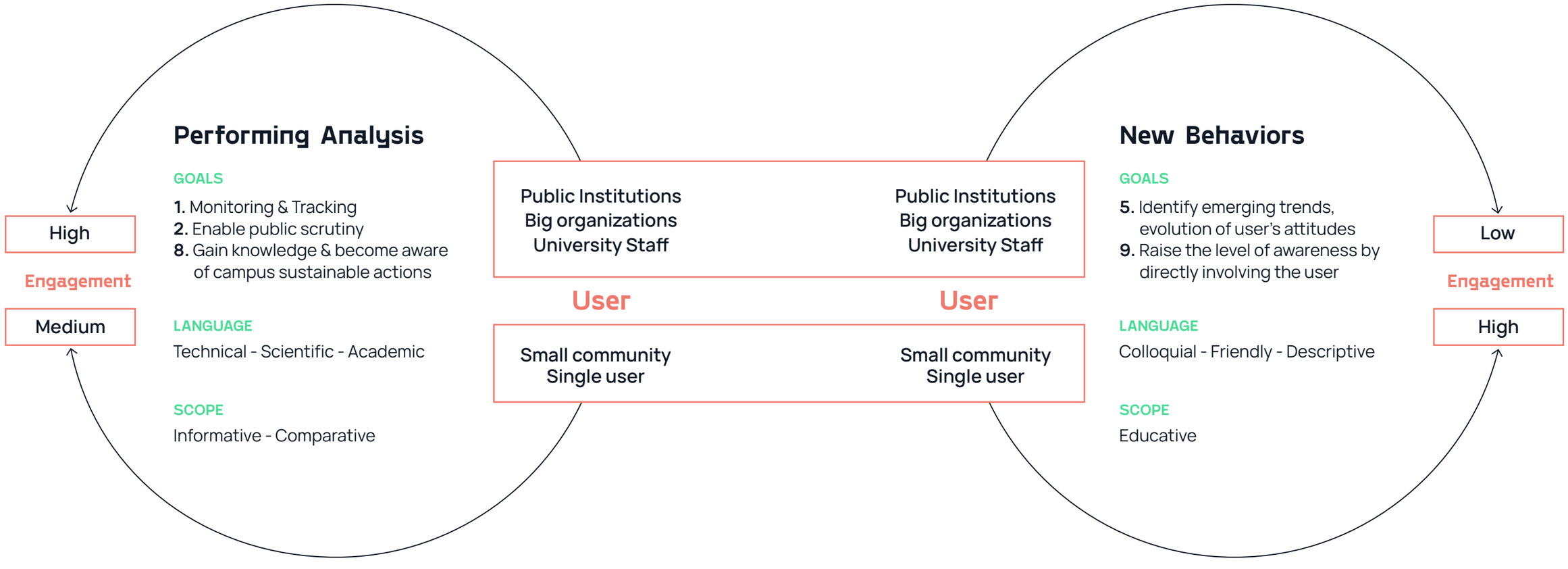
Table 1 - Summary table of the case studies

3.3
Scenario overview

Once having defined the summary table, two main clusters can be extracted and used to orient the case studies. On one side it emerged a trend towards 'Performing Analysis', meaning that reports (both static and dynamic) are more oriented to monitoring and tracking the impact, in order to enable public scrutiny from partners and other stakeholders. This approach requires the use of a technical and scientific language in order to inform the reader and activate a comparing process.

On the other side, it is possible to identify an approach towards 'New Behaviors' that involves mainly mobile apps and dynamic platforms; the main goal is to identify emerging trends, evolution of user's attitudes and to increase the level of awareness through a direct involvement of the users. To make this approach effective, a more colloquial, friendly, and descriptive language is used to reach the educative scope.

These two directions represent the starting point in the development of the project, as they guide the definition of the guidelines from which the concept will emerge.



Concept definition

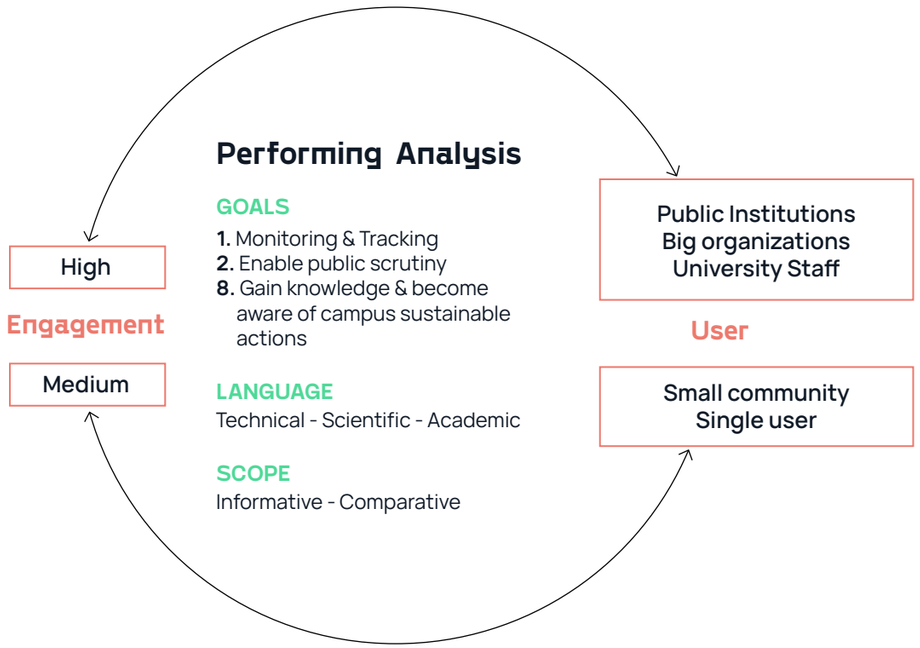
4.1
Towards a concept

The scenario analysis has brought to the identification of two main directions in which the collection of data, from the sustainability and SDGs scenarios, are oriented.

Performing Analysis and New Behaviors share the same users' categories, but with different levels of engagement. After the first phase of concept definition, in which both clusters were considered as a part of the project, goals and languages would have required two different project lines without a strong bond between them. It was therefore decided to focus the attention and develop the first cluster Performing Analysis as more inherent to the initial goal, that is to enable university campuses to map their contribution to the achievement of the SDGs.

After these considerations, the design phase started following four different steps:

1. Selection of the main guidelines
2. Definition of needs & requirements of the mapping tool
3. Identification of the main topics and contents to be mapped inside the tool
4. Definition of the main parameters for the creation of the digital platform



4.2
Guidelines & Needs

The definition of guidelines was the first step for the development of the concept. Considering the goal of the project and the insights emerged from the scenario analysis, they were organized into four categories:

1. **Performing analysis**
   Highlight the positive / negative impacts, and allow to transform complex data in useful insights
2. **User engagement**
   What the user should experience to make the tool a reliable reference
3. **Technical aspects**
   How the tool should be integrated in the university system
4. **Communication**
   Visual approaches & strategies to communicate various data.
   This category, if present, is analyzed inside the other three categories.

	Guidelines	Needs	Features
PERFORMING ANALYSIS	→ Offering an ID Card of the campus through its performance → Showing the goals to achieve → Offering digital archives of the progress over the time (enabling comparison of past years)	→ Prior identification of the goals to be achieved → Obtaining a 'still reference' of the consulted data → Contextualizing data and actions	→ Download area to obtain a static report → Suggestions of related data from other topics / SDGs
Communication	→ Use a visual language (graphs, charts, maps, ...)		
USER ENGAGEMENT	→ Self-evaluation of priority goals → Possibility to visualize impacted goals → Combine and compare different SDGs & related data	→ Explore unexpected connections → Manage the complexity of data and connections	→ Personal selection of SDGs and topics using keywords
TECHNICAL ASPECTS	→ Integration with the existing digital services of the applying campuses (website, app, ...) → Easy access (especially at the beginning, it should be evident the access from the campuses' websites)	→ Easy to maintain and update platform → Automatic update of data, based on a linked database	→ Allowing access to the tool also from the university portal → Login area with campus credential to allow university staff to have a more detailed vision of the data (the tool is open to everyone, but it offers a more general view without a login)
Communication	→ Use of a universal language, but still adaptable to each campus and its territorial and social context		

4.3
Analysis criteria & Typologies of interaction

After the identification of the main guidelines, with the correspondent needs and potential features of the tool, some considerations about the analysis criteria and typologies of interaction were extracted. This helped in the assessment of the first elements of the design phase.

ANALYSIS CRITERIA
How the data should be collected, compared, and visualized to have a clear and complete understanding of the state of the art of a campus:

- → **Direct / Indirect Impact**
- → **Synergies / Correlations among SDGs**
- → **Progress Monitoring**
- → **Mapping**
- → **User self-assessment**
- → **Surveys**

TYPOLOGIES OF INTERACTION
How the user can interact with the data visualized on the tool, to have a more guided and personalized experience:

- → **Choosing SDG /Topic**
- → **Comparing tool**
- → **Level of complexity (correlation)**
- → **Personalized download options**

4.4
Definition of the contents

All the features, typologies of interaction, and analysis criteria must find a match with the contents of the tool. That is why the following step of the concept definition is the identification of different topics useful for the university campuses to map their contribution to the 2030 Agenda. First, six macro-topics were identified: they represent the main areas in which universities are involved:

1. Campus setting
Everything that revolves around the use of resources inside the campus, the management of input/output, the use and eventual improvement of the spaces.

2. Community awareness
Aspects that help to understand how sustainability topics are perceived by the campus community.

3. Academic innovation
This category mainly focuses on the role of research and publications around sustainability topics, in order to increase the level of awareness.

4. Education
To map the structure of the courses, the cultural diversity of the community (students, professors, academic staff) and the relationships with other countries through exchange programs.

5. Outreach & Partnerships
The relationships that the university has with the local context, but also with international actors and partners.

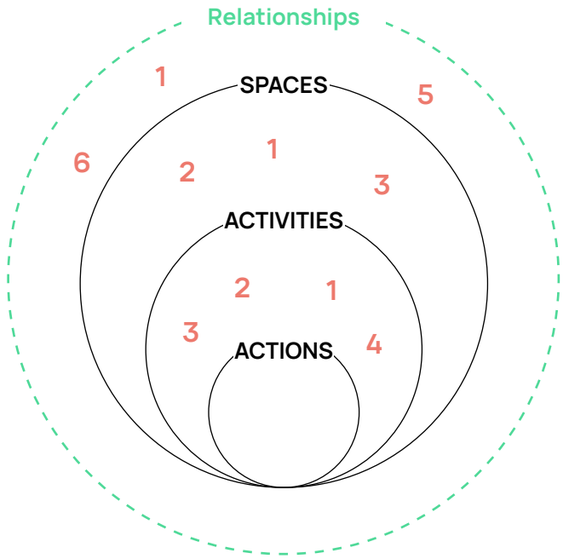
6. Leadership & Governance
The ability to innovate and improve through investments, digitalization, new policies, and regulatory changes.

The data that can be included in each of the six macro-topics can be then classified in:

- → **Actions**
- → **Activities**
- → **Spaces**
- → **People & Relationships**

Macro-Topics

1. Campus Setting
2. Community Awareness
3. Academic Innovation
4. Education
5. Outreach & Partnerships
6. Leadership & Governance



4.5
From SDGs topics to specific data

To better understand which topic can be mapped inside each of the six categories, a jump back was made to the moving force of the entire project: the SDGs. The platform aims to map the contribution towards the 17 Goals, each one of them covering specific aspects of social, environmental, and economic sustainability. But a step forward was made: if looking at a long-term strategy, so after 2030, the 17 Goals could be reduced/implemented or even substituted with a different approach. With this perspective, organizing the platform specifically around the SDGs could result in too specific customization that will lead to a lack of flexibility in a future where the contents will require to be reorganized. The process has moved on with the idea of creating a double reading layer: each SDG has been exploded in its targets (169 total targets); among them, a selection of the more suitable ones has been made, to have corresponding data from the campus [Tab. 2]. Then, the selected targets have been interpreted and adapted to the platform needs and goals, identifying 7 themes and 14 contents categories, as visible from the mapping process [Tab. 3].

SDG 1 End poverty	Reduce by half the proportion of men, women and children of all ages living in poverty
	Implement nationally appropriate social protection systems
	Achieve substantial coverage of the poor and the vulnerable
	Equal rights to economic resources, equal access to basic services
	Reduce exposure and vulnerability to climate-related extreme events and other disasters
	Ensure significant mobilization of resources from a variety of sources
	Enhancing development cooperation to provide adequate means for developing countries
	Implement programmes and policies to end poverty in all its dimensions
	Create sound policy frameworks at national/regional/international level (based on pro-poor and gender-sensitive development strategies)
	Support accelerated investment in poverty eradication actions
SDG 2 Zero hunger	Ensure access by all people to safe nutritious and sufficient food all year around
	End all forms of malnutrition
	Double the agricultural productivity and incomes of small-scales food producer
	Ensure sustainable food production system and implement resilient agricultural practises that increase productivity and production
	Maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals
	Increase investment in rural infrastructure, agricultural research and extension services
	Correct and prevent trade restriction and distortions in world agricultural markets
	Adopt measures to ensure the proper functioning of food commodity markets and their derivatives
	Facilitate timely access to market information, including on food reserves

Table 2 - Extract of the SDGs and target selection table

All these information have been organized in a database [Tab. 4-5]: for each macro-topic, themes and contents categories extracted from the mapping process have been exploited, allowing the definition of the types of data to be collected. The result is a total of 53 topics that will be displayed inside the platform. In some cases, like in Education and Outreach, some topics offer a second level of analysis to deepen the study.

Then, other kinds of information have been considered to follow the analysis: for each content, the correspondent SDGs have been identified, the collecting method (monitoring, mapping, or surveying) and which data are more suitable to be compared among different years of the monitoring.

The analysis of the contents resulted in a various and rich amount of data, with different levels of readability. Considering the user experience in the navigation of all these topics and information, it is important to define how the process of visualization can be managed.

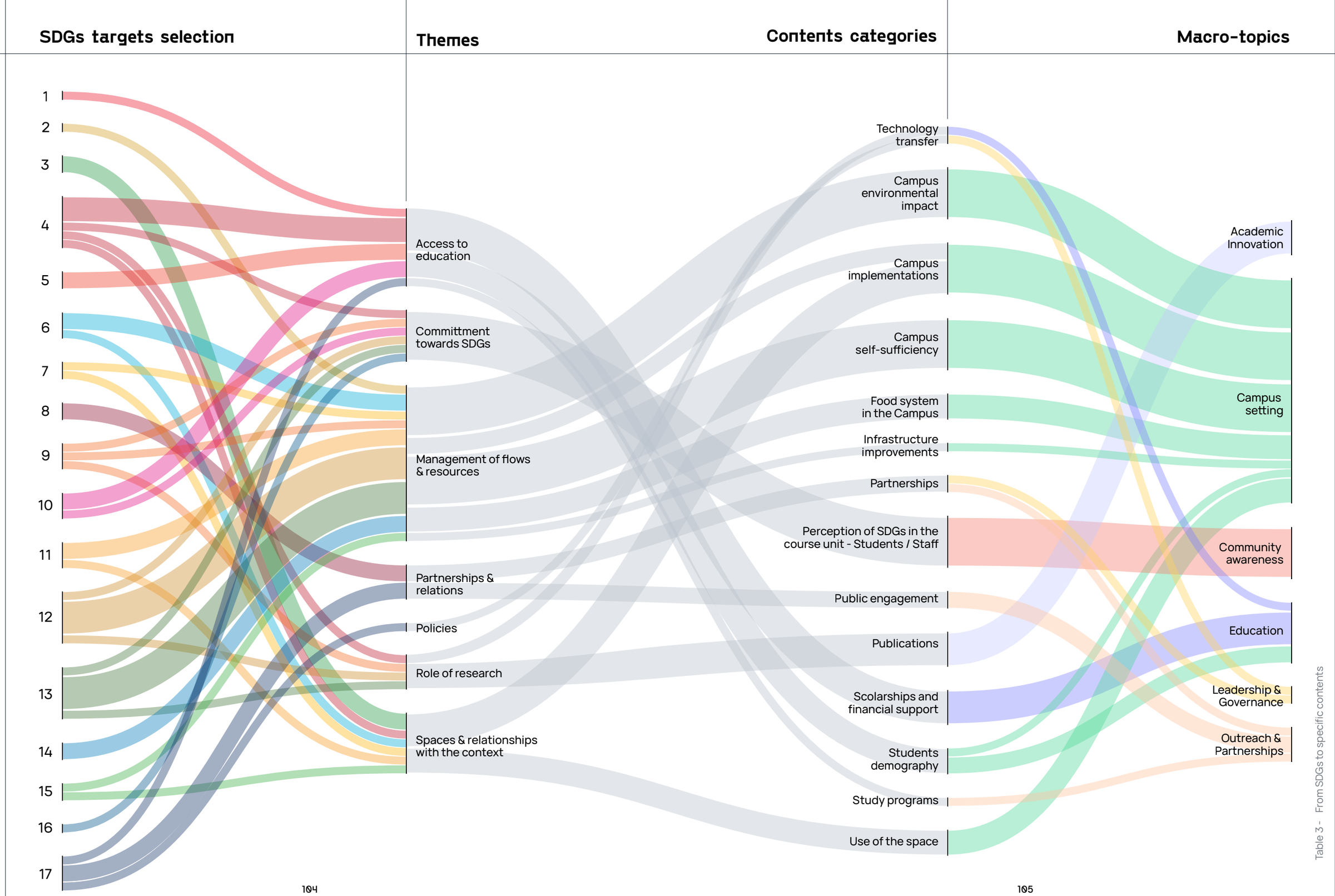


Table 3 - From SDGs to specific contents

MACRO TOPIC	THEME	TYPE OF DATA	WHAT TO MAP (1st level)	WHAT TO MAP (2nd level)	UNIT	SDGS	METHOD OF COLLECTION	TYPOLOGY	COMPARISON WITH OTHER CAMPUSES
CAMPUS SETTINGS	Management of Flows & Resources	Campus Waste Management	Amount of food waste		qnt	2 - 12	MONITORING	actions	
			Food provisioning system		qualitative	2 - 12	MAPPING	activities	
			Total waste vs. Recycled / Landfilled / Energy / other		% qnt	11 - 12 - 13	MONITORING	actions	
			Main outputs	Eventual reuse destination	% & qualitative	11 - 12 - 13	MONITORING	activities	
		Campus Environmental Impact	Total carbon footprint emissions		% qnt + future goal	11 - 13	MONITORING	actions	
			Main sources of carbon footprint		% qnt	11 - 12	MONITORING	actions	
			Energy consumption		GWh	11 - 12	MONITORING	actions	
			Use of renewable sources for energy consumption		% over the total consumption (qnt GWh)	7 - 12	MONITORING	actions	
			Water consumption		liters	12 - 14	MONITORING	actions	
		Campus Self-sufficiency	Energy self-production		kWh	7 - 12	MONITORING	activities	
			Water self-production		liters	6 - 7 - 12	MONITORING	activities	
	Spaces & Relationships with the context	Campus implementations	Investment in infrastructure improvements		€ / % over the total investments	3 - 9 - 11	MONITORING	actions	
			Actions to make building more sustainable (Building Performance Implementations)		qualitative	9 - 11	MONITORING	actions	
			Drinking water point		n°	6 - 9	MAPPING / MONITORING	spaces	
		Use of the space	Green areas over the total surface		%	3 - 4 - 9	MAPPING / MONITORING	spaces	
			Gathering spaces over the total surface (food & commuting spaces)		%	3 - 4 - 9	MAPPING / MONITORING	spaces	
			Space efficiency (space extension vs. total number of people)		m2 / n° ppl	3 - 4 - 9 - 15	MONITORING	spaces	
		Mobility system	Connection of the Campus with the rest of the city		qualitative / n°	3 - 9 - 11	MAPPING	relationships	
			Cross Campus Travel (Private / Sharing / Public transport / Walk)		%	4 - 9 - 11	MAPPING / MONITORING	relationships	
COMMUNITY AWARENESS	Committment towards SDGs	Personal perception of SDGs inside the Campus (Students + staff)	Self awareness of the SDGs		n°	4 - 12 - 13	SURVEY	actions	
			Self perception of the SDGs importance inside th Campus Activities and Services		n°	4 - 9 -16	SURVEY	actions	
			Perception of the SDGs inside the study programs / courses		n°	4 - 16	SURVEY	actions	
			Thesis & SDGs / Sustainability Topics	from bachelor degree / master degree	n°	4 - 9 - 12 - 13	SURVEY KEYWORDS SEARCH	activities	
	Sense of community	Events & Community	Social engagement (events & projects communication)		qualitative / n°	4 - 9	MONITORING	activities	
ACADEMIC INNOVATION	Role of Research	Publications	N° of publications on sustainability topic over the total	Articles / Conference proceedings Doctoral dissertations/ Book chapters	n° / %	4 - 9 - 12 - 13	MONITORING / KEYWORD SEARCH	activities	
				SDGs/topic with the most growth in number of publications	%	4 - 9	MONITORING / KEYWORD SEARCH	activities	
			Departments' contribution to research		n° / %	4 - 9	MONITORING	activities	

