



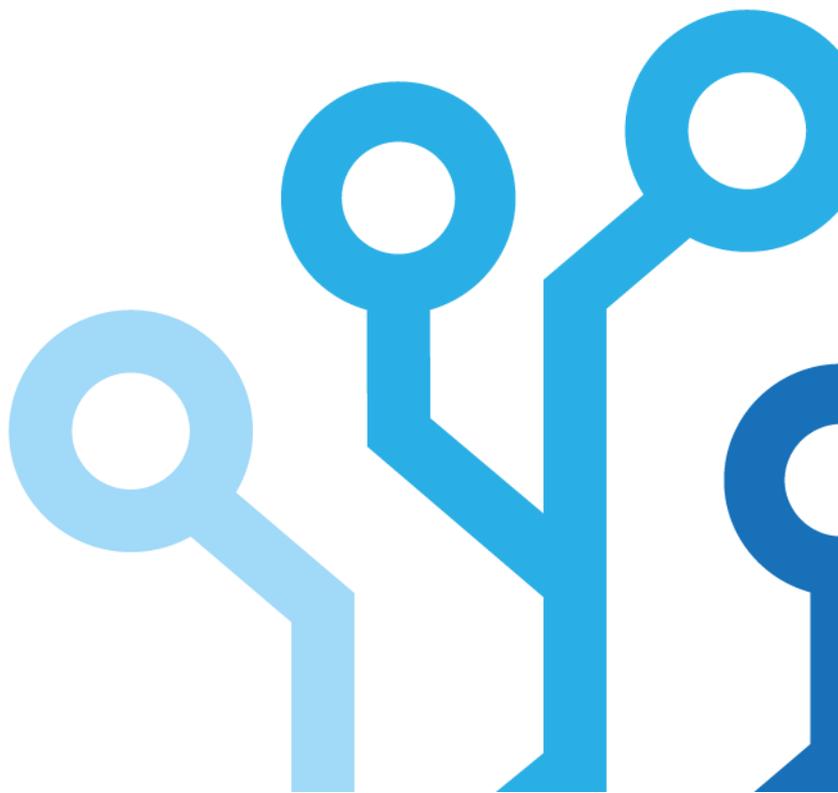
## D.2.2 Challenges identification



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## Definitions

**Challenge** is a fundamental problem facing policy- and decision-makers. Addressing a Grand Challenge requires focused action at the highest level across several sectors and actors including, policy, industry, research, etc. and requires multi-stakeholder approaches.

**Problem** is a situation, person, or thing that needs attention and needs to be dealt with or solved; a matter or situation regarded as unwelcome or harmful and needing to be dealt with and overcome; A thing that is difficult to achieve.

**Issue** is a subject or problem that people are thinking and talking about (e.g. acceptability of genetic screening, budgetary deficit, minimising the carbon footprint, etc.).

**Driver** or a driving force when applied to one or more system factors brings about a change or movement in trends that we identify within our system of interest. Driving forces are considered as factors that are significant to the question of concern, and generally not within an organisation's control, although they may be within an organisation's sphere of influence.

An **idea** is a narrative that describes a possible future situation that would have an impact on a given sector, topic, area or theme. Ideas may include information about historic and possible future trends, drivers, wildcards and weak signals. The narrative may describe impacts on the system that are detrimental (risks) or beneficial (opportunities), or combination of both. Whether the impact is viewed as beneficial or detrimental will be dependent on the perspective of the stakeholder group. 3

**Solution** is the answer to the problem.

# 1 Challenge identification

The aim of this chapter is to develop a challenge identification diagnostic instrument, which will be used by students as a tool for identification of the challenges and will help to reflect a holistic approach to the urban problems taking advantage of the new technologies so that the urban model and the relationships among the stakeholders can be redefined.

As it is noticed by George et al. (2016) our lives are surrounded by global challenges, which may have solutions, but it is not enough. Global challenges require coordinated actions between businesses, governments, multilateral agencies and diverse stakeholders toward a clearly articulated problem or goal. Dr. David Hilbert in 1990 listed a set of 23 problems collectively named as “grand challenges” (George et al., 2016). George et al. (2016) define a “grand challenge” as a specific critical barrier(s) that, if removed, would help solve an important societal problem with a high likelihood of global impact through widespread implementation.”

