Sustainable Development Goals and Current Sustainability Actions at Politecnico di Torino

Giulia Sonetti and Patrizia Lombardi

Abstract Adopted by the UN General Assembly in 2015, the agenda of the 17 Sustainable Development Goals (SDGs) represents a new coherent way of thinking about how issues as diverse as poverty, education and climate change fit together; it embeds economic, social and environmental targets in an holistic way. Implicit in such SDG logic is that each goal relies on another, although there are no clear ways to measure this intersection. International negotiations are obviously one trial table of these trade-offs. Universities, with their broad responsibility in the creation and dissemination of knowledge and their exceptional position within society, have a crucial role to play in the achievement of the SDGs and in understanding the complexity underling them, since they can help to demonstrate the university impact on society, shape an SDG-related education, build new partnerships, access new funding streams, and redefine the strategic plan of a university. This paper explores the way Politecnico di Torino maps its actions through the lens of a mission-based university, where SDGs can restructure and update the whole knowledge transfer approach to students and among staff. However, this transition is still difficult since departments and administrative unites operate in silos and the leader's agenda does not allow a real flexible and adaptable model to feed in. Researchers and administrators also lack tools to identify which interactions are the most important to tackle, and evidence to show how particular interventions and policies help or hinder progress towards the goals. Given the size of the task of achieving the SDGs, this mapping exercise provides interesting stimula for the academic sector to accelerate insights on the SDGs complementarity and prioritization.

Keywords SDGs · University · Collaboration · Strategic plan · Sustainability education

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1 Introduction

Today's global society faces pressing, complex challenges across many domains —including health, environment, and social justice (EC 2010; Leach et al. 2010; Wolch et al. 2014). Science (including social sciences), technology, the arts, and humanities have critical roles to play in addressing these challenges and building a positive and wealthy future. Universities are nuclei for breaking through, structuring new awareness, and varying our vision of the world (Ferrer-Balas et al. 2009; Lozano et al. 2015; Segalas et al. 2010). The role of universities in education is of public value; also, universities are often promoters of new businesses led by new values, in being spots for nurturing the ground science that leads to new products, or in producing evidence on which policy decisions should be made (Corbett 2005; Disterheft et al. 2014). By coming together as universities, collaborating with partners, and aiming for ambitious goals to address problems that might seem unsolvable, universities can show commitment to their communities and become inspirations for change (Ferrer-Balas et al. 2010; Lozano et al. 2014; Sonetti et al. 2016).

Mission-oriented policies can be defined as systemic public policies that relies on frontier knowledge to reach specific results (Mazzucato and Penna 2015). Missions provide a visible goal, a key, and a key to address the challenges that people face in their daily lives, whether that concerns air pollution, health and wellbeing in urban context of for the ageing societies, equal access to education and technologies enabling public services and fair trade (Edquist and Zabala-Iturriagagoitia 2012). To engage research and innovation in meeting such challenges, a clear direction must be given, while also enabling bottom-up solutions. The debate involves a wide array of stakeholders, and it is led by wider and over-national aims. The 17 Sustainable Development Goals (SDGs), articulated in 169 Targets to be reached by 2030, were born to respond to this need (Flückiger and Seth 2016).

The SDGs constitute a big occasion for University to restructure its strategy and bring up-to-date the education system to respond to the current societal challenges (Leal Filho et al. 2018). Given the size of the task and the critical role universities have in supporting, researching and delivering on them, there is an urgent need for the educational sector to accelerate insights on the SDGs complementarity and prioritization (Hartz-Karp and Marinova 2017). However, this transition toward a mission-based university is still difficult, since departments and administrative unites operate in silos and the leader's agenda does not allow a real flexible and adaptable model to feed in (Klein 2015; König et al. 2013; Tejedor et al. 2018). Researchers and administrators also lack tools to identify which interactions are the most important to tackle, and evidence to show how particular interventions and policies help or hinder progress towards the goals (Ferrer-Balas et al. 2010; Meadowcroft 2009; Parris and Kates 2003). Indeed, "missional motivation" has been regarded as one of the factors triggering the co-creation of sustainability, forming multi-actor partnerships and implementing solutions for localised issues (Yarime et al. 2012).