Table 4 - Database of the contents to be mapped inside the platform

MACRO TOPIC	THEME	TYPE OF DATA	WHAT TO MAP (1st level)	WHAT TO MAP (2nd level)	UNIT	SDGS	METHOD OF COLLECTION	TYPOLOGY	COMPARISON WITH OTHER CAMPUSES
EDUCATION	Access to education	Scolarships & Financial support	n° students with scolarships		%	1 - 4 - 10	MONITORING	actions	
			investment in scolarships		€	1	MONITORING	actions	
			Supporting projects (economic)		Qualitative	1		activities	
		Campus demography	Students ethnicity		% qnt	4 - 5 - 10	MONITORING	relationships	
			Students Gender Distribution		%	4 - 5 - 10	MONITORING	relationships	
			Students Gender Distribution in Field of Study					relationships	
			Staff Gender Distribution	Gender distribution on decisional role / professors / administratitve staff	%	4 - 5 - 10	MONITORING	relationships	
			Staff & Professors Pay gap		%	4 - 5 - 10	MONITORING	relationships	
			International / National students	Erasmus / exchange / enrolled	%	4 - 5 - 10	MONITORING	relationships	
		Study programmes	Extra curricular activities on sustainability	Students teams / interdepartmental centers	n°	4 - 12 - 13	MONITORING	activities	
			Courses with direct relationship with SDGs		n°	4	SURVEY	activities	
			Courses with indirect impact on SDGs		n°	4	SURVEY	activities	
OUTREACH & PARTNERSHIP	Access to education	Study Programmes	International / National students	Erasmus / exchange / enrolled	%	4 - 17	MONITORING	relationships	
			Students applied to exchange/erasmus programmes		%	4 - 17	MONITORING	relationships	
	Power of relationships	Partnerships	Active projects with local actors	% small companies / startups / public organizations / other schools	n°	8 - 9 - 17	MONITORING	activities	
			Active projects with regional actors	% small companies / startups / public organizations / other schools	n°	8 - 9 - 17	MONITORING	activities	
			Active projects with international actors	% of projects with companies / public organizations / NGO / Social enterprises	n°	8 - 9 - 17	MONITORING	activities	
			Students attending Internships during degree		%	4 - 8 - 17	MONITORING	activities	
		Public Engagement	Active projects between students / Team and the territory		n°	4 - 8 - 9	MONITORING	activities	
			Participation at national / international contests / conference / events	N° of people booked / N° people that participated	n°	9 - 11 - 17	MONITORING	activities	
	Ability to innovate and improve	Technology transfer	Patents / Copyrights / intellectual property		n°	8 - 9	MONITORING	activities	
			Investments in research		€ / % over the total investments	4 - 8 - 9	MONITORING	actions	
			Active research projects	financed competitive calls on sustainability	n°	8 - 9 - 11	MONITORING	activities	
LEADERSHIP & GOVERNANCE	Ability to innovate and improve	Campus demography	Staff Gender Distribution	Gender distribution on decisional role / professors / administratitve staff %	%	4 - 5 - 10	MONITORING	relationships	
		Campus implementation	Digitalization & new technology	Investment in Infrastructure Improvement	€ / % over the total investments	4 - 9 - 17	MONITORING	actions	
			Policy and regulatory changes		qualitative	4 - 16 - 17	MONITORING	actions	

Table 5 - Database of the contents to be mapped inside the platform

4.6
Process of visualization

Two main questions arise when thinking about the user experience with the information collected inside the platform.
How this data can be browsed inside the platform?
Which filters can be applied to guide the user in the analysis?

To find a proper solution to these questions, it is useful to start with the concept proposed by Mauri et Ciuccarelli (2013) in designing a good data interface: the problem is not the huge amount of data, but the quality of information provided and the different levels of aggregations (Ciuccarelli & Ricci, 2008).

To be defined as 'functional' an interface should be able to show the information clearly. However, being able to 'show everything' without creating a sense of confusion can be hard; so, it is important to identify the best modality of data aggregation. A suggested approach is the 'subtractive' one: the users see all the data at the same time but have the possibility to filter them; this approach guides the exploration according to users' needs and interests. There are three steps that can be followed to create this explorative approach ((Ciuccarelli & Ricci, 2008):

1. **Definition of the entities to be visualized**
2. **Definition of the perspective of the analysis**
3. **Definition of the filters to help visualize the elements**

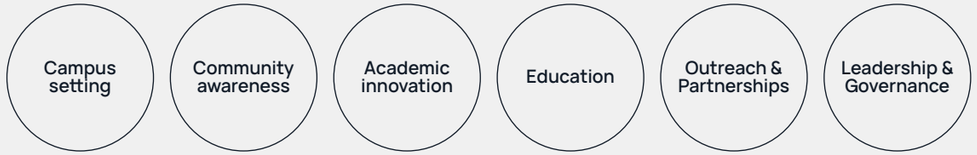
In this mapping tool, the entities to be visualized are the six macro-topics that offers a brief overview of what user will find on the platform; the perspective of the analysis is the possibility for the user to filter the research via actions, activities, spaces or relationships; then, the filters that help to visualize the elements are the 17 SDGs or their correspondent themes. In this way, users can navigate the information depending on their needs and their knowledge. There is the possibility that some users do not have a complete understanding of each goal and might find themselves more confident in relying on alternative filters.

"Overview first, zoom and filter, then details-on-demand."

Shneiderman, 1996

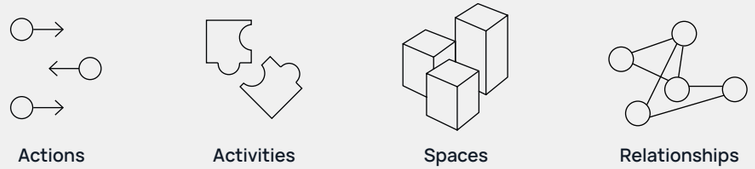
1. Entities to be visualized

6 macro-topics



2. Perspective of the analysis

4 categories



3. Filters

SDGs

Corresponding categories

Campus Waste Management
Campus Environmental Impact
Campus Self-Sufficiency
Campus Implementations
Campus Demography
Perception of the SDGs
Mobility System
Partnerships
Publications
Public Engagement
Scolarships & Financial Support
Study Programs
Technology Transfer
Use of the Space

4.7

Tool & Interaction: first suggestions

The previous step has been useful to define what contents can be included within the tool. But what is this tool going to be? A website, a digital portal, a YouTube channel?

To clarify the type of tool to be designed, which will act as a container for all the data, it was considered useful to return to the information collected with the scenario analysis; regarding dynamic platforms, three types of instruments emerged:

- → **MOBILE APP:** an application that offers access to news, information, and personal data/scores
- → **WEB TOOL:** a digital interface that enables data research and analysis
- → **DATA-DRIVEN DASHBOARD:** an information management tool that visually tracks, analyzes, and displays KPI , metrics and key data points to monitor specific targets related to the SDGs or to other topics

Right from the beginning, it was deemed necessary to exclude the mobile app, as it is an ineffective support to allow in-depth analysis of data and correlations of information that are not necessarily immediate in reading. The second category, web tool, has features that are already more effective and inherent to the identified needs; it is a digital platform in which information can be organized on different levels and pages. The last option is the dashboard, a tool that allows managing a large amount of information through a single screen. Regarding the last category, it was considered interesting to further investigate also considering the presence of bibliographic resources relating to the topic. The UNDP document "SDG Dashboard – The role of information tools in the implementation of the 2030 Agenda" (2017) is an example. Inside this research, a distinction is made between 'Information and Development Dashboard': the first is a visual display of the most important information needed to achieve certain objectives, that has been consolidated into a single screen so it can be monitored briefly (Few, 2013); the second, on the other and, is an evolution of the former: it addresses a broader set of issues which require whole-of-government coordination with a broader set of institutions and stakeholders. This requires a lot of coordination across institutions. Both cases are a way to bring measurement to the forefront and kickstart the Agenda 2030.

To better understand the feasibility of a dashboard to display SDGs data, the UNDP document analyzed twelve case studies. Here three cases are reported as the most relevant references to the project definition.

CASE STUDY

Sinergia - Colombia

https://sinergia.dnp.gov.co/Paginas/inicio.aspx

→ Each of the 998 performance indicators takes into consideration:
Recording of the objective
Strategy to achieve the objective
Baseline performance
Annual targets
Amount spent by the governments

→ Shows overall progress, progress by pillars, cross-cutting themes, and sector

→ The dashboard is useful to navigate the database by strategy, goals, program, indicator, sector, and institution

CASE STUDY

SDG Information system / SI-ODS - Mexico

http://agenda2030.mx/#/home

→ It allows consultation by goal and state, data on indicators and their metadata, offers visualization in dynamic graphs, allows export in different formats, and has a calendar for updating the indicators

→ 65 indicators in 15 of the 17 SDGs

CASE STUDY

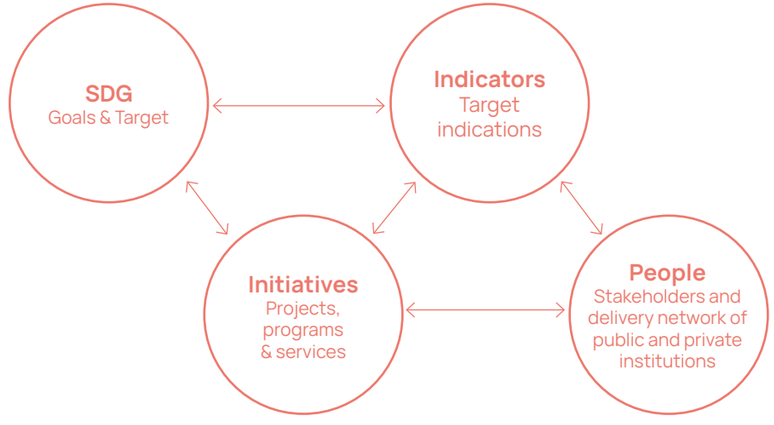
Panama Pilot SDG Platform - Mexico

→ Massive aggregator of data: data from ongoing initiatives that contribute to the delivery of SDGs + the results from official statistics

→ First pillar (initiatives): information from projects and services of public programs, aligned to the SDGs. The creation of a summary dashboard explorable by the users

→ Second pillar (indicators): data shown in ranks, tables, and maps

→ Producing automated reports



Graph. 3 - Fundamental elements in the creation of a SDGs Dashboard

The analysis of these examples has been useful to understand the potentiality of a dashboard to display data, like easy personalization and maintenance, but also the negative aspects of it, like difficulties in maintaining the efficacy. Because of it, most of the twelve platforms are still under development or still working as 'pilot projects' without public access.

PRO

→ All-in-one place visualization tool

→ Real-time data update

→ Easy personalization and maintenance

CONS

→ If data are not constantly updated → risk of failure in efficacy

→ Few examples are working

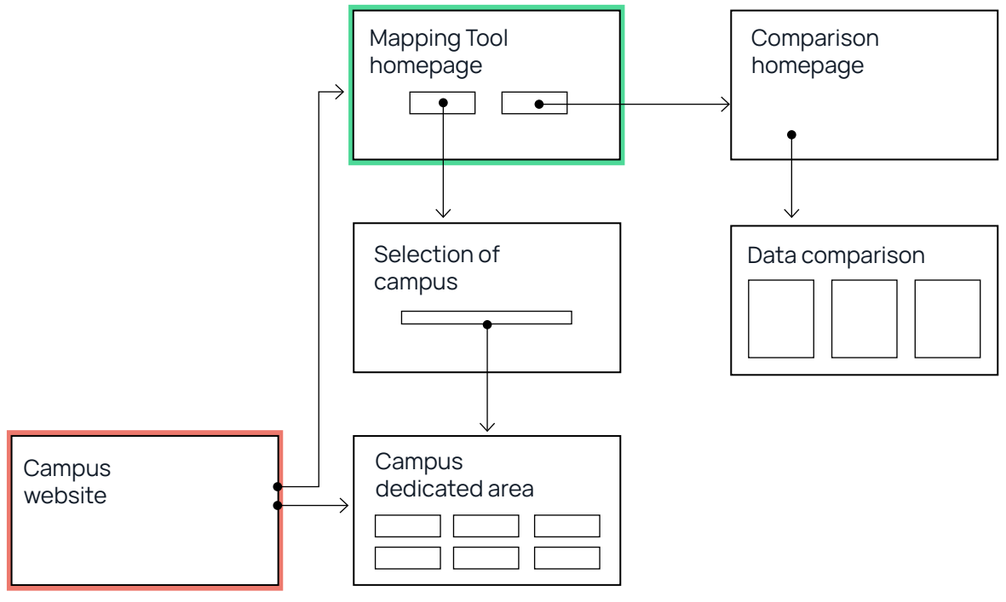
Back to the initial question, "What is this tool going to be?", even though dashboards show promising aspects in mapping and implementing the sustainable goals, in this project data do not need real-time updates: this would make the overall experience too static and not in line with the dashboard strategy. In addition, as the data collection will refer to one campus but will be very differentiated, it could be difficult to show all of them in one single screen if not using many filters that could create confusion in the final user. With these observations, the chosen path is the development of a web platform in which data will be organized in scrollable and multiple pages with the addition of information about the SDGs and the platform project.

4.8

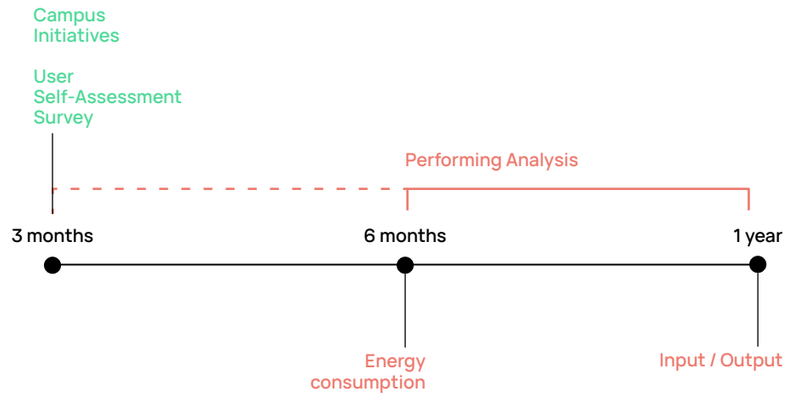
Towards a solution

To conclude the concept definition and move towards the development of the platform, the UNDP document suggests some fundamental elements that must be considered when designing an information tool; these elements are arranged and interpreted in five final aspects to consider before moving to the design phase.

1. PURPOSE
   It is the driver of the entire project. It has to be clear to the user without any possibility of misunderstanding.
   The purpose of this mapping tool is to give universities the opportunity to map their contribution to the 2030 Agenda, helping in the identification of gaps, the enhancement of already existing good practices, and the interpretation of new paths.
2. HOW & WHEN WILL THE DATA BE ACCESSED
   The platform will contain public data from different campuses. That is why it will offer an open access to everyone interested in the topic. The access will be granted towards two channels:
   → From the campus website (through an external link)
   → Directly from the platform domain



3. RANGE OF UPDATE
   Because of the type of contents that will be displayed inside the tool, the range of update will be every 6 or 12 months. Especially for data regarding the campus setting (like energy and water consumption) can be difficult to collect them more frequently and they would be influenced by seasonal trends that would not make the visualization useful. Some topics, regarding Community Awareness, could be detected every three months but it is still an improbable condition.
4. MAINTAIN INTERESTS & ENGAGEMENT



   Personalization and interaction with the elements visualized in the platform will help in maintaining the user engagement with the aim of making the platform a landmark for the future.
5. DATA QUALITY & DATA AVAILABILITY
   All the necessary data will be provided by each campus from monitoring/mapping activities and surveys collection. Then, the data will be collected and organized through an excel file that will work as a database directly linked to the platform. Data availability will depend on the range of update and on the possibility of each campus to map the defined topics.

Once having defined the concept and the fundamental pillars for the development of the project, the following chapter focuses on the realization of effective data visualizations to be displayed inside the platform and that translate the identified contents in a graphical way.

5

Data visualization*

Data visualization*

*The graphics are for illustrative purposes only. The visualizations are partially obtained from data retrieved from existing campuses while others are invented with the purpose of showing the most suitable mapping representations.