For the identification of global challenges, instruments such as citizen consultation and dialogue<sup>1</sup>, online consultation or expert group consultation<sup>2</sup>, or text-mining from a variety of media and sources<sup>3</sup> are normally used. These are expensive ways of challenge identification, thus for the training of the students we recommend to select relevant smart and health city challenges from a list of universal and widely used challenges.

## The main criteria which diverse Grand challenges from ordinary problems are :

- Phenomena is identified as a set of problems/issues by a certain group(s) of stakeholders.
- Narrative of the problem(s) is frequent in media and can be identified via text mining, stakeholders 'consulting.

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The most universal and widely used Grand Challenges are the Sustainable Development Goals developed by United Nations. UN Sustainable Development Goals include a set of 169 targets which are aimed to be achieved by 2030.

## UN Sustainable Development Goals

1. End poverty in all its forms everywhere
2. Zero hunger
3. Ensure healthy lives and promote well-being for all at all ages
4. Quality education
5. Achieve gender equality and empower all women and girls
6. Clean water and sanitation
7. Ensure access to affordable, reliable, sustainable and modern energy
8. Promote inclusive and sustainable economic growth, employment and decent work for all
9. Build resilient infrastructure, promote sustainable industrialization and foster innovation
10. Reduce inequality within and among countries
11. Make cities inclusive, safe, resilient and sustainable

<sup>1</sup> Citizens' dialogues and citizens' consultations: Key conclusions (2019) European Commission [https://ec.europa.eu/commission/sites/beta-political/files/euco-sibiu-citizensdialogues\\_en.pdf](https://ec.europa.eu/commission/sites/beta-political/files/euco-sibiu-citizensdialogues_en.pdf)

<sup>2</sup> iKnow ERA Toolkit (2011) European Commission: Directorate-General for Research and Innovation Socio-economic Sciences and Humanities

<sup>3</sup> Amanatidou E., Butter M., Carabias V., Konnola T., Leis M., Saritas O., Schaper-Rinkel P. and Rij V. (2012) On concepts and methods in horizon scanning: Lessons from initiating policy dialogues on emerging issues, Science and Public Policy 39 (2012) pp. 208–221

12. Ensure sustainable consumption and production patterns
13. Take urgent action to combat climate change and its impacts
14. Oceans: Conserve and sustainably use the oceans, seas and marine resources
15. Life on Land: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss
16. Peace, justice and strong institutions
- 17 Partnership for the goals

United Nations Social Development Goals can be further decomposed into geographical, community, or organizational outcomes (George et al., 2016).

The European Union is an appropriate place to deal with global challenges. During the development process of EU's strategic agenda for 2019 – 2024, EU citizens were asked what European decisions would make them proud of belonging to the Union, respondents to the online consultation mentioned problems relating to the environment and climate, migration and refugees, foreign affairs and defence.

While defining the EU's strategic agenda for 2019-2024, the European Commission<sup>4</sup> noticed that it is the right moment to address the challenges and opportunities Europe faces today. From the EU Commission's point of view, future action should focus on several dimensions<sup>5</sup>:

**Table 1 EU future action dimensions and related challenges**

EU future action dimension	Related challenges
A European that protects	Protection of social rights
	The gender pay gap
	Parental leave and other social issues, including health.
	Protection of the weakest members of society, such as the elderly and low-skilled workers
	Consumer rights
	Food safety and the quality of food products. Citizens expect trade agreements to respect high standards, including social and environmental ones.
	Unfair taxation, especially to the benefit of big companies
Addressing Migration	Crime and security. Especially terrorism and corruption
	Call for an end to irregular migration or for the return of migrants who have no right to stay in the EU.
	To stop the loss of human lives in the Mediterranean
	The integration of migrants and cooperation with non-EU countries
A dynamic economy	Call for solidarity among EU countries or emphasise the need for harmonised sea and land border controls
	The digital economy and its implications for the acquisition of skills, the creation of new jobs, and the protection of personal data
	Artificial intelligence and robotics: Europe being expected both to seize opportunities and to limit possible risks.
	Circular economy and its potential benefits
	Incentivise research and innovation. How to improve access to finance and investment
Fighting climate change, protecting the environment	Free movement
	The euro, the single market and international trade
	To reduce greenhouse gas emissions
	Development of renewable energy
A Europe of values	Investment in the green economy and innovation to help preserve the environment
	Waste management (especially plastics), pesticides and biodiversity, and on animal welfare.
	An area of freedom and fundamental rights
	Concerns about corruption and about the state of the rule of law in some Member States