This contribution highlights the match between the current sustainability strategy at the Politecnico di Torino (PoliTO) and the SDGs, introducing the national

context in which Italian higher education institutions are gathering toward the same sustainability objectives, mapping the SDGs and the PoliTO's activities in the six work areas of the Green Team (Energy and buildings, Mobility and transport, Urban outreach, Food, water and waste, Green procurement and Communication). The last part of this text draws the conclusions for PoliTO's weaknesses and opportunities, and potentially for all the other universities already *en marche* towards a sustainable path.

2 SDGs and the Italian Situation

On 25 September 2015, the United Nations approved the Global Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs in the English acronym), articulated in 169 Targets to be reached by 2030 (United Nations, Population Division 2015). It is an historical event, because eventually a clear judgment has been expressed regarding the unsustainability of the current development model, not only on the environmental level, but also on the economic and social ones (Kates et al. 2005; Kates et al. 2001). In this way, and this is the highly innovative character of the Agenda, the idea that sustainability is only an environmental issue and an integrated view of the different dimensions of development is definitively overcome (Giovannini 2018). This primary goal of intergenerational equity extends the reference horizon of choices and provides foresight for government action (Griggs et al. 2013). This is realistically possible where the value, the communicative and inspiring power of the SDGs becomes part of daily life, impacting concretely on the behavior of individuals and organizations (Colglazier 2015). Implicit in the SDG logic is that the goals depend on each other, even if there is still great uncertainty on how it happens.

The challenge for complex, multi-center and multi-stakeholder organizations, such as universities, is to seize the opportunities of the Agenda 2030 (Hajer et al. 2015; Martin and James 2012; Sachs 2012). Operationally, they should be able to promote new institutional governance mechanisms, coherently orienting internal decision-making processes, allocating resources, redesigning both the organization's mission and the system of incentives for teaching and research (Cortese 2003; Di Nauta et al. 2015; Waters 2013). And this is not easy.

The initial move of Italian university toward the SDG concepts was the launch of the Italian Alliance for Sustainable Development (ASviS) was established on February 3rd, 2016, upon the initiative of the Unipolis Foundation and the University of Rome "Tor Vergata" (http://asvis.it/).

This is consistent with the first principle of the Agenda 2030, that requires the universality of the commitment to change, not only in the sense that all countries must play their part, but that all the components of a country must be involved, not only public but also private, civil society and so on. From this comes the second principle, that is the participation (Ferrer-Balas et al. 2009; Hopwood et al. 2005; Sachs 2012). The aim of ASviS is indeed to raise the awareness of the Italian society,

economic stakeholders and institutions about the importance of the 2030 Agenda for Sustainable Development, and to mobilize them in order to pursue the Sustainable Development Goals (SDGs) (Giovannini 2018). This alliance already brings together over 180 of the most important civil society institutions and networks at national level, such as: associations representing social partners (businesses, trade unions and third sector associations); networks of civil society associations pursuing specific goals (health, education, employment, environment quality, gender equality, etc.); associations of local public administrations; public and private universities and research centres; associations of stakeholders working in the fields of culture and information; foundations and networks of foundations; Italian organizations that are members of international networks dealing with the SDGs.

The 2030 Agenda was the result of a two-year negotiation between governments and therefore is the result of a mediation, not all-encompassing but well structured, that includes and shows the connections, also operational, among the different subjects. An example: the Third Sector Forum asked its associates to reclassify the activities carried out according to the targets of the Agenda; the request that could have been understood as a bureaucratic burden, but instead it was accepted with a great participation, with a sense discovery, as a break with the routine and a way to deal with one's own historical legacy and with other subjects.

Moreover, in AsviS there are subjects that historically have had different positions on many issues (for instance, the environmental ONGs, or the production actors such as "Confindustria", "Confcommercio", with the trade unions CGIL, CISL and UIL). In these two years, the ASviS network has not been an intrusive component, but it has represented an added value. For example, the report produced each year with the contribution of 300 experts is sent to all associations before its publication, being a collective product that welcomes different points of view.