5.1 Campus setting

- → Campus waste management
- → Campus environmental impact
- → Campus self-sufficiency
- → Use of the space
- → Campus Implementation
- → Mobility system

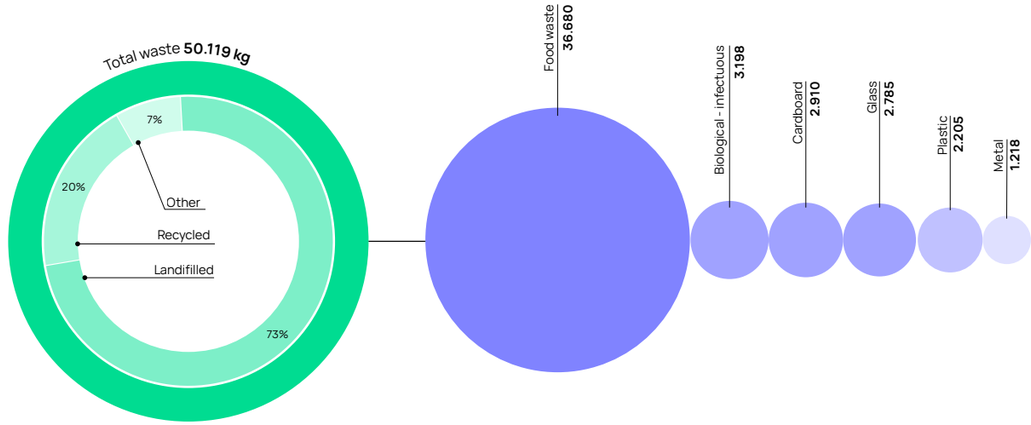
CAMPUS WASTE MANAGEMENT

Management of the waste (kg)

On the total waste produced in a year, the quantities destined for recycling, landfill, or other sources are calculated. Further analysis identifies the main sources of waste (organic, paper, plastic, ...).

Type of data viz:

Donut Chart
Circle Chart

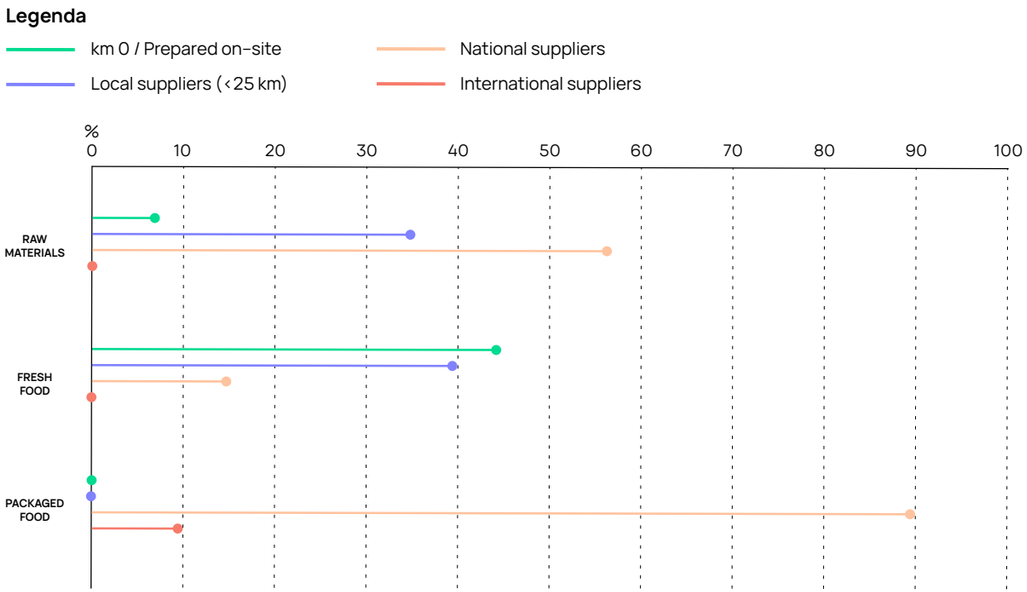


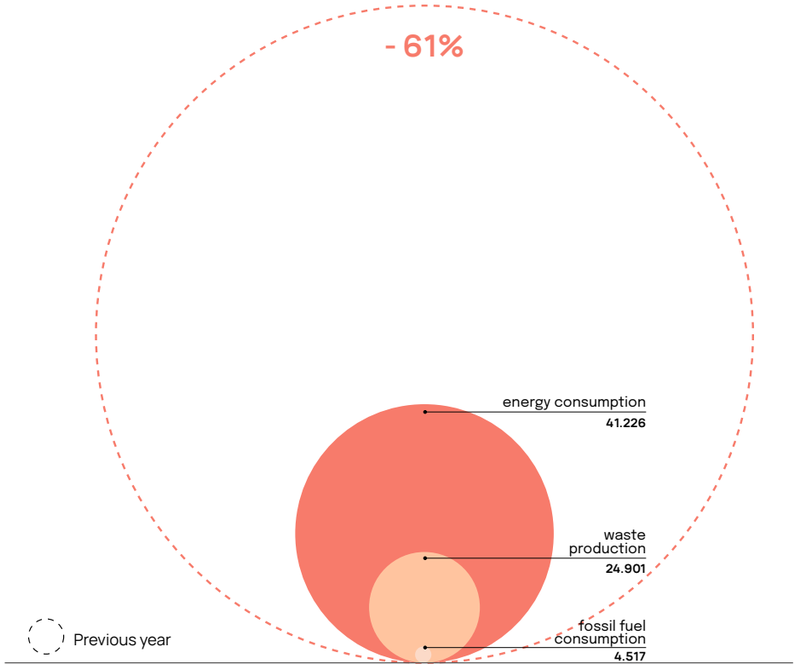
Food provisioning system

In this graph different information are crossed: type of food, type of suppliers based on the distance from the campus, and related quantity (%).

Type of data viz:

Dumbbell Plot





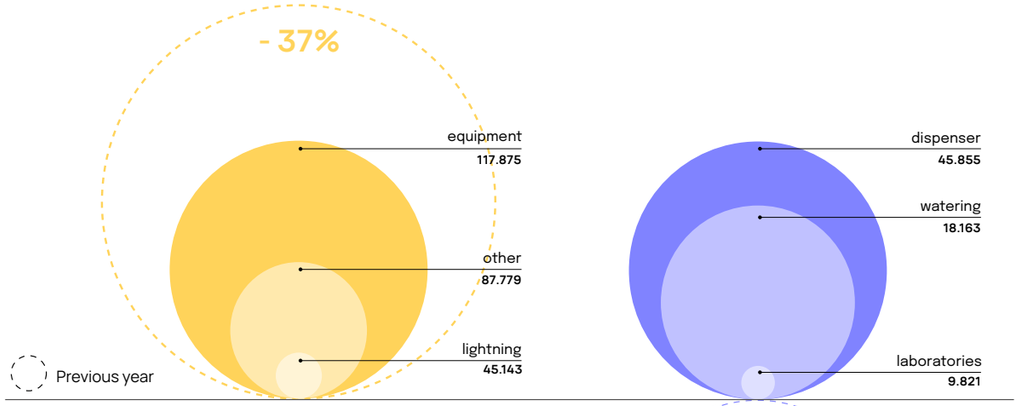
Carbon footprint
70.645,45 kg CO_2eq

CAMPUS ENVIRONMENTAL IMPACT

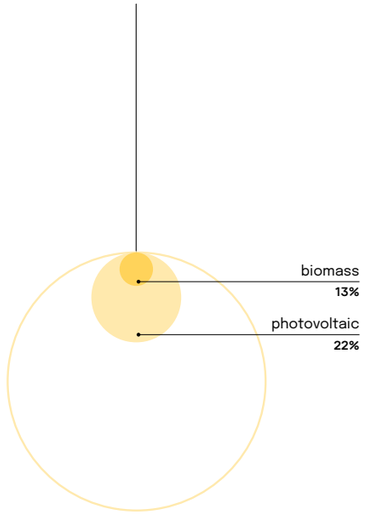
Emissions & Consumptions

Carbon footprint, energy, and water consumption are analyzed based on the activities that have the greatest impact on the total of a year. The dashed circles shows if the consumptions have reduced, increased or remained equal to the previous year.

Type of data viz:
Nested Proportial Area Chart

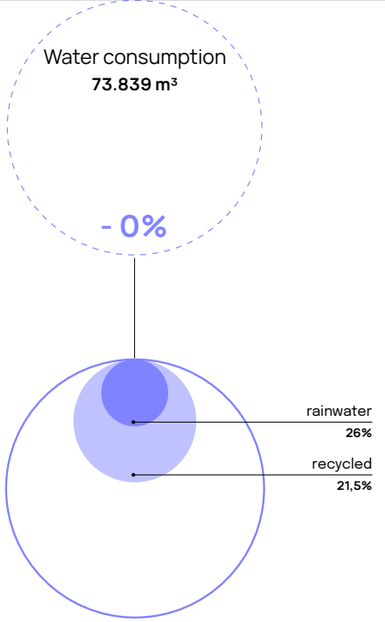


Energy consumption
250.797 kWh



Energy self-sufficiency
87.778 kWh

Water consumption
73.839 m³



Water self-sufficiency
35.073 m³

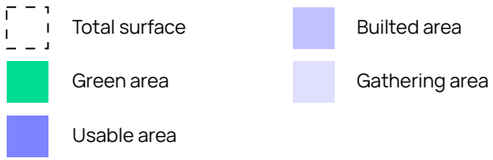
USE OF THE SPACE

Campus extension (m²)

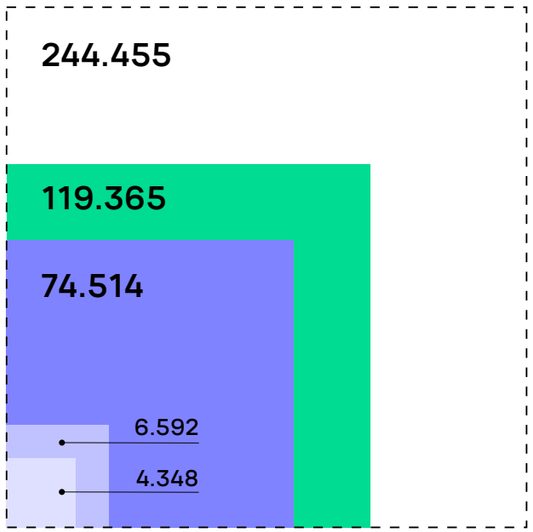
A double level of analysis: distribution of the spaces over total available space, and how much space a person 'has' within the campus.

Type of data viz:

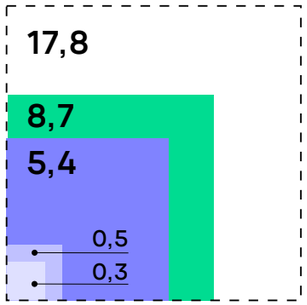
Proportional Area Chart



Total use of the space (m²)



Space efficiency per person (m²)



CAMPUS IMPLEMENTATIONS

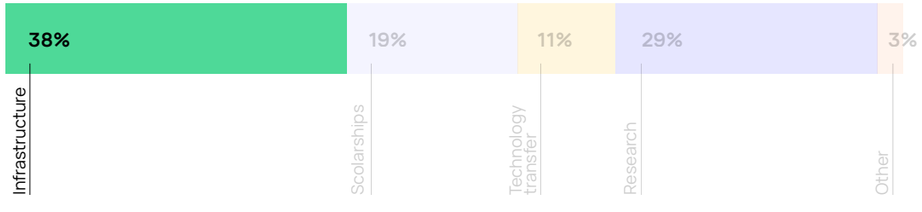
Investments & Performance implementations

Amount of money invested in implementing the campus' infrastructure, and a list of the actions undertaken or planned to improve the infrastructures with their status of realization.

Type of data viz:

Stacked Bar Chart
Table Chart

Total investments
13.548.000 €



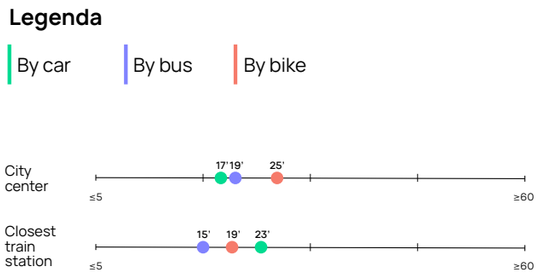
completed
in sight
in progress
not reached / cancelled

Action	Intervention	Status
Low carbon flooring choices	RENOVATION	→
Increase 10% drinking water point	CONSTRUCTION	⇉
Electric vehicle charging point	ADDITION	✗
High efficiency air source heat pumps	ADDITION	✓

Connection with the city (average in minutes)

To understand how the campus is connected to the rest of the city, in particular to the nearest station and the city center. The analysis considers the time taken with the most common means of transport.

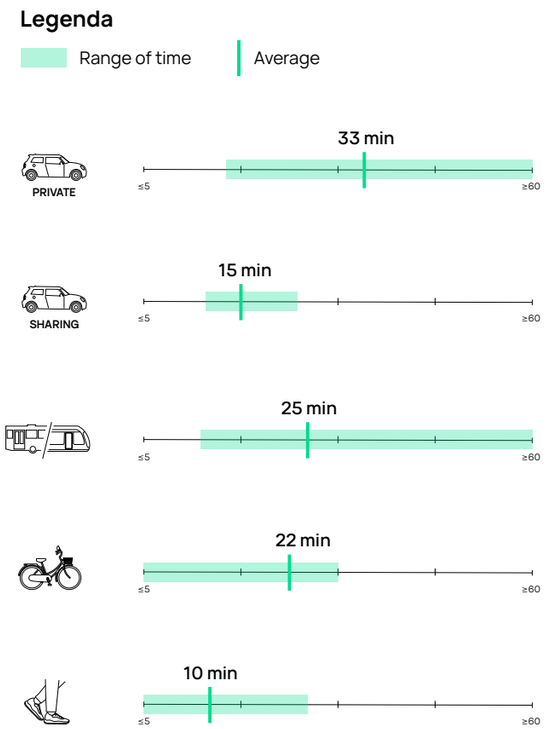
Type of data viz:
Dumbbell Plot



Cross campus travel/time

In this case, average times to reach the campus by students, teachers and staff are calculated according to the used means. The goal is to re-evaluate the connection of the campus with the rest of the territory.

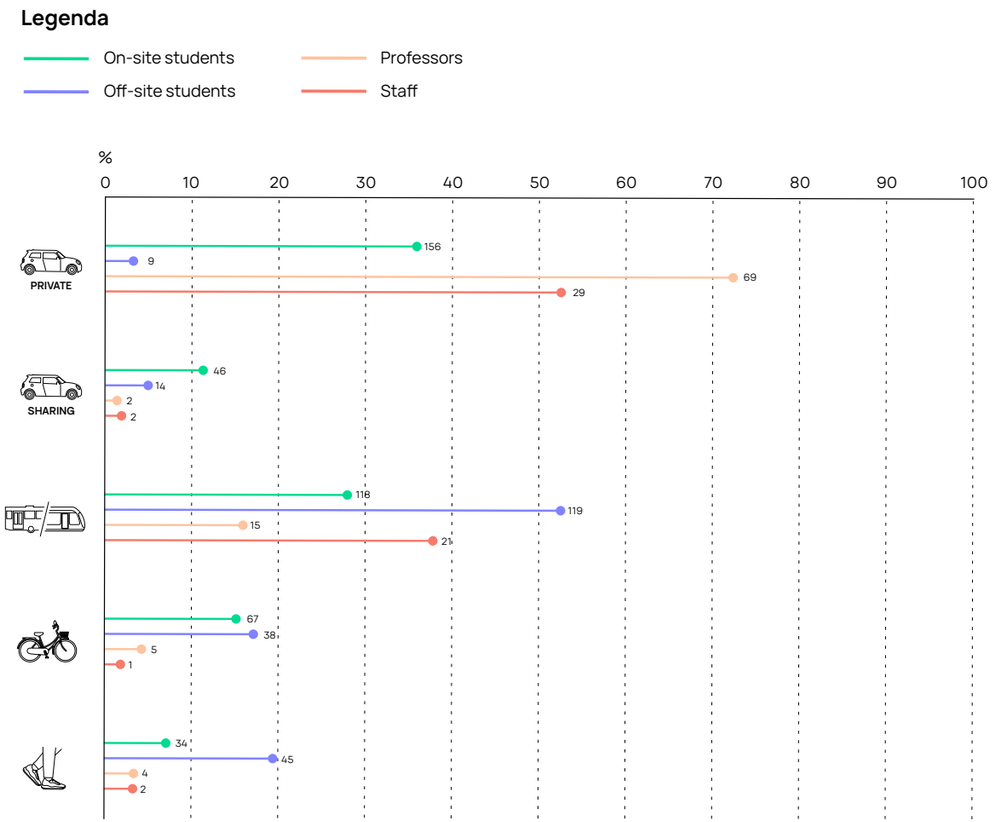
Type of data viz:
Candlestick Graph



Cross Campus Travel

Analysis of how the community reaches the campus by choosing more or less sustainable means of transport.

Type of data viz:
Dumbbell Plot



5.2

Community awareness

→ Community awareness
→ Community perception

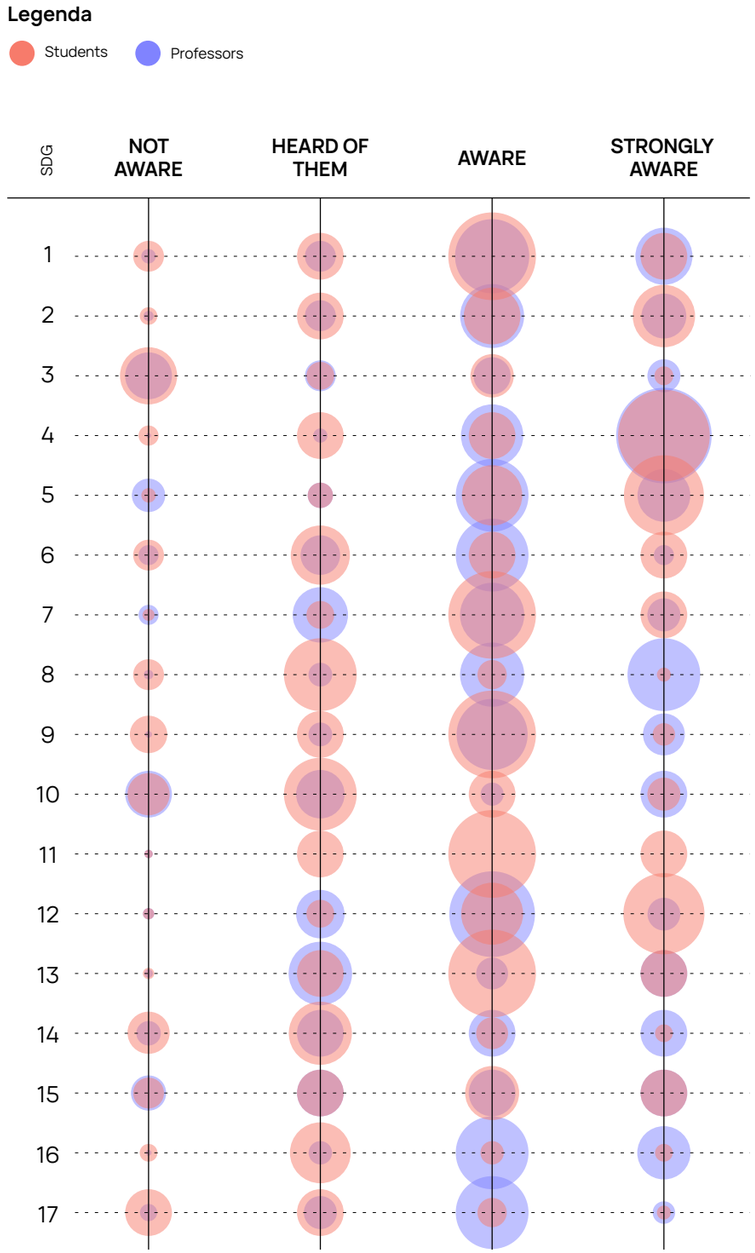
COMMUNITY AWARENESS

Self-awareness towards SDGs

This data are collected through a survey, investigating the level of awareness of students and professors towards each goal.