<sup>4</sup> Strengh in unity: Commission makes recommendations for the EU's next strategic agenda 2019 – 2024 (2019) [http://europa.eu/rapid/press-release\\_IP-19-2309\\_en.htm](http://europa.eu/rapid/press-release_IP-19-2309_en.htm)

<sup>5</sup> Citizens' dialogues and citizens' consultations: Key conclusions (2019) European Commission [https://ec.europa.eu/commission/sites/beta-political/files/euco-sibiu-citizensdialogues\\_en.pdf](https://ec.europa.eu/commission/sites/beta-political/files/euco-sibiu-citizensdialogues_en.pdf)

	Gender equality and non-discrimination
	Bring the European Union closer to its citizens
	Trust in the European institutions
A perspective for the young generation	Mobility and education
	Youth unemployment
	To adapt training provision to new trends such as the digital economy
	Schools is a place where Europe should be taught and where the young generation can learn about Europe's common values
A stronger Europe in the world	A common foreign policy and a common defence policy
	Other global powers such as Russia, China and the United States
	Worries about cybersecurity or trade
	To speak with a 'common voice'

For addressing UN Social Development Goals and EU Future Action Goals we propose to identify “X” smart and health city-related challenges by using a questionnaire (see Annex A). The questionnaire is developed out of the most relevant UN Social Development Goals and EU Future Action Goals for smart and health city problematic areas. The identification of Grand Challenge collective targets is the most important step for the success of targets’ implementation, because it gives a collective sense of purpose.

George et al. (2016) noticed that human progress stems from achieving these targets through collective, collaborative, and coordinated efforts. Thus, in the next section we will present a methodology which shows how to address identified “X” smart and health city challenges.

## 2 Addressing “X” smart and health city challenges

According to George et al. (2016), a Grand Challenge reflects the needs of multiple actors, who in certain situations (e.g. poverty) do not have opportunities to communicate their needs or the needs differ between actors and are in conflict between each other. Thus, identification of actors’ needs and the alignment of a common agenda is an important step when addressing the challenges. As it was noticed above, different instruments such as citizen consultation and dialogue, online consultation or expert group consultation, or text-mining from of a variety of media and sources can be used for the identification of actors’ needs and consequently, Grand Challenges. However, all those instruments are too expensive for the use of the students during their study process. Thus, we recommend, during the study process, to use multi-actors workshops for the identification of the actors’ needs, as it is recommended by MIOIR-VTT Executive Course (2018).

### 2.1 The guidelines on “X” smart and health city multi-actors workshop<sup>6</sup>

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<sup>6</sup> Adapted from:

- MIOIR-VTT Executive Course 2018 :The ART of Foresight and Sustainable Future: Anticipating, Recommending and Transforming Research and Innovation Futures. Practical guidelines;
- Wartic Steven L. and Wood Donna J. (1998) International business and Society, Blackwell Publisher Inc., 1st edition, p.249

### Brainstorming on ideas and drivers

Brainstorming is a mean of generating as many ideas as possible from group work. The following four rules are applicable for a brainstorming session:

1. No criticism is allowed.
2. Freewheeling is welcome.
3. Quantity wanted.
4. Combination and improvement are sought.

A time horizon should be agreed (5 years, 10 years, 15 years...) before starting to think about ideas that are likely to be important and uncertain in the selected period.