Working together on the Agenda 2030 targets represented a model of integration between very different realities that have discovered the value of working together, inspiring also the Italian Sustainable University Network (RUS), born with the aim of promoting the SDGs, spreading the culture and good practices of sustainability and strengthening the value of the Italian experience at an international level. The RUS, co-founded by Politecnico di Torino (PoliTO), in July 2015 with other Italian Universities, represents the first experience of coordination and sharing for all higher education institution involved in the issues of environmental sustainability and social responsibility. In this perspective, PoliTO, also partner of ASviS, adopted the United Nations Agenda 2030 as an innovative guideline for an integrated approach to strategic planning and social reporting, in which to give expression of the effects of government action in terms of economic growth, social inclusion and environmental protection. The multi-year experience acquired by PoliTO through a process of reporting that combines the economic dimension with the social and environmental, has had as a natural outlet the questioning of the status quo regarding the university missions of teaching, researching and outreaching, to contribute to the Agenda 2030 (Green 2013; Lauder et al. 2015; Lozano et al. 2014).

3 The SDGs Mapping Exercise at Politecnico di Torino

Energy efficiency strategies and pro-environmental actions have been in place by PoliTO for almost 20 years, as well as concrete choices of emissions avoided thanks to the renovation and reuse of historic buildings, the continuous promotion of leadership and innovation in sustainable technologies, seminars for students and staff aimed at enhancing a wiser use of our resources. Nevertheless, it has been only in 2015 that the "PoliTO Sustainable Path" was promoted by the vice-rector to logistics and infrastructures at the institutional level. A dedicated internal team, the "Green Team" (Fig. 1), was created to support the best international universities in recognizing our role as drivers of change toward a low-carbon society.

This team is intended to lead the PoliTO towards the university sustainability mission, as stated in the Horizon 2020 strategic plan: a comprehensive integration of sustainability into the university research, teaching, outreach and operations that prepares students, faculty and staff to be sustainability leaders in their professional, personal and civic lives.

The Green Team of Politecnico di Torino is the hub of skills, material and human resources and information related to the objectives of sustainable development translated into the university. It coordinates all activities related to the promotion of sustainability in the University to ensure that the SDGs are integrated into all the activities of the institution (both educational and awareness and dissemination), and to align and optimize the way resources are deployed in national and international projects.

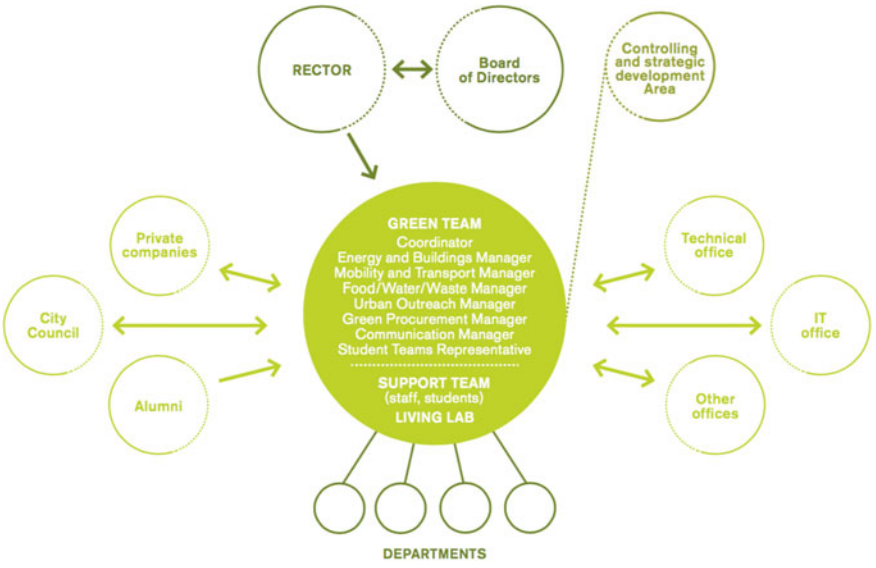

Fig. 1 The Green Team governance model

The Green Team is therefore the unit of connection between the university community and the general management board for ensuring the implementation of the SDGs in different processes transformations already in place. It is organized by vertical lines of action on six themes: Energy and buildings, Mobility and transport, Urban outreach, Food, water and waste, Green procurement and Communication. These vertical actions are then flanked by transversal and multidisciplinary "engagement" actions, coordinated and supported by administrative members, researchers and student representatives attentive to the wider impacts that fall into the "third mission", in the campaigns of inclusion of sustainability in research and teaching, in internal and external dissemination, to the wider community of the city and in the networks of universities with similar goals in Italy and in the world.