Type of data viz:

Bubble Chart



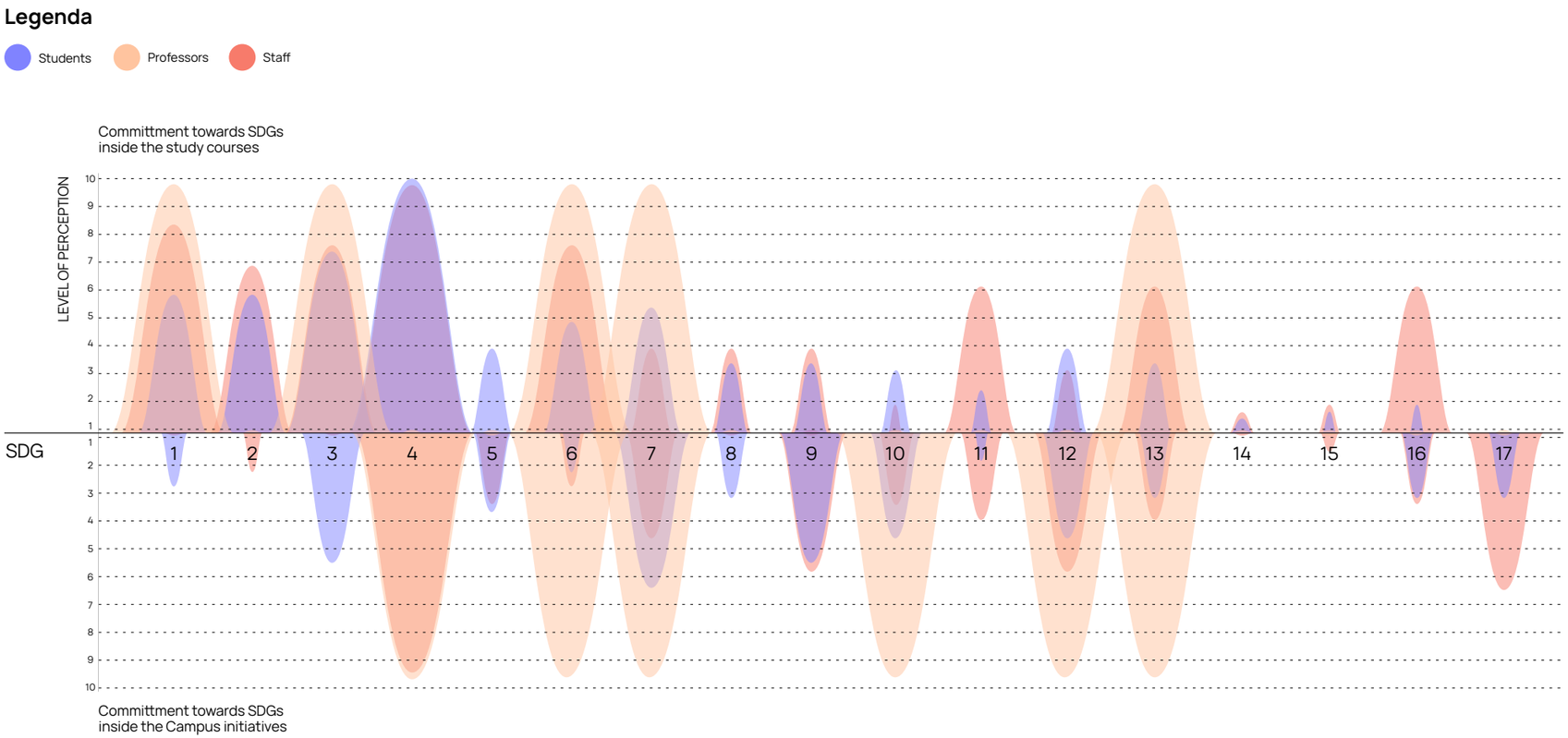
COMMUNITY PERCEPTION

Perception of the committment towards SDGs inside the Campus

This graph shows how the commitment of the campus towards the SDGs is perceived by students, professors and staff. The perception is investigated considering study courses and campus initiatives. Data are collected using a survey.

Type of data viz:

Curved Bar Chart

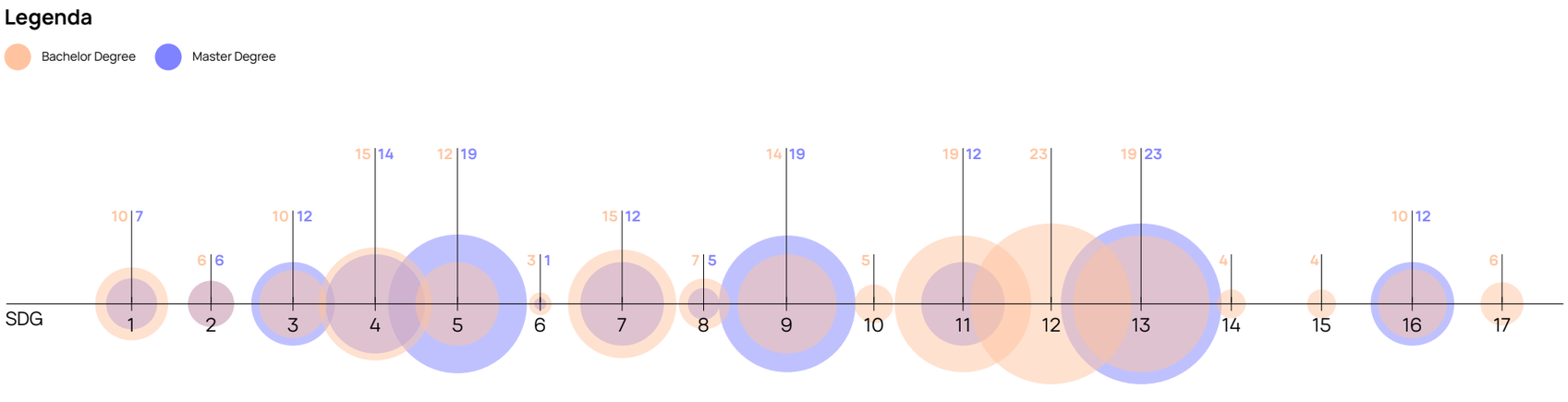


Thesis about SDGs & Sustainability Topic

Another level of understanding the perception of the SDGs inside the community is to visualize the number of theses regarding sustainability topics or specific goals developed by the students. The visualization distinguishes the contribution from bachelor's degree and master's degree. Data are collected considering two parameters: keywords used to describe the work and a self-assessment of the student, done during the uploading procedures of the thesis.

Type of data viz:

Bubble Chart



5.3

Academic innovation

→ Publications

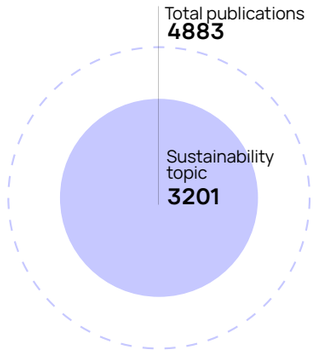
PUBLICATIONS

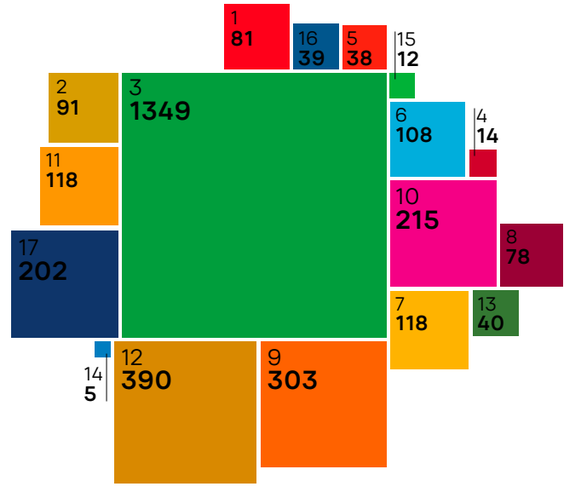
Numbers of publications related to sustainability topics

Over the total publications delivered inside the campus, the amount related to sustainability topics is highlighted, also representing the distribution of published researches among all the 17 Goals.

Type of data viz:

Circle Chart
Proportional Area Chart



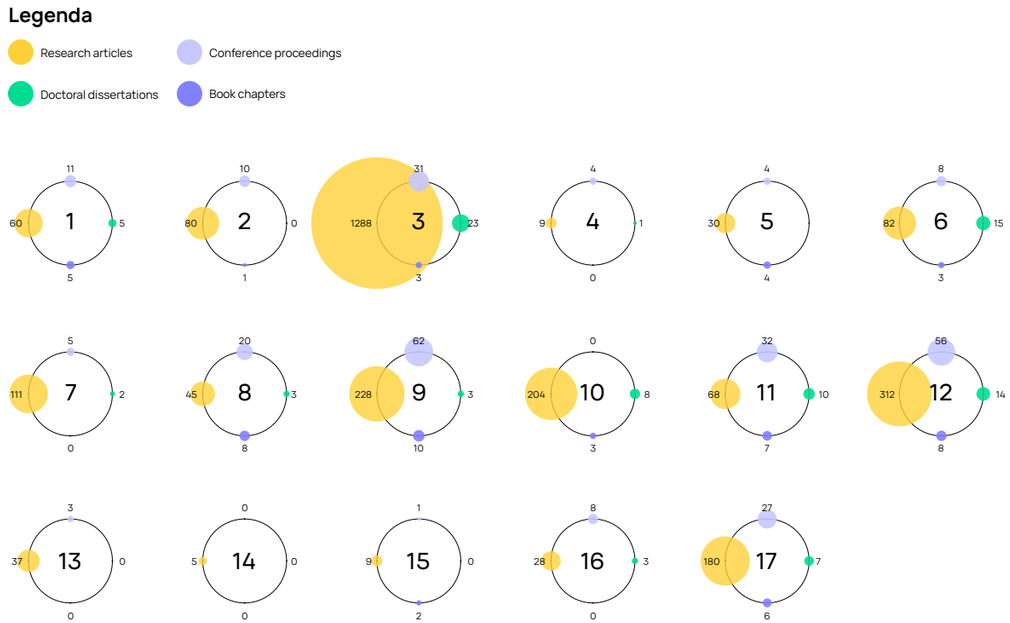


Type of publications about SDGs & Sustainability topics

To deepen the analysis of publications, a distinction is made between research articles, conference proceedings, doctoral dissertations, book chapters, and their ratio in each SDGs.

Type of data viz:

Proportional Circle Chart



5.4

Education

→ Study Programs
→ Campus demography
→ Financial support

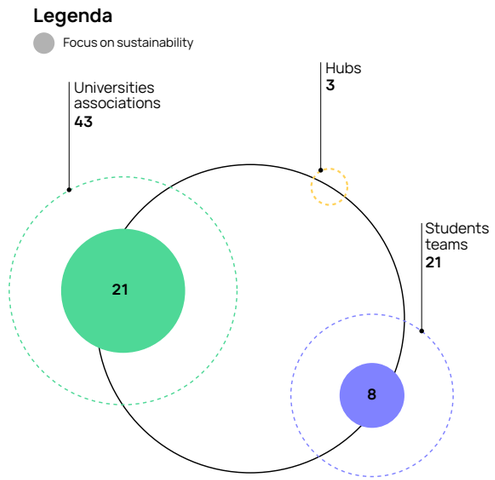
STUDY PROGRAMS

Extra-curricular activities

The different organizations that involve students as extra-curricular activities and the amount specifically focused on sustainability.

Type of data viz:

Circle Chart

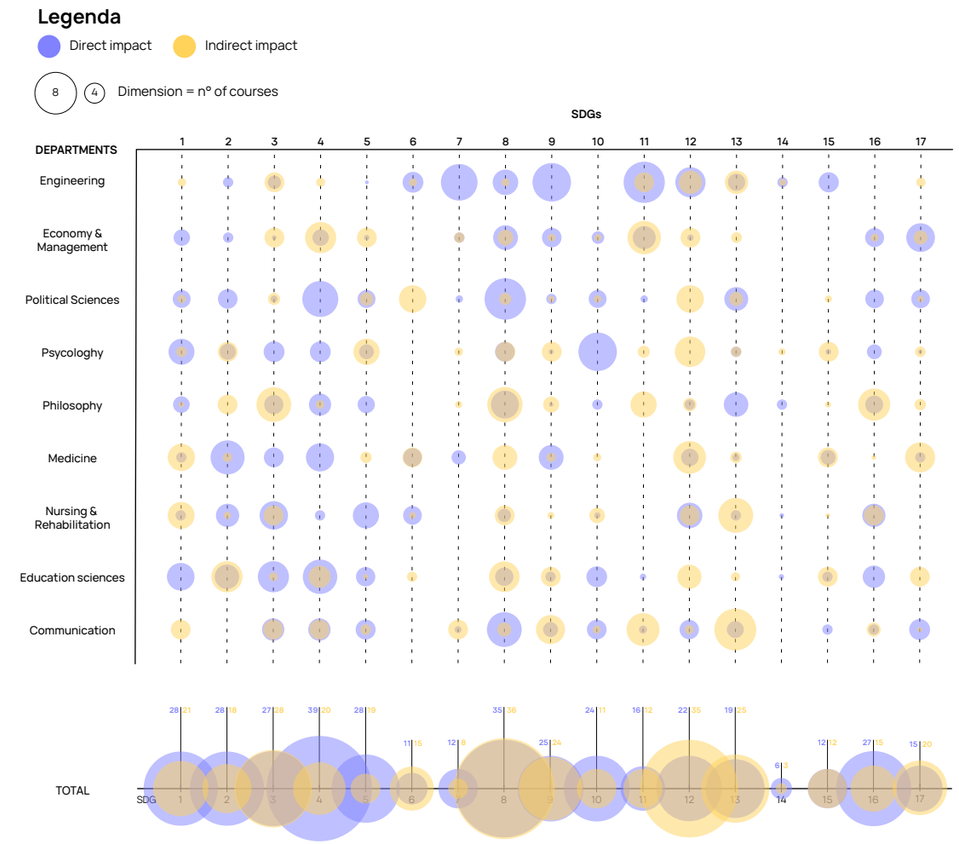


Courses with direct/indirect impact with SDGs

For each department, the number of courses that include the individual SDGs is calculated. The analysis is divided into: DIRECT (giving resources to understand how to tackle the goal) and INDIRECT (helping to understand the basis and build the knowledge) impact.

Type of data viz:

Bubble Chart



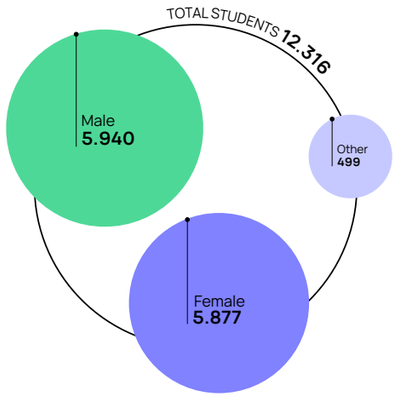
CAMPUS DEMOGRAPHY

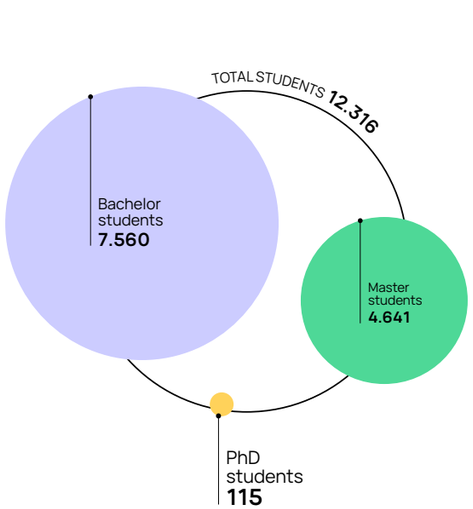
Students gender identity

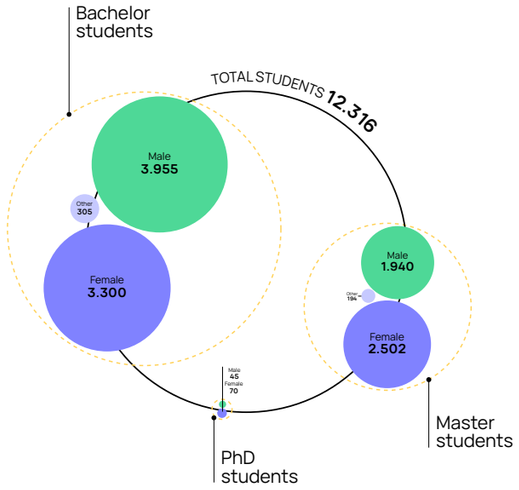
Gender distribution is investigated under two different levels:
- over the total amount of students
- inside the different degree programs and PhD

Type of data viz:

Circle Chart
Packed Circle Chart





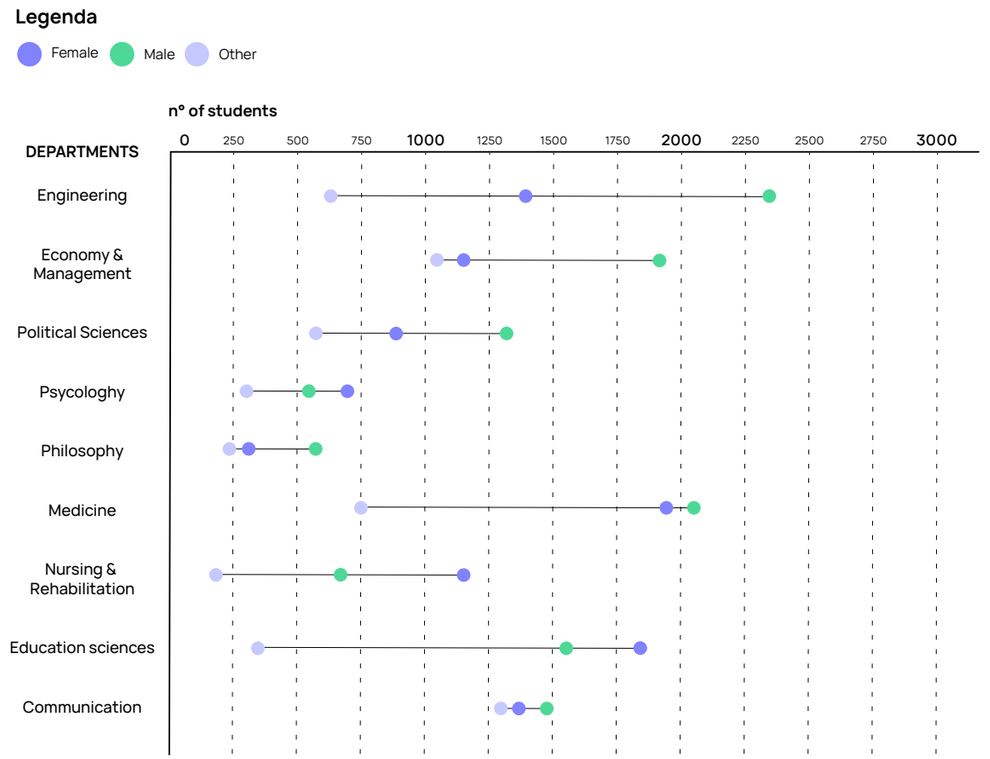


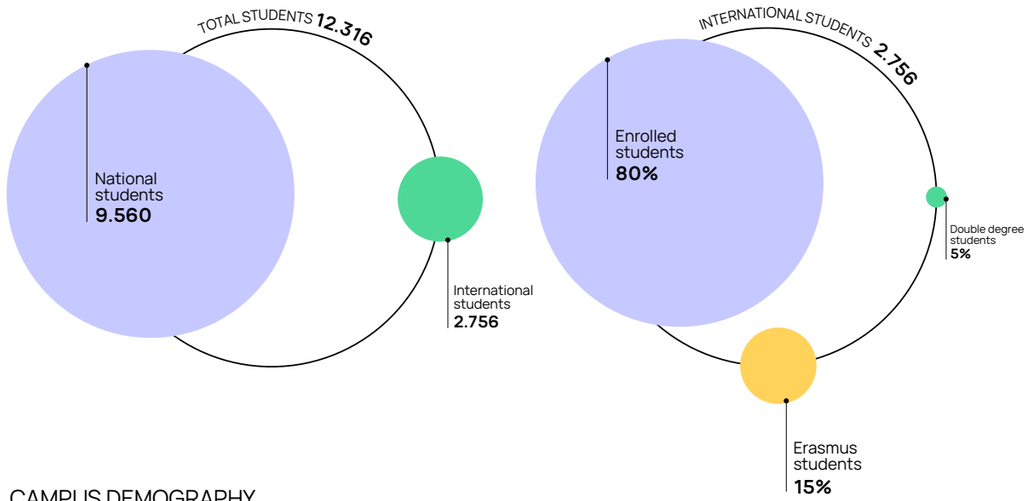
Students gender / Field of study

This graph shows gender distribution inside the different departments of the campus.

Type of data viz:

Dumbbell Plot



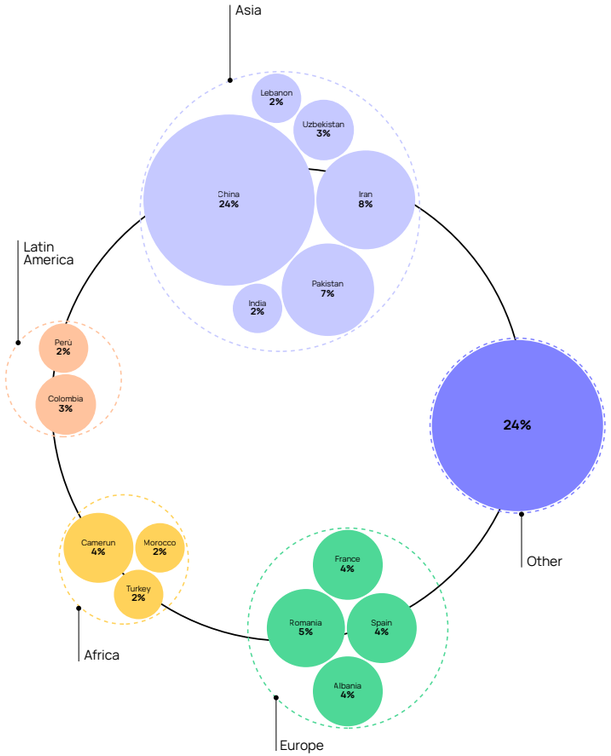


CAMPUS DEMOGRAPHY

International students

Over the total number of students, the amount of international ones are visualized considering their status (Erasmus, double degree and enrolled). For a more detailed analysis international students are then clustered depending on their ethnicity.

Type of data viz:
Circle Chart
Packed Circle Chart

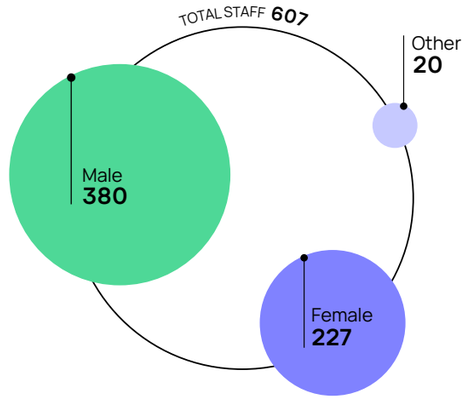


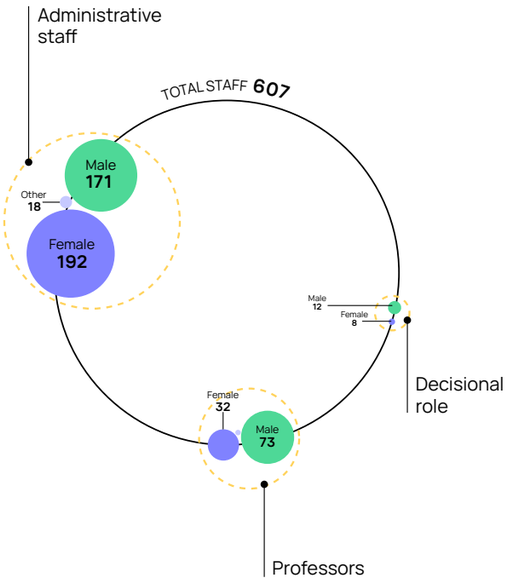
CAMPUS DEMOGRAPHY

University staff /gender identity

As for the students, also gender identity of the staff is visualized under different levels. This time data are clustered depending on the roles covered.

Type of data viz:
Circle Chart
Packed Circle Chart





CAMPUS DEMOGRAPHY

Staff gender / Pay-gap

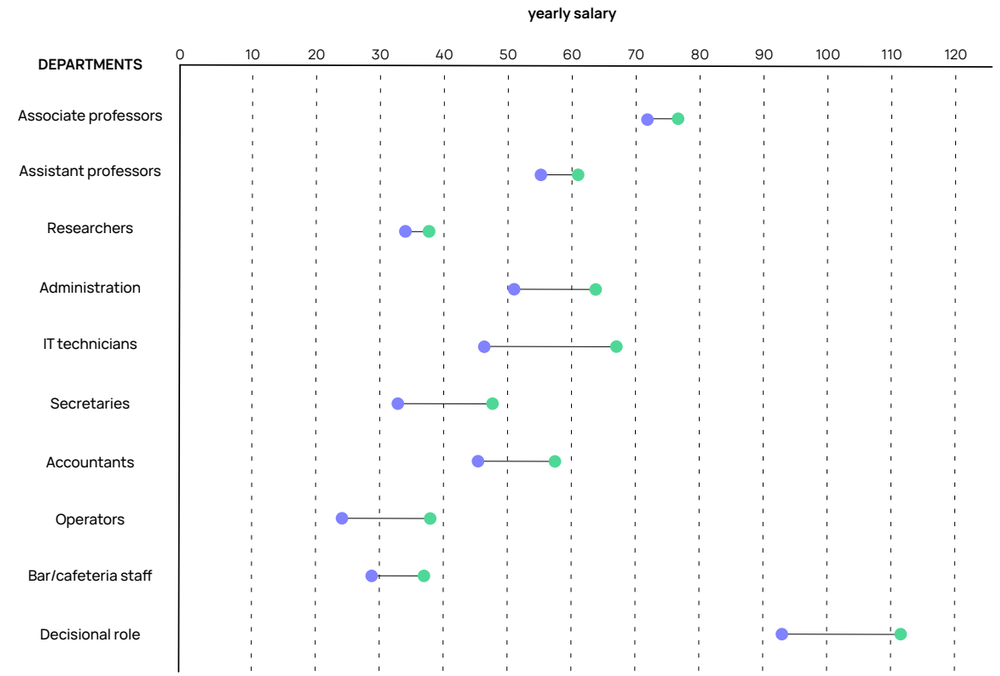
This graph highlights the male/ female pay-gap in the different roles covered by the university staff.

Type of data viz:

Dumbbell Plot

Legenda

Female Male



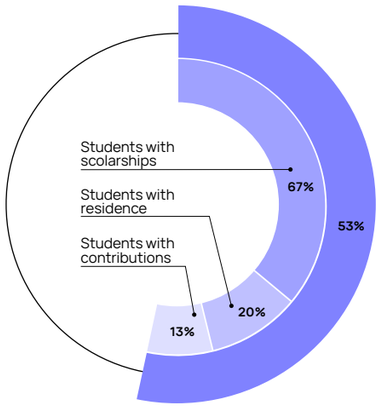
FINANCIAL SUPPORT

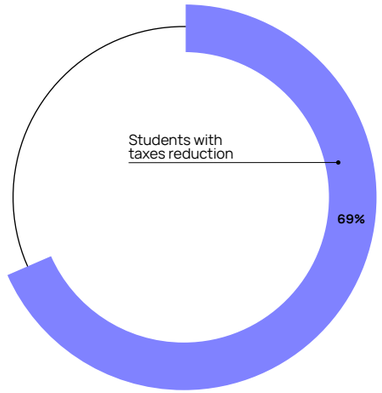
Students with financial support

Two types of financial support are mapped: on one side the % of students supported with scolarships, residence or other contributions while, on the other side, the % of students with taxes reduction.

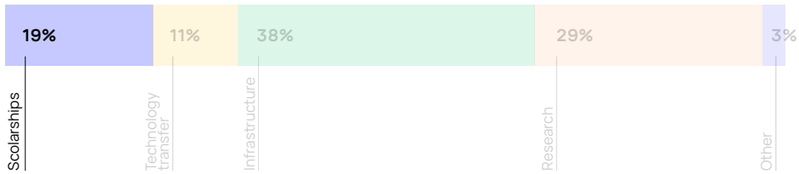
Type of data viz:

Multi-level Donut Chart
Stacked Bar Chart

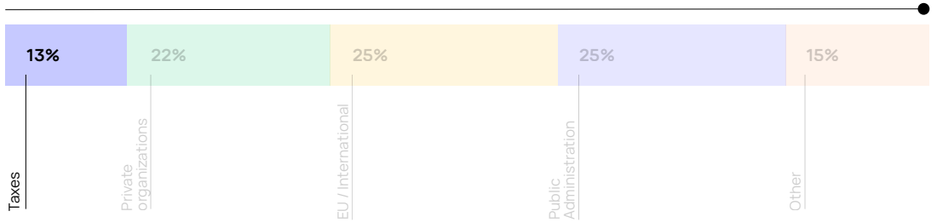




Total investments
13.548.000 €



Financing & Funds
17.321.890 €



5.5

Outreach & Partnerships

- → Study programs
- → Public engagement
- → Technology transfer
- → Partnerships

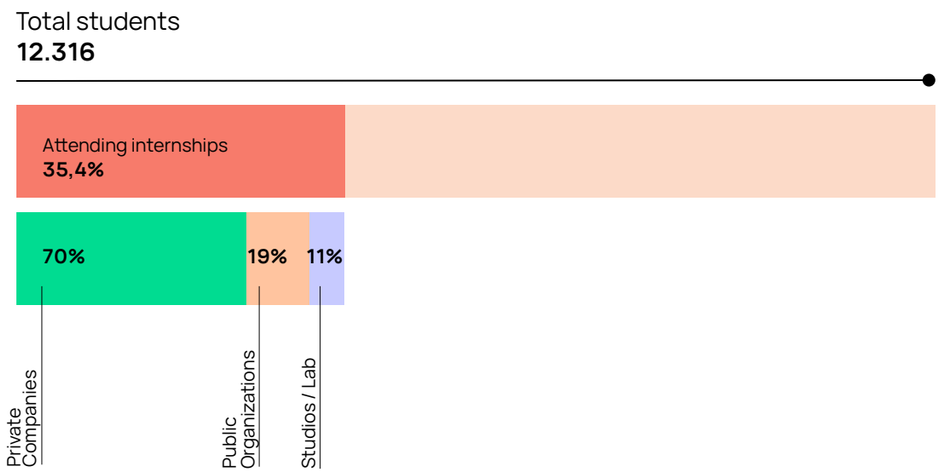
STUDY PROGRAMS

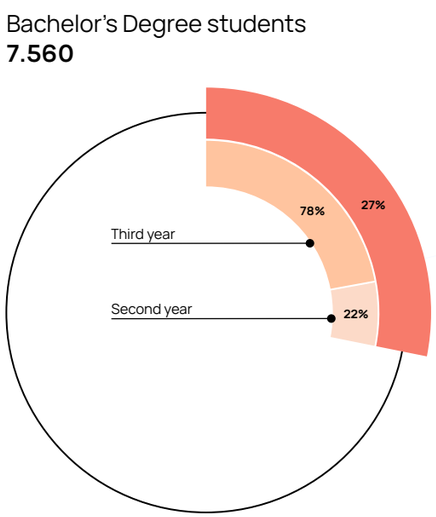
Students attending internship

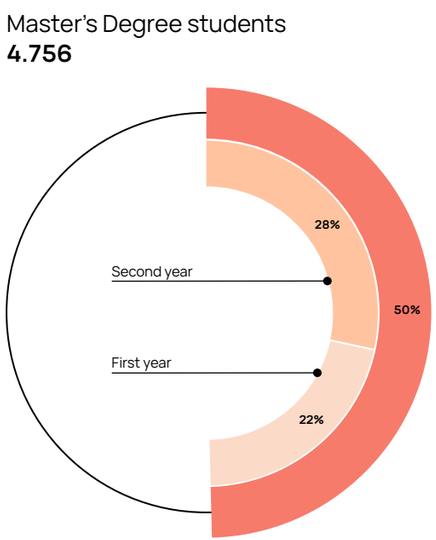
The first graph considers the % of students who are attending an internship, with a second level that investigate the environments where they are taking place. The second typology of graph focuses on the distribution of students attending an internship in the different degree programs.

Type of data viz:

Stacked Bar Chart
Multi-level Donut Chart





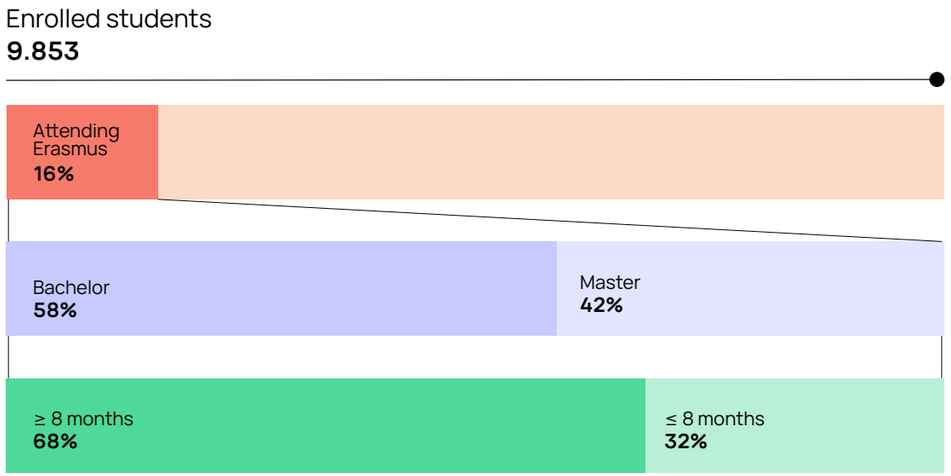


STUDY PROGRAMS

Students attending Erasmus

The visualization considers the % of students that are attending an Erasmus, during which degree program and for how long.

Type of data viz:
Stacked Bar Chart



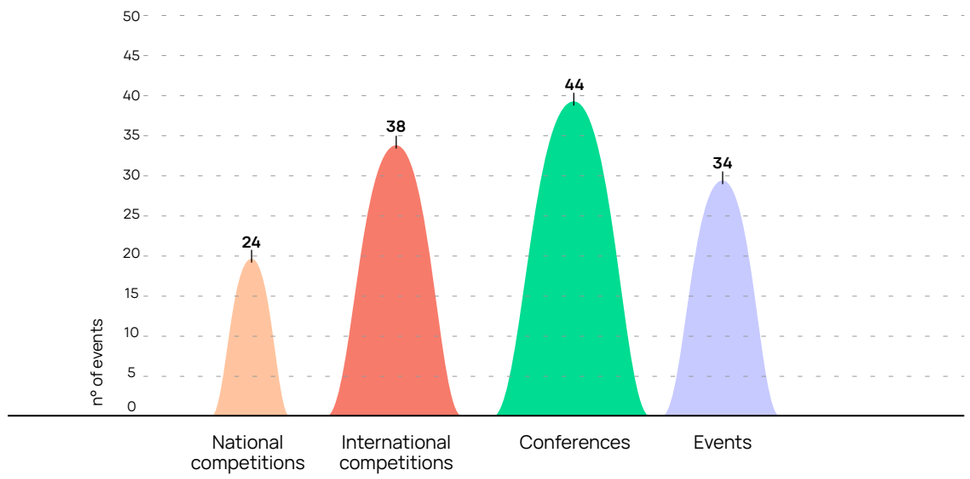
PUBLIC ENGAGEMENT

Participation at events

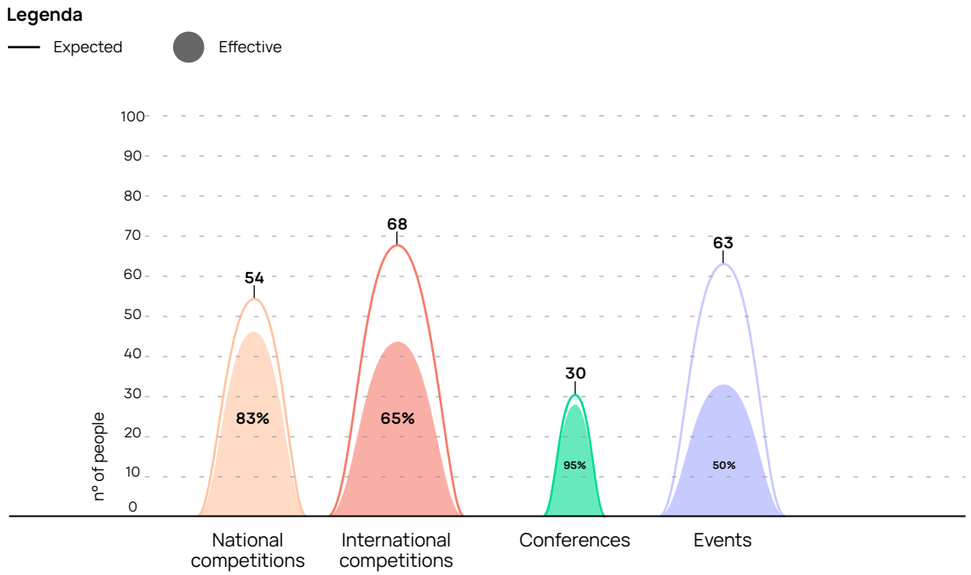
The first graph visualize the amount of events in which the university was involved, divided by categories. In the second graph, the amount of people that signed to participate to the events are compared to the effective % of people that participated.