For the encouragement of people to think widely it is recommended to use a framework such as PEST (Political, Ecnomical, Social, Technological), SEPTEmber (Social, Economical, Political, Technological, Ecological), TEEPSE (Technological, Economical, Environmental, Political, Social, Ethical) or similar. Those frameworks represent a set of categories that stimulate a broad thinking or helps to clasify ideas, trends or drivers.

Actors are encouraged to generate ideas (trends, drivers, weak signals...), related to a selected challenge, and write them on flip charts. And to take some minutes per selected framework (PEST, SEPTEmbers, TEEPSE...) category and to come up with a list of bullet points representing different ideas that could be important to the selected challenge.

Table 2 Idea development tables

ID	Technological Ideas/Issues	Opportunity	Risk
T1			
T2			
T3			
...			

ID	Ethical Ideas/Issues	Opportunity	Risk
Eth 1			
Eth 2			
Eth 3			
...			

ID	(category) Ideas/Issues	Opportunity	Risk
1			
2			
3			
...			

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- Aurum A. and Gardiner A. (2013) Creative Idea Generation <https://pdfs.semanticscholar.org/1fc4/649055b30a4ac969c495cfb823b85fc60476.pdf? ga=2.143906101.1815901720.1560634699-1913600618.1560634699>

### Reviewing and Selecting Ideas and Drivers

In order to review and select the most relevant ideas and drivers the following instructions need to be executed:

- Look again at the list of ideas discussed. Are there any ideas that are duplicated and should be combined? Have you thought of important additional drivers?
- Come up with the top 10 (or 15 is OK) drivers that are liable to be MOST INFLUENTIAL on selected challenge, trying to give due regard to each of selected categories (PEST, SEPTEmber, TEEPSE...) issues. This means:
  - discussing the drivers,
  - combining those that deal with essentially the same idea,
  - explaining why they are more or less important.
- Group very similar or closely related ideas/issues them together under a new heading. Having looked at the lists of drivers, the selection of top drivers may be easy, you may have a good degree of consensus. Often discussion can take a long time, and it is easier simply to vote, for example each team member allocating 5 post-its to the drivers, and then choosing those with most "votes".
- Write the main drivers very briefly (a few words per driver) in large and legible text onto a flip chart or two. There is no need to rank order them.

### Rating the Importance and Uncertainty of the Drivers

In order to identify the importance and uncertainty of the most influential drivers the following guidelines are proposed:

- There are 10 or 15 most influential drivers
- Every participant gets 10 votes which should be distributed among most influential drivers, showing IMPORTANCE and UNCERTANTY of each driver, and/or its impact on the selected challenge.
- The voting is done by using sticky-dots of two different colours, ONE COLOR (for importance) and SECOND COLOR (for uncertainty).
- Discussion moderator has to mark those votes on the paper
- Map the drivers into the matrix which identifies Key drivers, Potential drivers, Dominant drivers and Emerging drivers (See figure 1)

**Table 3 Drivers rating table**

Total votes	Driver 1 important/uncertain	Driver 2 important/uncertain	Driver ... important/uncertain
X ONE COLOR votes	x votes	x votes	x vote
X SECOND COLOR votes	x votes	x votes	x vote

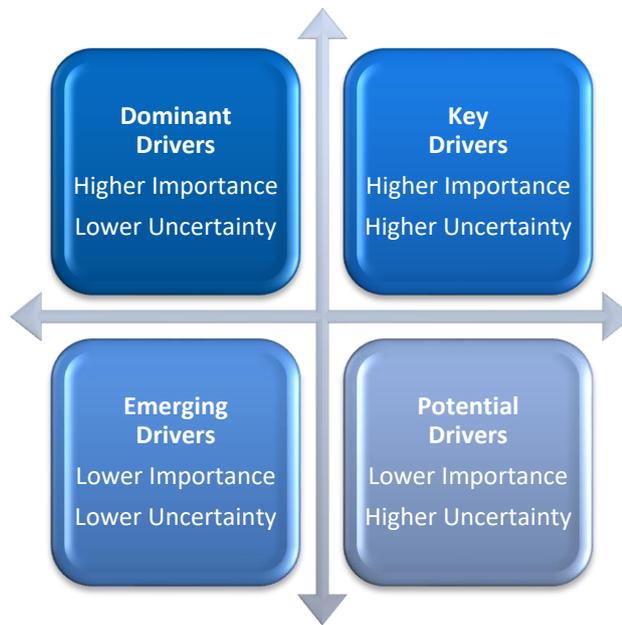


Figure 1 Drivers mapping

**Identify the stakeholders that are relevant to the drivers selected**

Wartick and Wood (1998) suggest to identify stakeholders by thinking about the wide spectrum of actors (see figure 2).