The vision of development underlying the new Green Team program document[1] is already offering clear and transparent decision-making criteria for the enhancement of multidisciplinary heritage in the planning of new training initiatives and in the policies for encouraging research on SDGs, but there is still no clear threshold to understand the starting point and the status quo of SDG integration into current and future activities. In order to aligning the Green Team vision on decision-making criteria by the administrative board a sustainable development objectives, PoliTO wanted to start a re-reading of its teaching, research and third mission activities according to the 17 objectives and sub-objectives, proposed in the UN Agenda 2030.

For this reason, the Green Team is conducting a three folded initiative as follows: (i) One is an in-depth analysis to define the criteria for evaluating the correspondence between current activities and SDGs. In collaboration with special projects office and IT departments, an Artificial Intelligence device is being trained to suggest which SDG is most likely related to a research product as found in the last five years in the PoliTO scientific products repository. The papers/book chapters/proceedings mapped via the algorithm have to be validated by the corresponding authors. This is first of all to take ownership of the 17 Sustainable Development Goals of the United Nations, and then to inform the government action of the new rector for a shared vision towards a more sustainable society. (ii) The same mapping detail action has been undertaken at the level of teaching course with reference to the current education portfolio opportunities offered to students. This activity has been just started and will be concluded by end of June. (iii) An initial activity undertaken by the Green Team has been to link existing and forthcoming lines of actions toward a sustainable campus with the 17 SDGs to demonstrate university impact, capture demand for SDG-related education, build new partnerships, access new funding streams, and ri-define the strategic plan of a university that is responsible and globally aware.

Given the amount of publications to be analyzed (over 13,000 for the last 3 years) for the (i) initiative, it has been tried to perform a classification test using a semi-supervised classification tool. This was the "Watson", a question-answering computer system capable of answering questions posed in natural language, developed in IBM's DeepQA project (Ferrucci et al. 2013).

[1] http://www.campus-sostenibile.polito.it/output_and_publications.

Some possible basis of knowledge for teaching the AI system have been defined by the Green Team's dedicated working group. The analyses were conducted separately for each language (English and Italian) and therefore the knowledge bases were always separated into two sets. Three types of tests were done, using three different knowledge bases: the definitions of the SDGs as extracted from the UN official website; 5 publications certainly attributable according to the highest Google Scholar citation index for each SDG; a sample of about 100 PoliTO's publications, manually classified by the Green Team members, expert of each "category" of goals. Preliminary results of the three analyzes show a polarization on three SDGs: 7, 11 and 12. In general, the analysis based on the official UN definitions returns a greater distribution on all the SDGs. A significant difference is in the third type of analysis, which returns 6545 classified publications compared to about 4000 of the other two. It therefore seems to be less resolving than the others. It appears clear that a human control is necessary to cut out the "false friends" retraced in a quick control over few publication, where the word "environment", for instance, was strongly related to the IT semantic realm, rather than to the SDGs "life below water" or "life on land". While the polarization toward SDGs such "affordable and clean energy" or "industry, innovation and infrastructure" is quite predictable in a technical university such as PoliTO, having just engineering and architecture departments, it is essential to carry out a human driven punctual verification of the classification obtained, on a significant sample, that is now undergoing at the time of this writing. Therefore, in the following sub paragraphs, the result of the iii) activity related to current results/targets mapped on SDGs per action lines exercise is presented.

4 Energy and Buildings

Pursuing energy sustainability at Politecnico di Torino means reducing and rationalizing energy use and its environmental impact on campus reality. PoliTO's energy consumption in 2014 accounted for 5064 toe, while in 2015 the total decreased to 4967 toe, 4 987 toe in 2016 and 4398 toe in 2017, decreasing by the 13% in four years.

The carbon foot print is 2217 tons of CO_2, as 100% of electric energy comes from renewable sources. In 2015 we consumed 4.0 koe per cubic metric and 166 koe per student, while in 2016 this last portion decreased to 151 koe per student. While providing the quality/comfort of indoor spaces, plus the security and the affordability of the supply, PoliTO aims to make its building structures more efficient, and to produce and/or to buy energy from renewable sources. Energy sustainability of the University therefore concerns plants, buildings and sources. This dimension, besides all action aimed at saving energy and fostering the widespread use of renewable sources, includes the monitoring of all resources, the real-time control of these flows (with the Living Lab facility) and the adoption of new management methods for energy saving. Therefore, the PoliTO priorities in the energy action fields are twofold: to reduce the energy demand as much as possible, while trying to pursue the principle