Type of data viz:
Curved Bar Chart

Typology of events



Rate of engagement (% of people that participated)



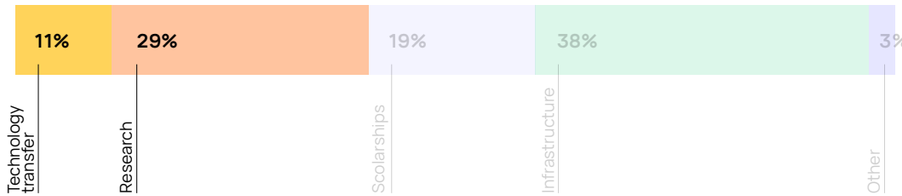
TECHNOLOGY TRANSFER

Investment in technology transfer

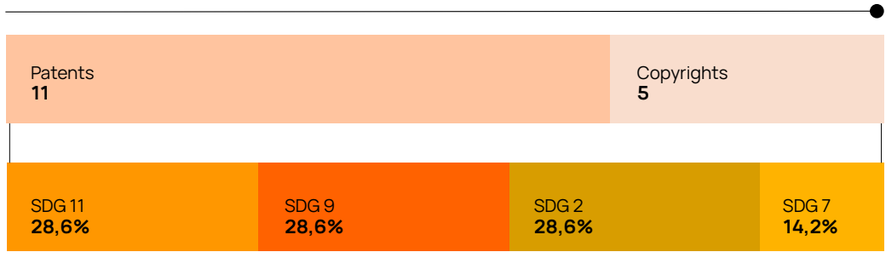
The role of innovation is investigated considering the investments in research and the amount of patents/copyrights registered in a year.

Type of data viz:
Stacked Bar Chart

Total investments
13.548.000 €



Technology transfer / SDGs
16

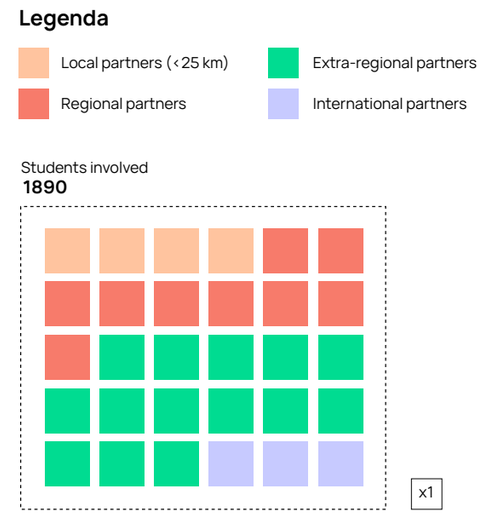


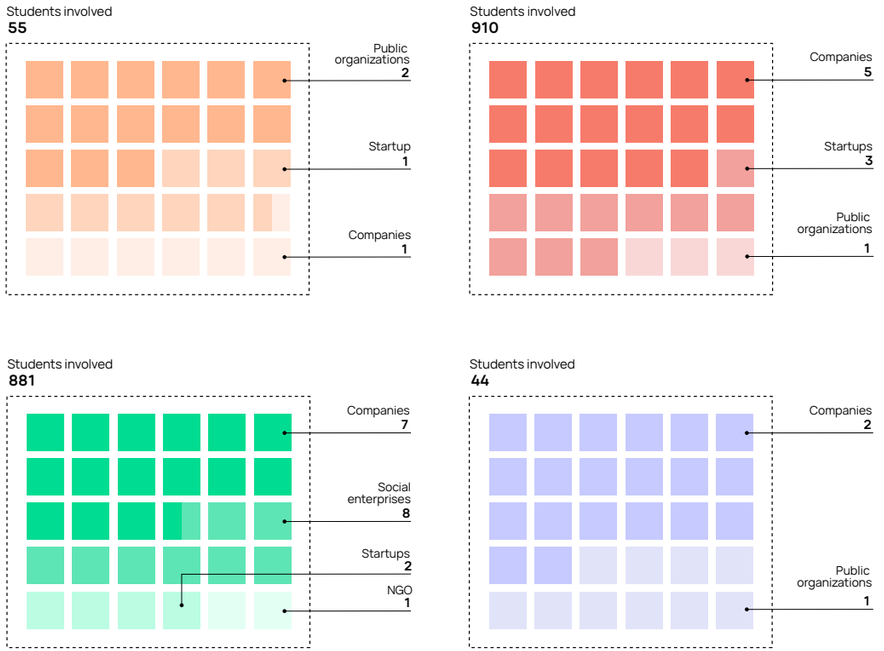
PARTNERSHIPS

Active projects (n°)

The first matrix shows how the active projects are subdivided on a geographical level (local, regional, extra-regional, international). The second matrix analyzes the different actors involved inside each geographical level.

Type of data viz:
Square Matrix Chart





5.6

Leadership & Governance

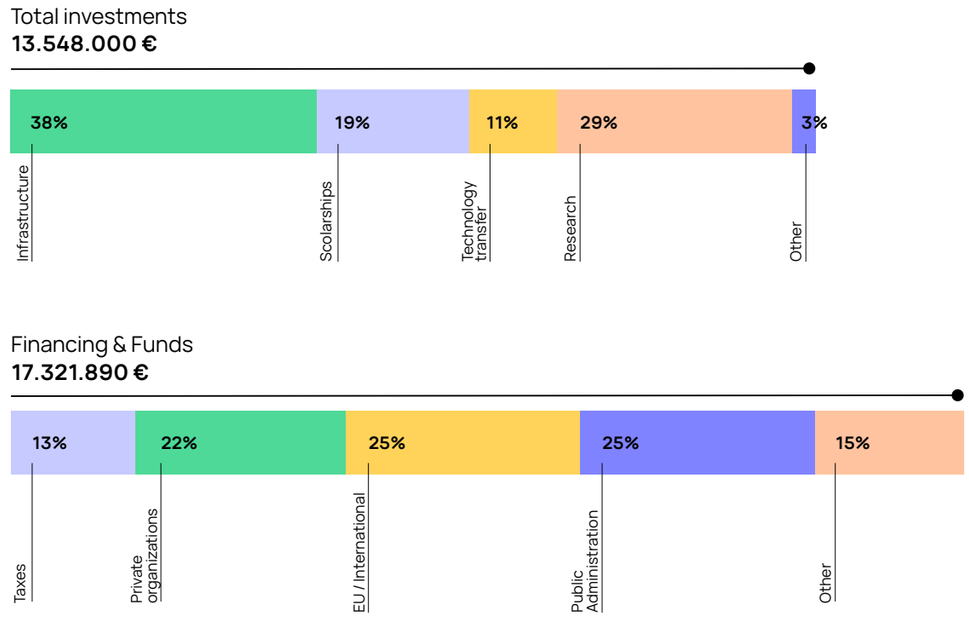
CAMPUS DEMOGRAPHY

Same visualizations of:
University staff /gender identity (pag. 137) and
Staff gender / Pay-gap (pag. 138)

CAMPUS IMPLEMENTATIONS

Campus investments
Amount of money invested and financed to improve activities, spaces, and financial support offered from the university to its community.

Type of data viz:



Operational performances
List of the main policies, strategies and regulatory changes activated by the campus, also considering the level of development, if internal or external.

Type of data viz:
Table Chart

Action	Category	Development
Environmental Management System	PROGRAM	External
Annual Business Plan	REPORT	Internal
Open Access	POLICY	Internal
Sustainable strategy 2017-2020	STRATEGIC PLAN	Internal

6

Behave platform

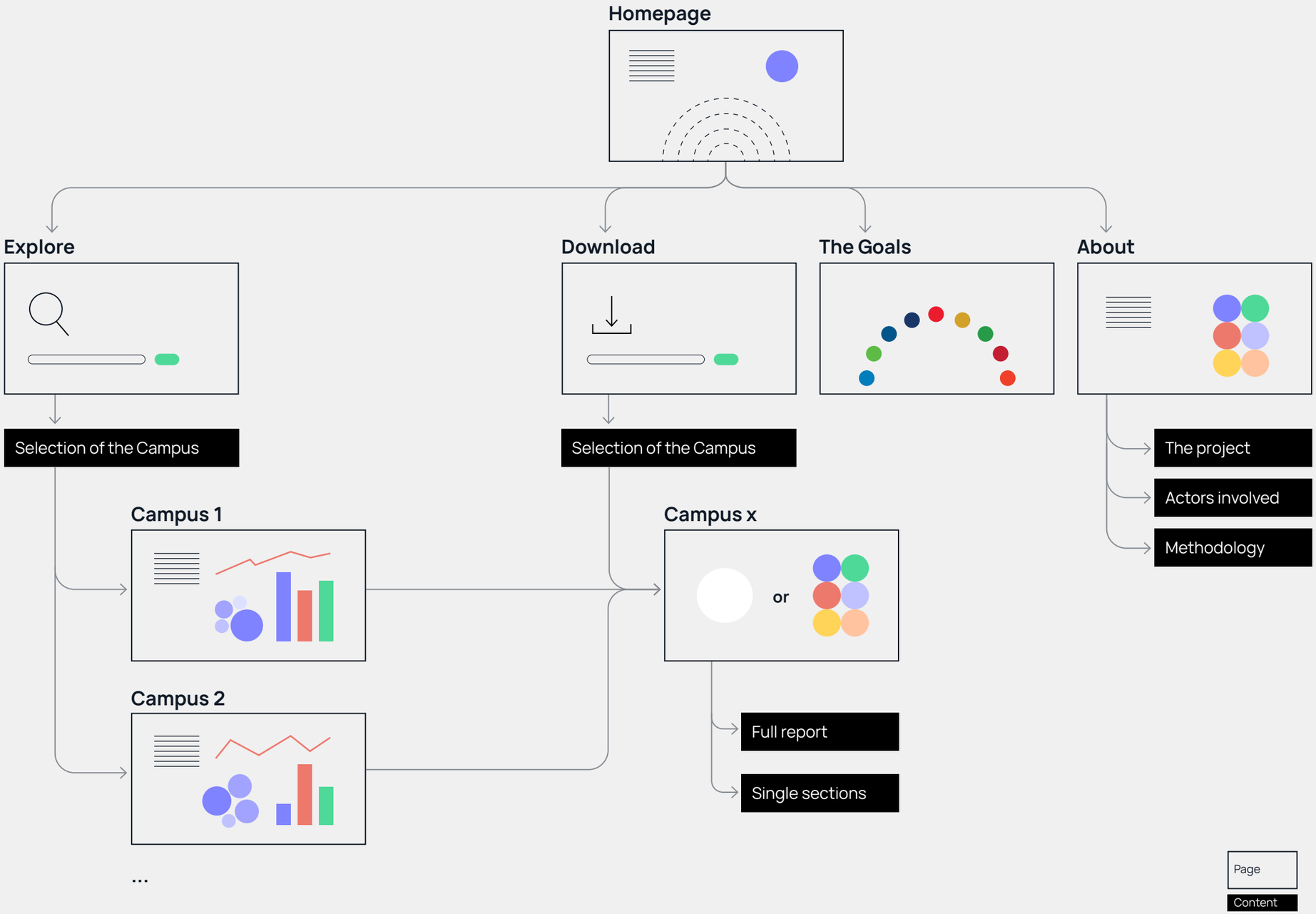
Behave platform

6.1
Platform & Navigation flow

In the previous chapter, the main elements of the platform were identified: requirements, contents, and process of visualization. In this last part, the focus is oriented towards the definition of the visual elements of the tool, as well as the realization of visual artifacts interpreting the previously identified contents. The final output is the realization of a functioning prototype of the interface.

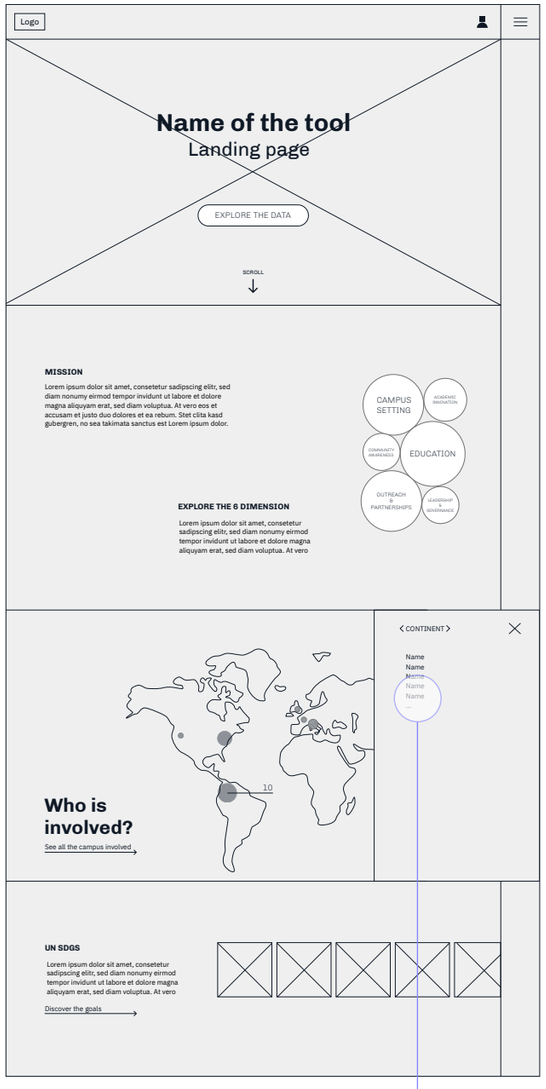
THE SITEMAP

When designing an interface, it is important to empathize with the users and to imagine how they will navigate between the various contents; for this reason, the first step is the definition of a sitemap, a scheme that summarizes pages, contents and navigation flows of the platform.



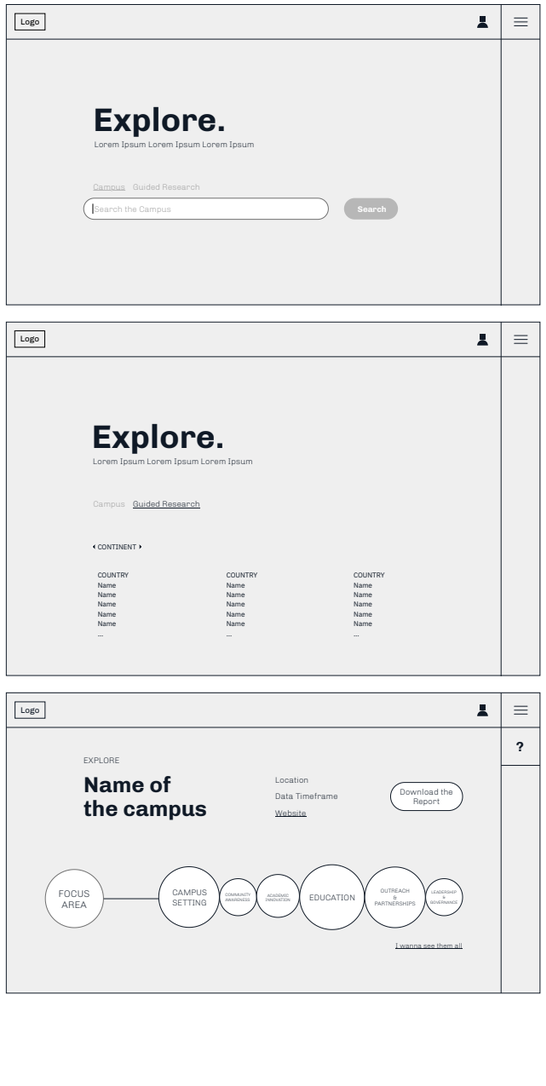
6.2
User Experience

Homepage

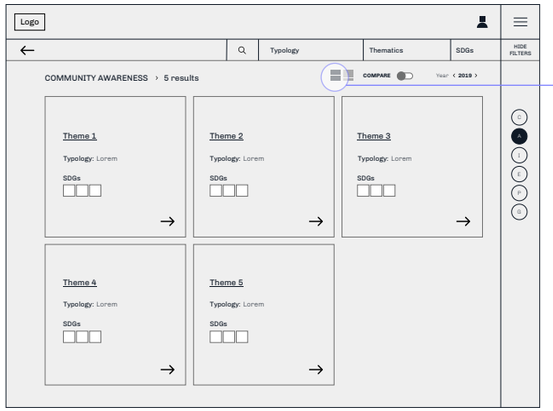


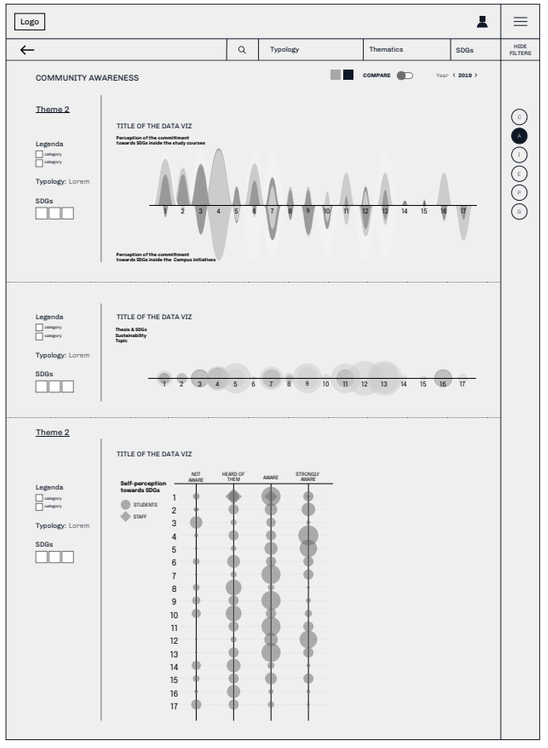
Scrolling curtain to consult the participating campuses and, by clicking, reach their data collection page.