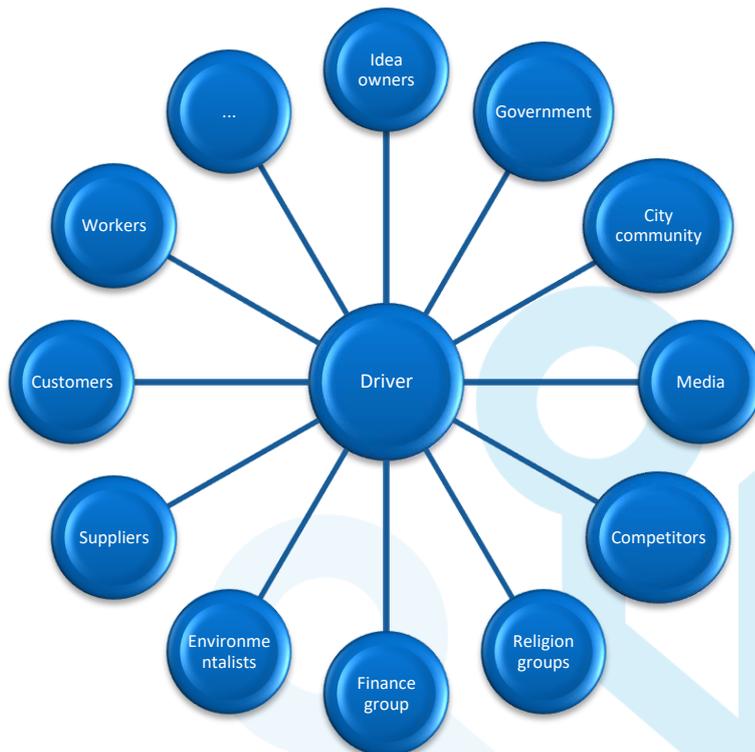


Figure 2 Challenge and stakeholders

For the more exact identification of stakeholders who are the most relevant to the drivers in the context of X smart and health city challenge, “D2.1 Framework of health and smart city ecosystem “should be used (see document/chapter Design of health and smart city ecosystem framework).

**Table 4 Health and smart city stakeholders’ matrix.**

Dimension Layer	Mobility	Security	Health & Wellness	Education	Sustainability (Energy, water, waste)	Economic development and housing	Engagement & Community
Decision making							
Decision implementation: management and operations							
Smart applications and data analytics							
Connectivity, accessibility and security enabling infrastructure							
Traditional infrastructure							

When filling the matrix, please, think about the questions:

- Who needs change?
- Who is responsible for implementation?
- Who has a power?
- Who will benefit?
- Who will be harmed?
- Who is impacted?
- Who might be afraid?
- Who are the potential competitors of alternative ideas?
- Who will promote an idea?
- Who will obstruct an idea?
- Who has a power to make an influence for the community/ decision makers/implementors?
- Who / which groups are underrepresented?
- Who speaks for future generations?

Identified stakeholders should be invited/participate during the phase of scenario writing.