Fig. 2 The SDGs related to the energy and buildings initiatives at Politecnico di Torino

of self-sufficiency. Following these premises, here is a list of the main initiatives PoliTO is pursuing and will pursue in the next future:

- Increase energy savings
- Detect anomalous electrical loads during periods of inactivity (in particular due to lighting and ventilation)
- Map all indoor and outdoor lighting systems
- Replace at least the 50% of the total installed power with LEDs
- Replace the remaining 40% of old windows with new high-efficiency ones
- Systematize data collection and monitoring of energy consumption of major carriers through the Living LAB structure
- Communicate achievements and engaging audience through dedicated on line channels and national/European campaigns.

All these actions can be mapped along the SDGs 7, 9, 10, 11, 12 and 13, as illustrated in Fig. 2.

5 Mobility and Transport

Sustainable mobility from and to the university campuses and its five metropolitan poles means to guarantee to all PoliTO's employees and users the availability of various transport modes. PoliTO is not only committed to propose new vehicles, services and systems, technologies, innovative ICT applications for urban mobility plans, but also to promote them in mobility management activities of Turin City Council.

Solutions including new transport modes, alternative energy sources beyond fossil fuels, the collection and the dissemination of information to help mobility are believed to be the path for sustainable mobility actions, in collaboration with the Turin delegated public authority, essential interlocutor when planning the public transport services satisfying the university needs and the latest solutions for shared transport systems.

Turin and its hinterland is the only area in Italy, one of very few in Europe, to engineer, design and implement the various transport systems and vehicles (by road, rail, rope, air and water), along with the relative road and multimodal control (for road, rail, rope, aircraft) using a strong component of technological innovation, ICT, recognizable in ITS (Intelligent Transport System).

Fig. 3 The SDGs related to the mobility and transport initiatives at Politecnico di Torino

Based on these premises, monitoring the mobility of PoliTO users is the first step to understand what to do for:

- the promotion of quality, safety, efficiency and awareness inside and outside of the campus;
- regulating cycle paths and car parking areas;
- improving relations between all poles of the campus and the City of Turin.

All these actions can be mapped along the SDGs 7, 9, 10 and 11, as illustrated in Fig. 3.

6 Urban Outreach

This actions field includes two fundamental focuses: a first one, towards the city and the society, and a second one, directed to PoliTO's internal community.

With regard to the first one, a strategic point of the urban outreach strategy of PoliTO is the preservation of existing facilities and buildings as well as to increase the recognition of urban places used by university users (buildings, paths, bars, study rooms etc.) and to strengthen of the sense of belonging in the city of Turin. PoliTO' sites are located all over the metropolitan area, offering a widespread and multi-polar system of services, which are highly interconnected and permeable with the local resources, including public and private companies and institutions of all levels. The dialogue between university and local authorities is encouraged by PoliTO's board of directors in order to support the development of common strategies to feed local service companies and services to the city users, especially the students enrolling every year from many different countries.

In relation to the aspects outlined in the "campus settings" section, the reuse of historical building like the Valentino Castle, as well as the refurbishment of former industrial sites, like Mirafiori and Lingotto campuses, outline the importance of PoliTO in the urban valorisation of green, brownfields or restricted areas, now available to the citizens, including students, employees and local residents.

The action field directed to PoliTO's internal community is a second important focus of Urban outreach strategy. In line with recent trends in the sustainability science, great attention is paid to quality of life and environmental responsibility of PoliTO's campus operations. For the PoliTO's community, being sustainable

Fig. 4 The SDGs related to the urban outreach initiatives at Politecnico di Torino

means focusing not only on the environment but also on the welfare of those who live inside the university (students, faculty, technical—administrative employees). PoliTO develops projects to improve its employees' recreation and physical well-being, to promote safety, health and welfare, education and awareness and equal opportunities; to provide tax assistance and cultural services, to optimize the use of public and green areas. Finally, PoliTO believes that a major role of university in contemporary society is to make people aware of human impacts in contemporary climate change. Therefore, a vital role is played by the teaching, training and the knowledge exchange activities delivered by our academic staff, spreading sustainability culture at local, national and international levels. All these actions can be mapped along the SDGs 3, 4, 5, 8, 11, 12 and 16, as illustrated in Fig. 4.