Explore



Campus area

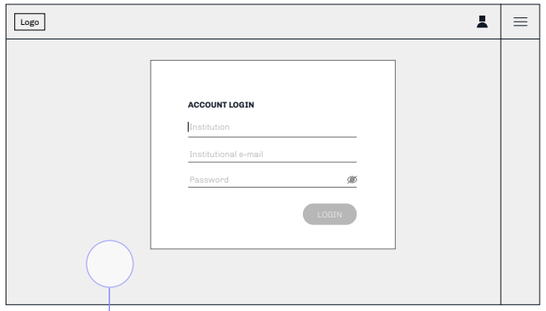




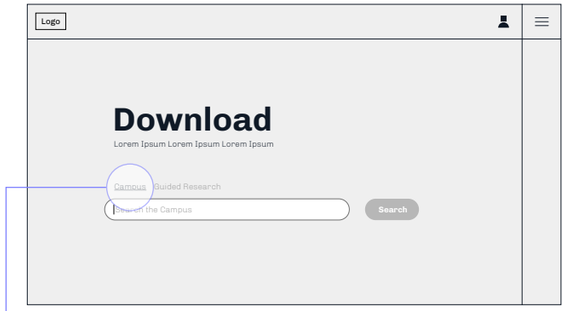
The 'Explore' area offers two navigation options: the first one (left) gives a preview of all the data connected to the chosen topic; the second one (bottom) shows all the results with an 'infinite' scroll.

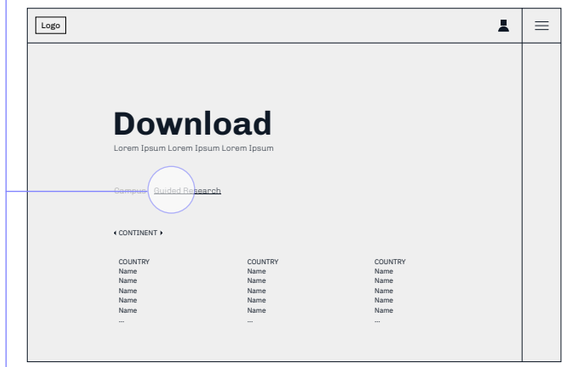
From here users can switch the exploration among the six dimensions.

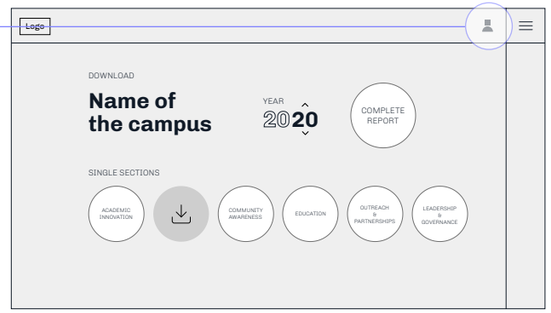
Login



Download



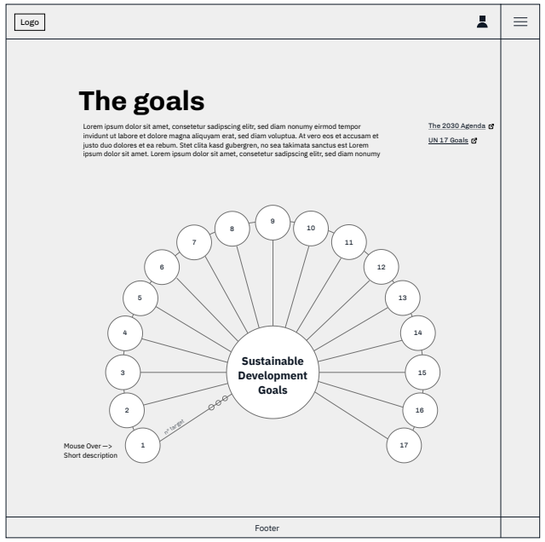




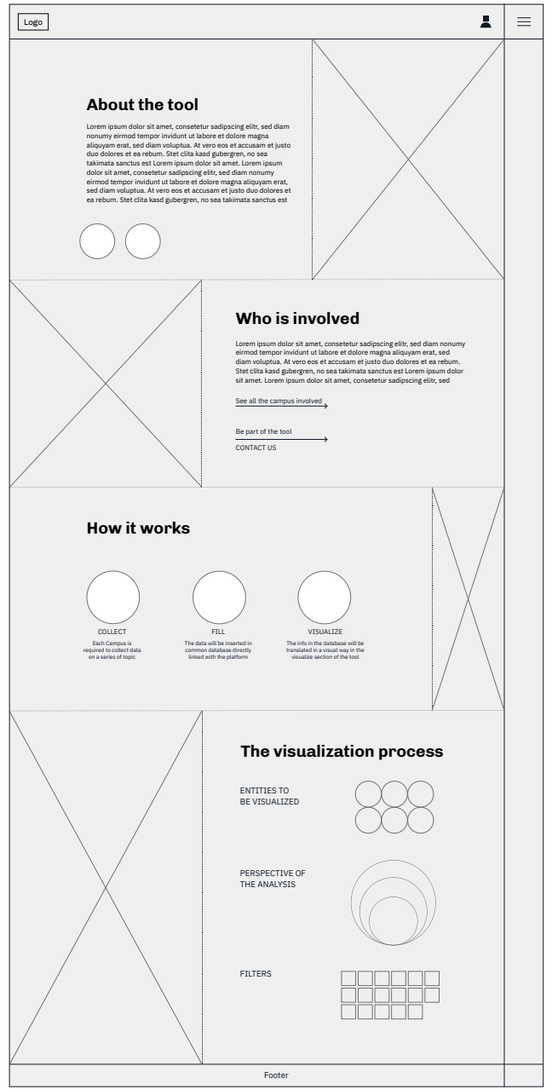
Login Icon: to have full access to the data the user must login with the institutional credentials.

The research of the Campus can be done through a direct (by typing the name) or indirect (by selecting from a list) search.

The Goals



About

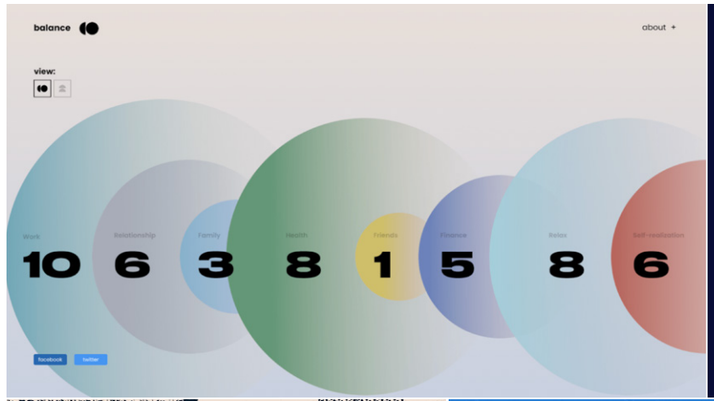


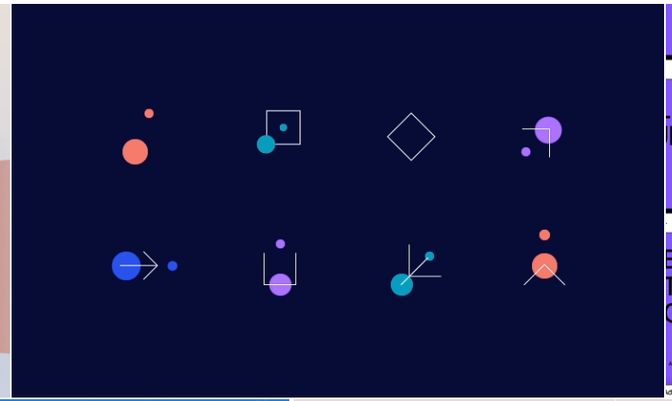
6.3
Visual Identity

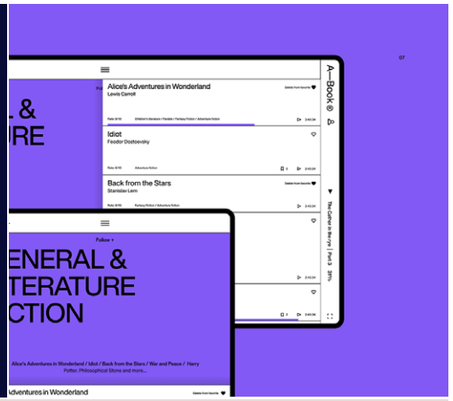
MOODBOARD

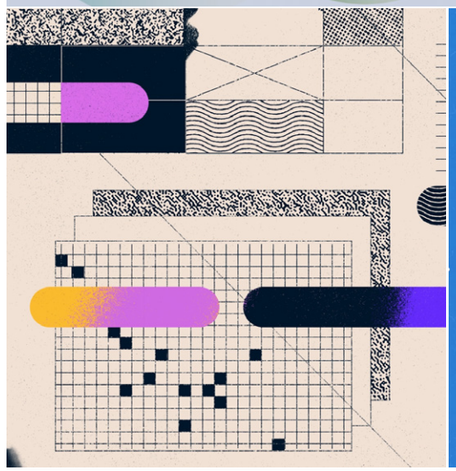
‘Lost’ in space

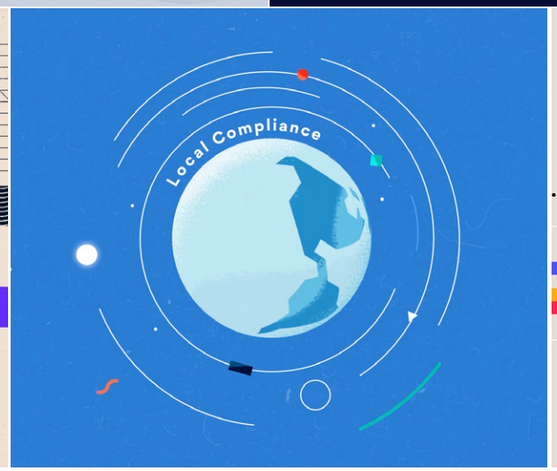
The visual identity of the platform is oriented towards the use of bright and rather contrasting colors to bring out data representations. To accompany these touches of color, two shades, dark blue and light grey, set the tone of voice. The general mood wants to recall an almost cosmic atmosphere, a space in which it is possible to explore a lot of information, organized into categories, which can be seen as planets that belong to the same system. The structure of the platform is mainly based on the use of two simple and geometric shapes (square and circle). The square recalls the shape of the SDGs while the circle refers to the idea of the planets. Both forms are also the basis of all the graphical representations shown within the interface.

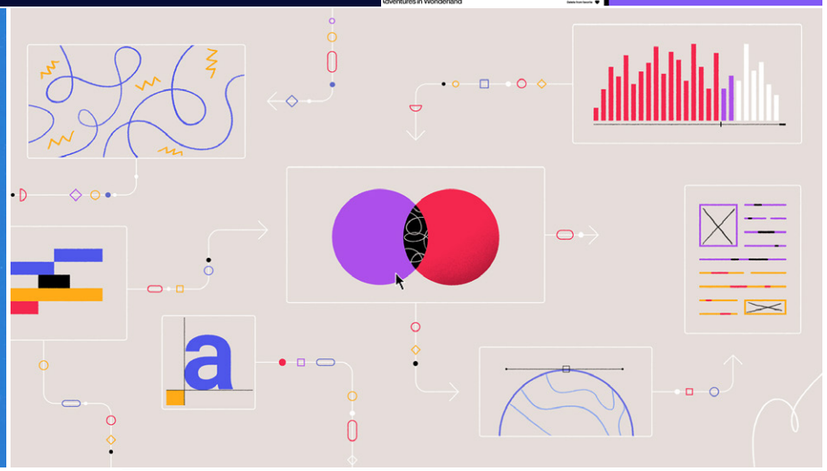


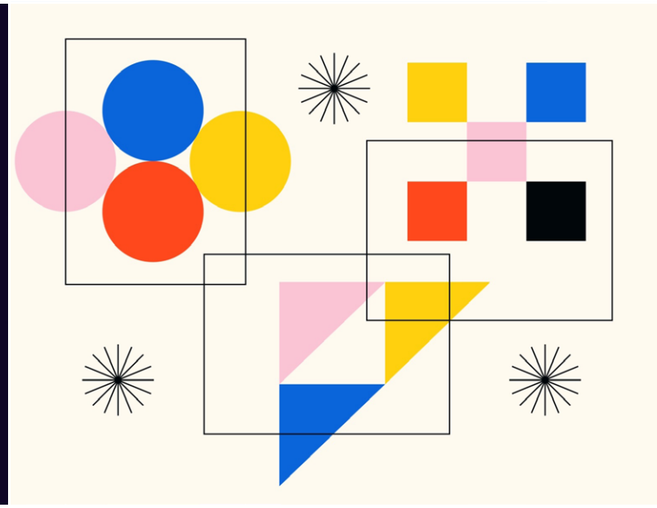


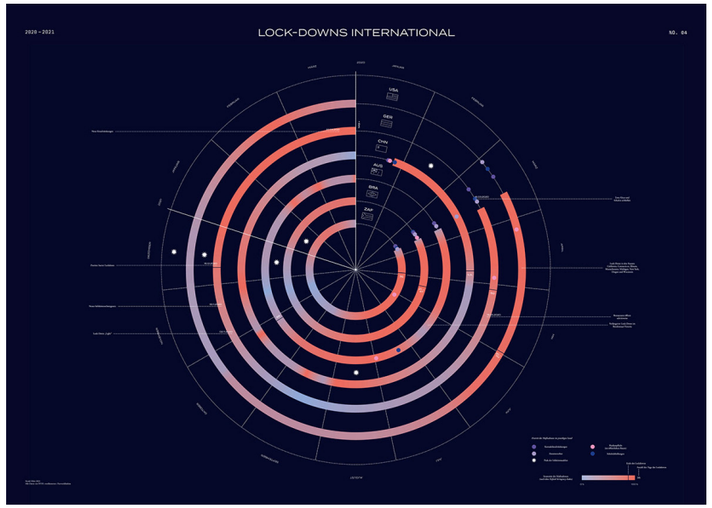










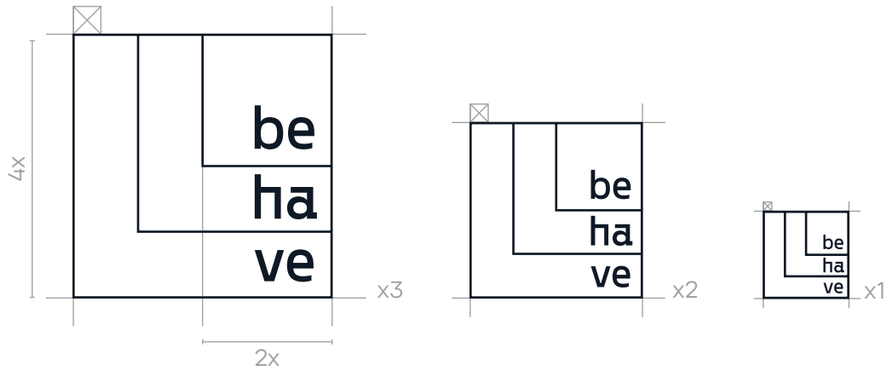


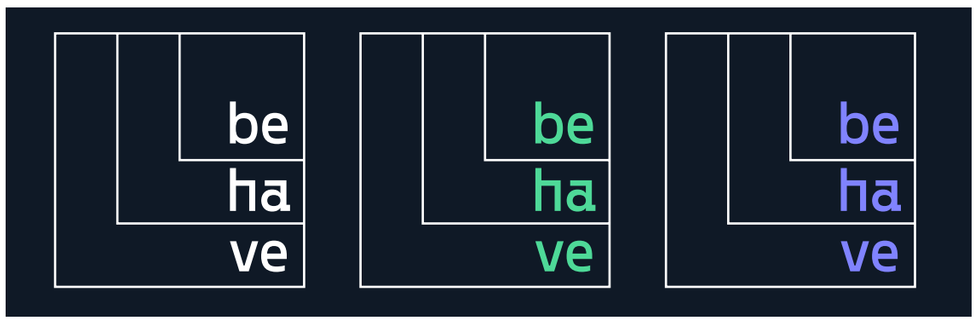
NAMING

behave

Meaning
To show particular behaviour in a particular situation or under particular conditions.