7 Food, Water and Waste

This dimension is twofold: on the food and wellness side, PoliTO is committed to promote the sustainability of the agro-food chain (energy saving, re-use of surplus) and local and traditional products and to encouraging guidelines for catering providers within the university in terms of contract and procurement (materials used). About waste management, PoliTO is committed to reduce/rationalize waste production, thus reducing its environmental impact following the "reuse-recycle- reduction" approach. To this end, PoliTO aims to increase the efficiency of both disposals and purchases, looking towards a full closure of the life cycle of the product in a sustainable way. This dimension of a sustainable university represents the reality of the campus in terms of environmental impact concerning waste; an entity such as PoliTO has an important influence on the city from this point of view and on users themselves (primarily students) who often are not educated or aware enough in terms of disposal and recycling.

Based on the current conditions, one of the PoliTO's absolute priorities is to face the situation trying, on one hand, to reduce the quantity of material where possible, while on the other hand continuing along the road of awareness and informative campaigns, creating ecological islands for recycling and other activities in order to educate generations of students and young adults living in the university and properly train the adults of tomorrow towards sustainable development. All these actions can be mapped along the SDGs 2, 3, 4, 6, 12, 14 and 15, as illustrated in Fig. 5.

Fig. 5 The SDGs related to the food, water and waste initiatives at Politecnico di Torino

Fig. 6 The SDGs related to the green procurement initiatives at Politecnico di Torino

8 Green Procurement

Materials for the university and its employees are bought following the green public procurement guidelines, in order to respect the environment without forgetting the cost effectiveness of supply. The sustainability of Politecnico in this regards refers indeed to all its purchases—i.e., paper, food and beverages, cleaning products, IT products and goods of any kind—and part of the waste.

The offices in charge of the purchases are obliged to do the best possible sustainable choice according to two protocols: one of the Ministry of Environment and one born from an initiative of the Province of Torino with ARPA, which is also joined by the City of Turin. The university spent about 10 M € in 2015, of which over the 54% is conform to GPP protocols. The Green Procurement actions included are:

- GPP Protocol adherence (Green Public Procurement);
- Use of ecological cleaning products;
- Use and purchase of "green" information technology products;
- Initiatives to recover and reuse printed paper;
- Training courses for staff on the use of "green procurement".

All these actions can be mapped along the SDGs 12 and 13, as illustrated in Fig. 6.

9 Communication

The creation of a communication plan for the Sustainable Campus Initiatives is a transversal action supporting all the previous ones. It encompasses the design of national/international events such as the sustainability week (promoted by AsviS), the promotion and communication inside and between the different areas of the Green Team via video/websites/web apps), the activation of specific thesis on the topic of sustainability marketing and communication, the joining of sustainable campus

Fig. 7 The SDGs related to the communication initiatives at Politecnico di Torino

networks and surveys to understand the degree of knowledge of the team and of the actions carried out by the different members.

All these actions can be mapped along the SDGs 4 and 17, as illustrated in Fig. 7.

10 Discussion

The SDGs mapping exercise over current and forthcoming action of the Politecnico di Torino Green team was very helpful made visible all the strengthening and weakening relationships among all the different fields of action. Being a technical university, the results highlight that the expertise and the actions are of course polarized toward the SDG 7, 9, 11 and 12. That implies that technology is being considered as the enabling factor for the implementation of the other SDGs, and in particular on the overarching SDG 13 on climate change mitigation and adaptation. This relation is bidirectional, too, in the forthcoming strategy of PoliTO, meaning that the struggle against climate change is believed to be positively driven by the deployment of sustainable energy services, and that the integration of climate change measures into national policies positively contributes to the deployment of renewable energies and energy efficiency measures.

The risks embedded in this direction, not touching for instance the 1, 2, 5 or 16 SDGs (End poverty in all its forms everywhere, End hunger, Achieve food security and improved nutrition and promote sustainable agriculture, Achieve gender equality and empower all women and girls, Promote just, peaceful and inclusive societies), are that the message the Politecnico could be giving to the students is that it is enough to just rely on technology to solve societal challenges.

A lacking SGD, for instance, is the 10th: “Reduce inequality within and among countries”, which is crucial in the new UN agenda in order to ensure an equal and just progression toward a better quality of life for everybody on this planet (Chelleri et al. 2015; Escobedo et al. 2015; Mitlin and Satterthwaite 2012). That impedes to “glue” all the other objectives toward a just dimension in the distribution of the benefits out of innovation and technology investments. However, one of the reason for this polarization can be the fact that the mapping exercise has not been extended to the activities related to the so called Third Mission, where a number of initiatives related to cooperation are undertaken. Nevertheless, such mapping exercise allowed highlighting “black spots” in the current Green Team activities, both in collecting and giving a direction to existent PoliTO initiatives.

Another important opportunity underlying in the SDGs set is the need for collaboration for sustainability, which, from the analysis of the current structure of PoliTO, is still slow in its implementation (Leal Filho et al. 2018). To this extend, the mapping exercise did not include initiatives such the recent interdepartmental research centers, merging different disciplines. Indeed, according to the objectives of its Strategic Plan, PoliTO tried to turn the interdisciplinary collaboration among different technological and scientific fields into something more systematic. This strategic objective was put into action through the establishment and the funding dedicated to the so-called Interdepartmental Centers.

Through some physical and organization temporary platforms (3/5 year of lifetime), researchers belonging to different Departments interacted and cooperated with the aim of combining competences and producing knowledge in the field of the so-called breakthrough technologies; making the reputation and the visibility of University grow in the areas of strategic interest at a local and a national level; enhancing relationships with the most prestigious international institutions. The Interdepartmental Centers turned to be the result of two different selection approaches. In the first approach (called Top Down), the University Governing Bodies performed the role to detect the strategic topics (Energy, Additive Manufacturing, Mobility; Urban Challenges/Cultural Heritage, Data Science/Big Data and Internet of Things), where PoliTO is considered to be leader at an international level.

Within the same five thematic fields, other five interdisciplinary groups of researchers were created and involved in the second approach (called Bottom Up), where they proposed interdisciplinary research topics autonomously. The results are therefore market-oriented, and not SDG oriented, meaning that it will be difficult to implement the implicit logic of SDGs, where the goals depend on each other and not by financial leverages. If PoliTO and the other technical universities do not undertake the real challenge behind the SDGs strategic guidelines, it will lost the opportunity to be a critical stakeholder in shaping the future of University as the driving force for a low carbon, just and human society.

A last issue popping out from the mapping exercise was that, apart from the communication fields, none of the working team is effectively collaborating with the others in pursuing some concrete objectives. The SDG's underling need of collaboration is a crucial to achieve a common agreement for deciding a direction to take for funding distribution and organizational change. Materiality matrix, focus groups and workshop may favor the creation of concrete of goals adapted to a university dimension, where, for instance, the SDG 3, "Good health and well-being", can be scaled to a local dimension and be translated into welfare initiatives for students and staff, and in turn be connected to SDG 11 initiatives on teaching urban models fostering active lifestyles and architecture regenerative sustainability (Brown 2016; Sonetti et al. 2018).

Collaboration is also indispensable in current European research funding policy. In Horizon 2020, collaborative research is at the core of its Societal Challenges pillar. Here, the Commission have identified seven challenges which are of pressing, international concern, and which, as such, require collaboration to be addressed. This collaboration will not only span countries, but disciplines and sectors too, to

nurture a "collective" consciousness toward the agreed (sustainable development) goals. Working toward a common goals also fosters creative skills and mindsets are indispensable in a workforce that must be responsive to change and capable of finding new solutions to complex problems. The World Economic Forum itself has identified social abilities such as coordinating with others and persuasion, as well as complex problem-solving skills, as essential in the knowledge-based workplace of the near future.[2] Also, according to the European Commission's new Entrepreneurship Competence Framework, entrepreneurial education includes life skills as well as business skills. It means learners can act upon opportunities and ideas and transform them into value for others, whether financial, cultural, or social (Kim 2011).