LOGO & IDENTITY





CONCEPT KEYWORDS

Site role	Navigation Consultation Database
Tone of voice	Scientific Informative Formal

TYPEFACES

Gosha Sans Bold
ABCDFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789
.,:;!?@&$£€”

Vela Sans Regular
ABCDFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789
.,:;!?@&$£€”

Vela Sans Bold
ABCDFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789
.,:;!?@&$£€

COLOR PALETTE

Base colors

#F0F0F0

#0F1926

Supporting colors

#4ED998

#8083FF

#C7C9FF

#EF7A6C

#FFC49F

#FFD459

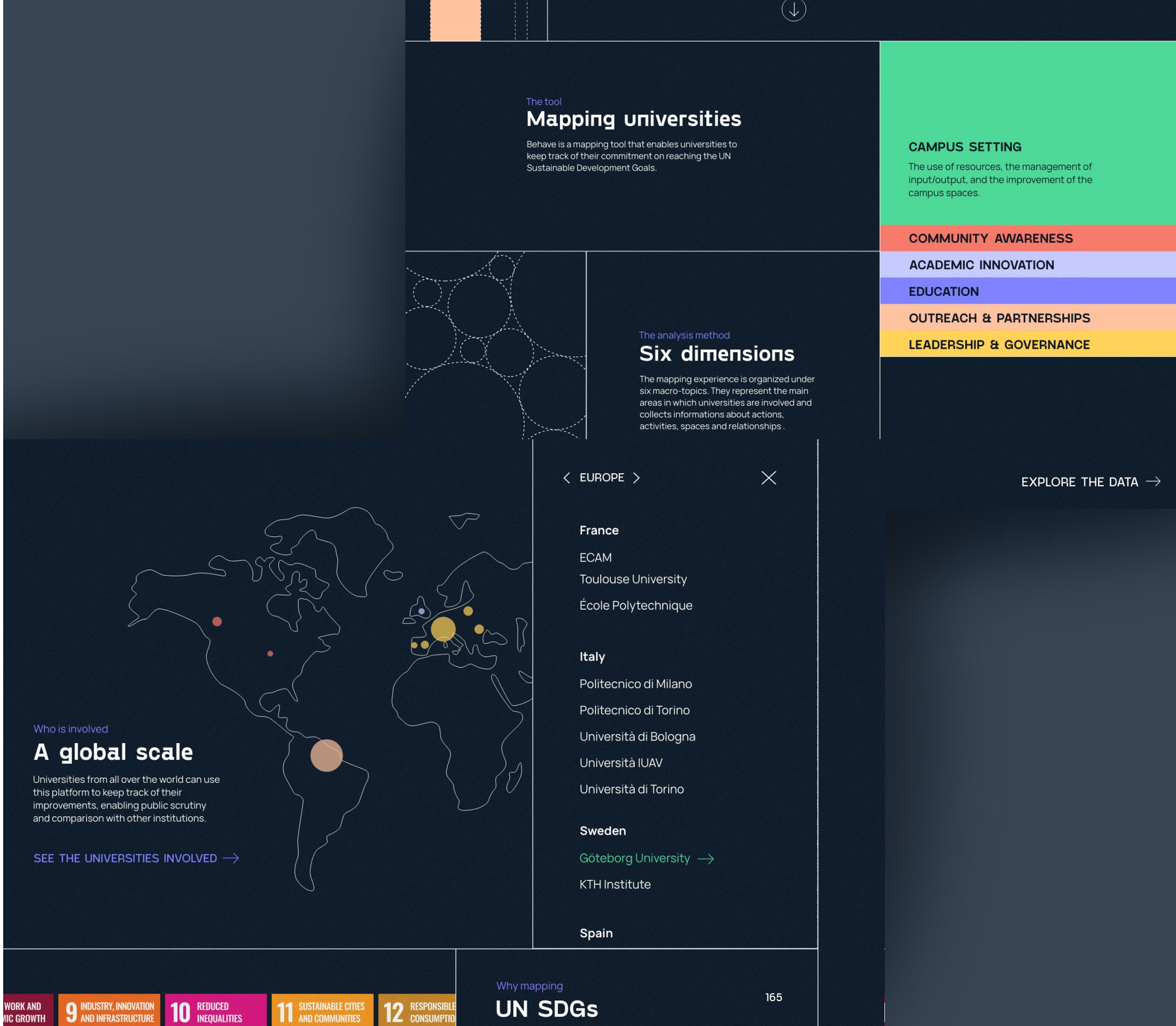
6.4
User Interface

Behave - Mapping the way towards sustainability is the final output of the project: a mapping tool where campuses can keep track of their development, while stakeholders can explore data about the performances.

The platform is built following a grid structure, with simple and schematics screens. The contrast between the dark blue and the light grey reflects the organization of the content: blue for the informative and general functions of the platform, grey for the areas where the user can explore data.

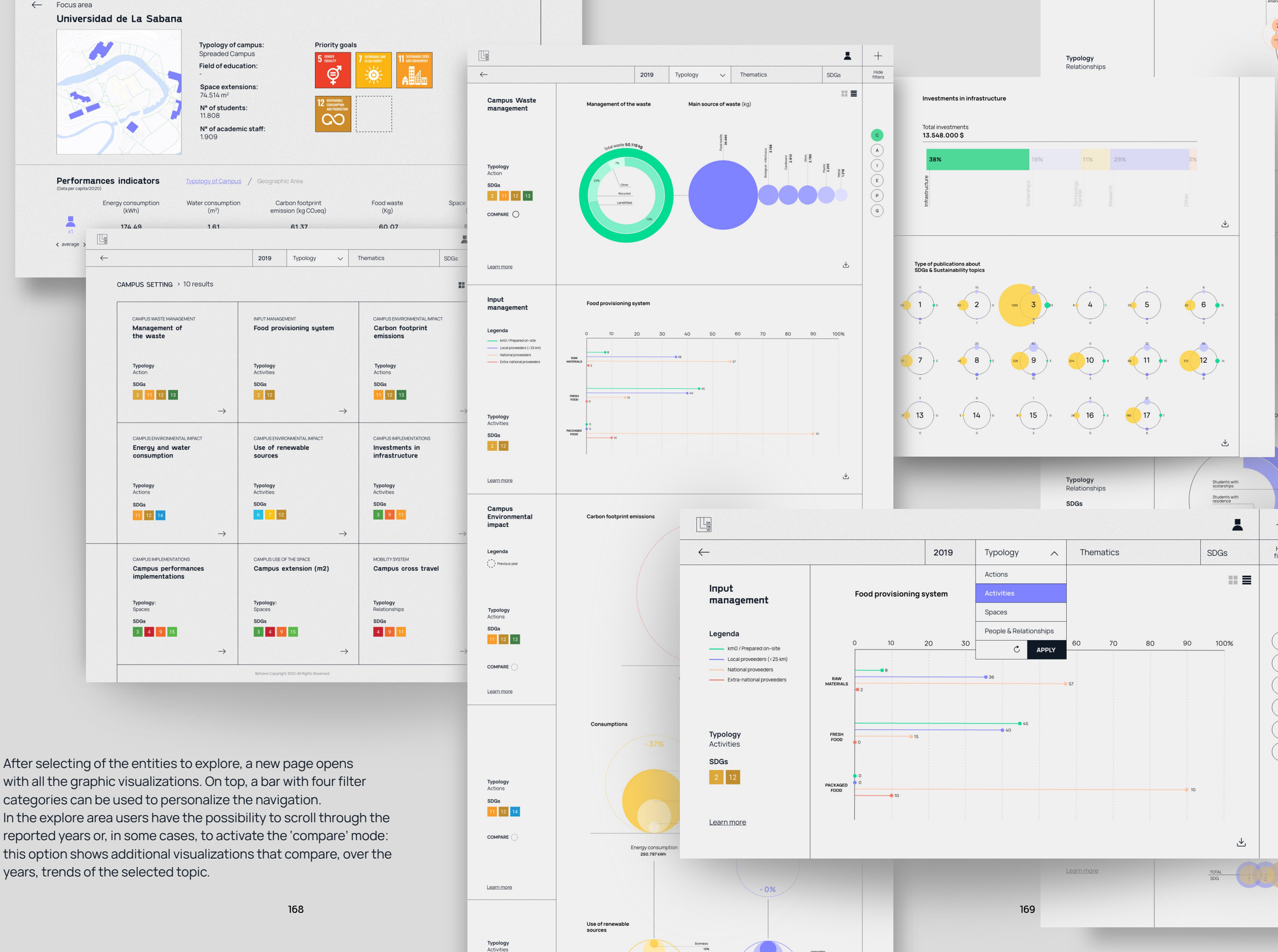
Homepage

This area allows users to become aware of what the platform has to offer. After a brief explanation of the main categories in which data are analyzed, users can discover the joining campuses and directly reach their pages, in order to explore the data. At the bottom of the homepage, a brief overview of the SDGs is given, with a direct link to their deepen descriptions.



Explore

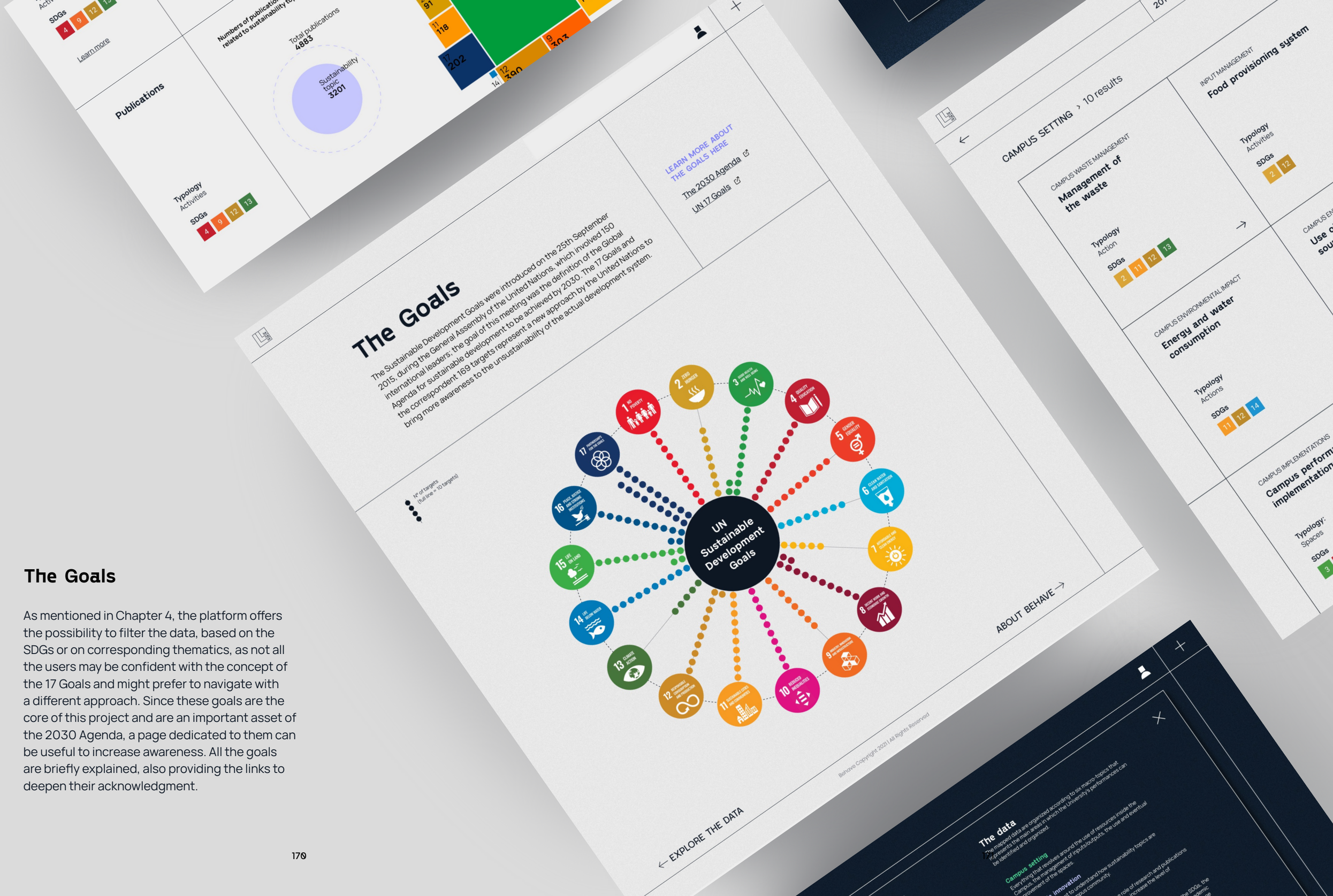
This is the main part of the tool, where all the data can be visualized, compared, and analyzed. After selecting the campus, via a direct or guided search, users will be directed to the main page of the university: here the main information are displayed (location, time range, and link to the university website). The time range refers to the number of years that are reported in the tool, e.g., 2016 – 2019. Then user scan select the 'entities' to be explored, so one of the six dimensions. There is also the possibility to choose the 'Focus Area' containing information that enable the comparison with other campuses.



After selecting of the entities to explore, a new page opens with all the graphic visualizations. On top, a bar with four filter categories can be used to personalize the navigation.
In the explore area users have the possibility to scroll through the reported years or, in some cases, to activate the 'compare' mode: this option shows additional visualizations that compare, over the years, trends of the selected topic.

The Goals

As mentioned in Chapter 4, the platform offers the possibility to filter the data, based on the SDGs or on corresponding thematics, as not all the users may be confident with the concept of the 17 Goals and might prefer to navigate with a different approach. Since these goals are the core of this project and are an important asset of the 2030 Agenda, a page dedicated to them can be useful to increase awareness. All the goals are briefly explained, also providing the links to deepen their acknowledgment.



Download

In this area, users have the possibility to download a static report of the data collected on the platform. Like in the 'Explore' area, after selecting the desired campus, the user is directed to the university's page via a direct or guided search. Here, after selecting the year of the report, there are two possibilities: download the complete report or download a single section that correspond to one of the six dimensions of the analysis.

About area

This area has the goal to give more information about Behave and the actors involved. First, a brief explanation of the tool is included, describing the mission and its main functions. Then, there is the possibility to see all the universities that use the platform, to keep track of their commitment to the UN Goals. This works also as an opportunity for other campuses to become part of the tool, with a link to eventual contacts.

The 'About' area ends with a section dedicated to the functioning of the tool: how universities collect and update their data through a database, from which the visualizations are obtained; at the bottom of the page there's a section that explains the visualization process, with the different filters that can be applied during the exploration.

Menu & Login

The menu is reachable on the top right of the platform and it leads to the main four areas in which Behave is structured; the homepage is also reachable by clicking the logo on the top left of each page.

Near the menu icon, the user has access to the login area. This is an option that has been included to give a more personalized and detailed experience on the platform. Even if the displayed data are public and open to everyone, without the login only some general information are available; to download the complete report or the single sections, a login is necessary. The login is based on the university credentials, so students, staff, and professors can use their academic credentials to enter the tool.

6.5
Future implementations

Behave current level of development allows university campuses to keep track of a wide range of data and see how these are connected to the SDGs. Behave is presented as an alternative to the annual reports published by campuses, with a greater supply of data, unified among the various members and offering greater user involvement. However, the platform can be further implemented, imagining a series of future operations that can expand its features and content management.

Data implementations
The set of data to be mapped within the platform allows for a good understanding of the analyzed campus. General aspects are enriched by some more detailed information; however, data categories can always be improved and expanded, especially taking into account that universities are dynamic entities, whose structure is constantly evolving according to needs and society.

The 'Academic Innovations' section is the one that currently has fewer data to map and the reason is mainly related to the thin line that separates this category from that of Outreach & Partnerships; some of the data belonging to the latter, such as technology transfer and public engagement, could also be seen under the eye of academic innovation but, by convention, this does not happen. However, through further research, additional categories could be identified, by greater involvement of students and professors (via surveys or interviews).

Another aspect that could be implemented is the management of qualitative data. At the actual state of development, much of the mapped data are quantitative, making it easier to collect and compare with other campuses information. Qualitative data, however, are just as important and allow a more complete overview of the projects and relationships developed within universities; the difficulty lies in finding a method to collect information, managed in a very different way among the various campuses, without transforming them in quantitative data.

Platform implementations
The Behave platform is presented as a tool that campuses can use as a sort of digital archive, a container to keep track of progress and to show stakeholders the actual value of the university's initiatives. The type of access that is offered (complete with university login, partial without login) allows consulting other campuses' data in order to make a personal comparison, made freely by the user himself. Initially, the interface included an additional section in which the system compared different campuses on some issues: energy consumption, gender distribution, ... During the development, however, some problems emerged concerning this type of analysis: as previously mentioned, campuses are very different one from each other and comparing data that are inevitably influenced by dimensional factors can negatively affect the comparison. It could be useful to think of a future in which the platform, through a well-structured database, will group campuses according to some parameters such as the number of students, space extension, geographical area, and create data visualizations within these categories. In this way, the comparison of information such as energy consumption or amount of waste produced in a year would have an effective meaning.

These are some of the implementations that could be developed to give the Behave platform additional features, helping it to become a landmark tool for campuses. Some of them are more useful than others, they do not need to be added all at the same time but they offer additional ideas for the design process.

Conclusions

Mapping the way towards sustainability

Behave represents the final step of a wide process made of heterogeneous elements: universities as fundamental actors to trigger a change towards more sustainable behaviors, the SDGs as a starting point for a new attitude, and data visualization as a language for representing the whole process. Each university has its own identity, strengths, and weaknesses. This platform was born as a solution to try to align campuses towards the same direction, without losing what makes each of them recognizable. Behave can therefore be seen as a network in which the Higher Education System can develop new strategies and, at the same time, compare the various results with an open and collaborative approach.

Compared to sustainability reports, that are published every year by universities, this digital platform allows users to no longer be just observers of static information but creators of their own exploration path, depending on the information they deem necessary for their evaluation. Simple and intuitive graphical representations accompany the reading of data, keeping in mind the type of users; public institutions, policy makers, partners, or members of university staff are the main stakeholders to whom the platform is addressed; however, even students or research groups may have an interest in this type of data. The chosen representations are therefore suitable for all those users who are not necessarily able to interpret complexity.

Data approach
The core of the entire project has been data visualization, as the chosen approach to acquire more awareness of the actions that academic institutions carry on every day. The biggest challenge for visual artifacts is to find a way to untangle and represent complexity. Data visualization is a language which duty is not to influence the user towards specific choices, and not even to suggest a final solution; visualizations must push towards an individual's critical analysis, provoking the rise of new questions. It must not be neutral, but at the same time, it must spread information that are universally accessible.

> "The purpose of visualization is insight, not pictures"
> Schneiderman, 1999

The scenario analysis made evident how mapping performances is an activity that is establishing in the corporate and academic fields; however, only few of the case studies are using data as a starting point to improve even more, and not as a mere result or as a final evaluation of a process.

The role of universities
Education is considered a fundamental resource for society, to a point that one of the Sustainable Development Goals is entirely dedicated to it (SDG 4). However, the research carried out with Behave has shown how the world of education, and in particular Higher Education, contributes not only on a learning level but also on an environmental, economic, and cultural one. The six dimensions identified to map data inside the platform (Campus setting, Community awareness, Academic innovation, Education, Outreach & Partnerships, Leadership & Governance) push university campuses to broaden their field of action and develop new operational practices to renew their identity. Mapping performance and achievements of the UN Goals allows the identification of possible connections and opportunities for improvement, following the principles of the holistic diagnosis of the systemic approach (Assess, Research, Collect, Visualize, Interpret). Care must be taken not to fall into superficial behaviors: there is the risk that the commitment is sometimes clouded by practices, such as rankings, whose purpose is positive but it risks to be weakened by marketing strategies.

Beyond SDGs
The Behave platform has been developed almost halfway through the process of achieving the 17 SDGs, introduced in 2015 and scheduled to last until 2030. To date, the goals have managed to spread a strong message so they are not only seen as part of a niche devoted to sustainability: they are establishing themselves as a universal and shared language. In the short term, they are an excellent starting point to recall the role of universities in creating future generations able to fully understand the meaning of sustainable development. However, this project also aims at the long term, offering an alternative and more inclusive mapping tool compared to the already existing ones.

The previously described future implementations show how the platform can be considered the output of a first phase, in which the bases of the interface have been outlined and from which it is possible to improve and evolve in future.

In conclusion, Behave represents the will to identify in data visualization a fundamental tool to tackle the contemporary challenges, recognizing Higher Education as the engine for an effective contribution to the 2030 Agenda and the Sustainable Development Goals.

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