The problem is indeed not in the "amount" of knowledge the University transfer to students. The problem is a knowing-doing gap: a disconnect between our collective and our collective actions. These gaps and divides are amplified by the silos structure of our key institutions and the mindset of the decision makers that operate inside them (Scharmer 2018). A collaborative group of departments or students formed around a real challenge (that can come from a company, institution or from the students themselves) will chose to learn certain skills or knowledge or do research on a tailor-made base (Hogg et al. 2004; Kleine et al. 1993; Turner and Reynolds 2001). This approach stimulates a learning by doing approach, making knowledge and skills acquired relevant and applicable to the concrete goal achievement, besides contributing to the full development of an autonomous, supportive, responsible and committed person with an entrepreneurial mindset. At the end of the university path, students could have made a real positive impact on society and the University can be part of an educational system helping young people to develop their full physical, intellectual, emotional, social and spiritual capacities as individuals and as members of society, and thus contribute to the development of a better world (Fink 2013; Magolda 2004; Pizzolato 2003).

11 Conclusion

Adopted by the UN General Assembly in 2015, the agenda of the 17 Sustainable Development Goals (SDGs) represents a new coherent way of thinking about how issues as diverse as poverty, education and climate change fit together; it embeds economic, social and environmental targets in an holistic way. Implicit in such SDG logic is that each goal relies on another, although there are no clear ways to measure this intersection. International negotiations are obviously one trial table of these trade-offs. Universities, with their broad responsibility in the creation and dissemination of knowledge and their exceptional position within society, have a crucial role to play in the achievement of the SDGs and in understanding the complexity underling them, since they can help to demonstrate the university impact on society, shape

[2] https://www.weforum.org/agenda/2018/04/education-systems-can-stifle-creative-thought-here-s-how-to-do-things-differently.

an SDG-related education, build new partnerships, access new funding streams, and redefine the strategic plan of a university. This paper explores the way Politecnico di Torino maps its actions through the lens of a mission-based university, where SDGs can restructure and update the whole knowledge transfer approach to students and among staff. Being a technical university, results highlight that the expertise and the actions are of course polarized toward the SDG 7, 9, 11 and 12. That implies that technology is being considered as the enabling factor for the implementation of the other SDGs, and in particular on the overarching SDG 13 on climate change mitigation and adaptation. While a large number of actions related to Energy and buildings, Mobility and transport, Urban outreach, Food, water and waste, Green procurement and Communication are already mapped, even if "ex post", on almost all SDGs, these vertical actions need to be fostered by transversal and multidisciplinary "engagement" actions, coordinated and supported by administrative members, researchers and student representatives attentive to the wider impacts that fall into the "third mission".

This transition toward a collaborative model is still difficult, since departments and administrative unites operate in silos and the leader's agenda does not allow a real flexible and adaptable model to feed in. Researchers and administrators also lack tools to identify which interactions are the most important to tackle (AI and data mining still need a human touch to be effective in supporting the decision making process). The focus on "technical" SDGs demonstrate that PoliTO organizes its activities and research investments in technology innovation for results in mitigation scenarios, digital partnership with private companies and alignment with the major market trends. In order to understand the existing trade-off between SDG 7 and 9 and the other SDGs, further research is needed to study the directionality of each interaction in terms of counteracting/enabling other objectives. To make coherent policies and strategies, the PoliTO board of directors may need a rubric for thinking systematically about the many interactions, beyond simplistic synergies and trade-offs, in order to quickly identify which internal and external group of stakeholders could become their allies and which ones they will be negotiating with in the path toward a sustainable university.

Lastly, the SDG's underling need of collaboration is a crucial to achieve a common agreement for deciding a direction to take for funding distribution and organizational change. Materiality matrix, focus groups and workshop may favor the creation of concrete of goals adapted to a university dimension, where, for instance, the SDG 3, "Good health and well-being", can be scaled to a local dimension and be translated into welfare initiatives for students and staff, and in turn be connected to SDG 11 initiatives on teaching urban models fostering active lifestyles and architecture regenerative sustainability.

Given the size of the task of achieving the SDGs, and the critical role universities have in supporting and delivering on them, there is an urgent need for the sector to accelerate insights on the SDGs complementarity and prioritization, and this mapping exercise provides interesting stimula to redefine current models of education.

The difficulties we have in meeting today's global challenges, such as implementing the 17 Sustainable Development Goals (SDGs) worldwide, are not caused by a

knowledge gap, but a lack in the collaborative culture in the strategic plans of universities. The SDGs lens of a mission-based approach can be a precious occasion to restructure and update the whole knowledge transfer approach in the higher education institutions, helping young people to develop their full physical, intellectual, emotional, social and spiritual capacities as individuals and as members of society, and thus contribute to the development of a better world.

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