### 3 Challenge identification within the ATHIKA project

#### 3.1 Partners’ Survey Results

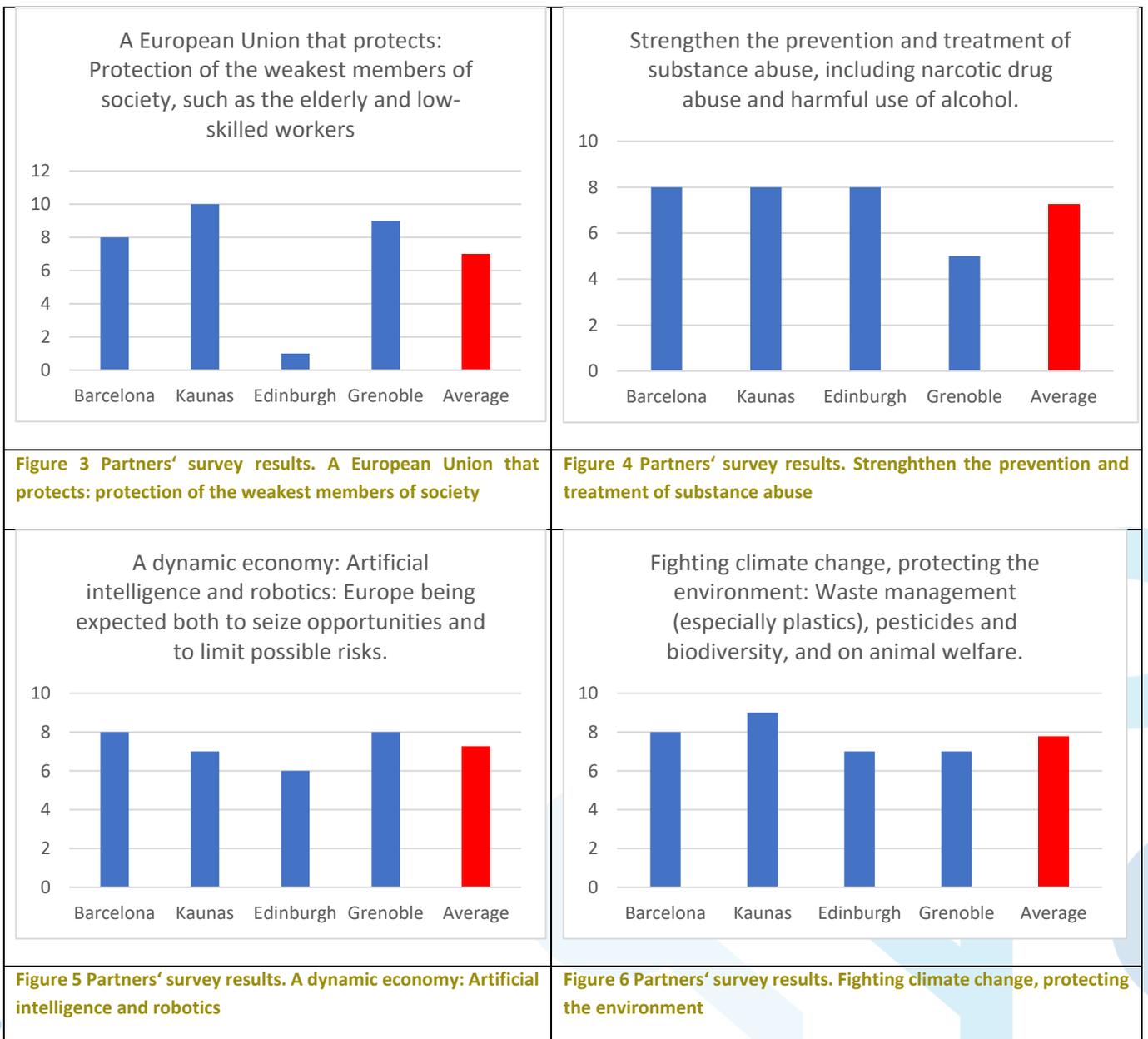
For the identification of the challenges which are **relevant** to the cities represented by the ATHIKA Consortium, the partners survey was fulfilled by testing “Challenge identification questionnaire” (see Annex A). The Challenge



identification partners' survey overall results are presented in Annex B. According to survey results the highest average evaluation was given to the following challenges:

- A European Union that protects: Protection of the weakest members of society, such as the elderly and low-skilled workers.
- Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.
- A dynamic economy: Artificial intelligence and robotics: Europe being expected both to seize opportunities and to limit possible risks.
- Fighting climate change, protecting the environment: Waste management (especially plastics), pesticides and biodiversity, and on animal welfare.

Figures 3, 4, 5 and 6 demonstrate opinions distributions among partners.

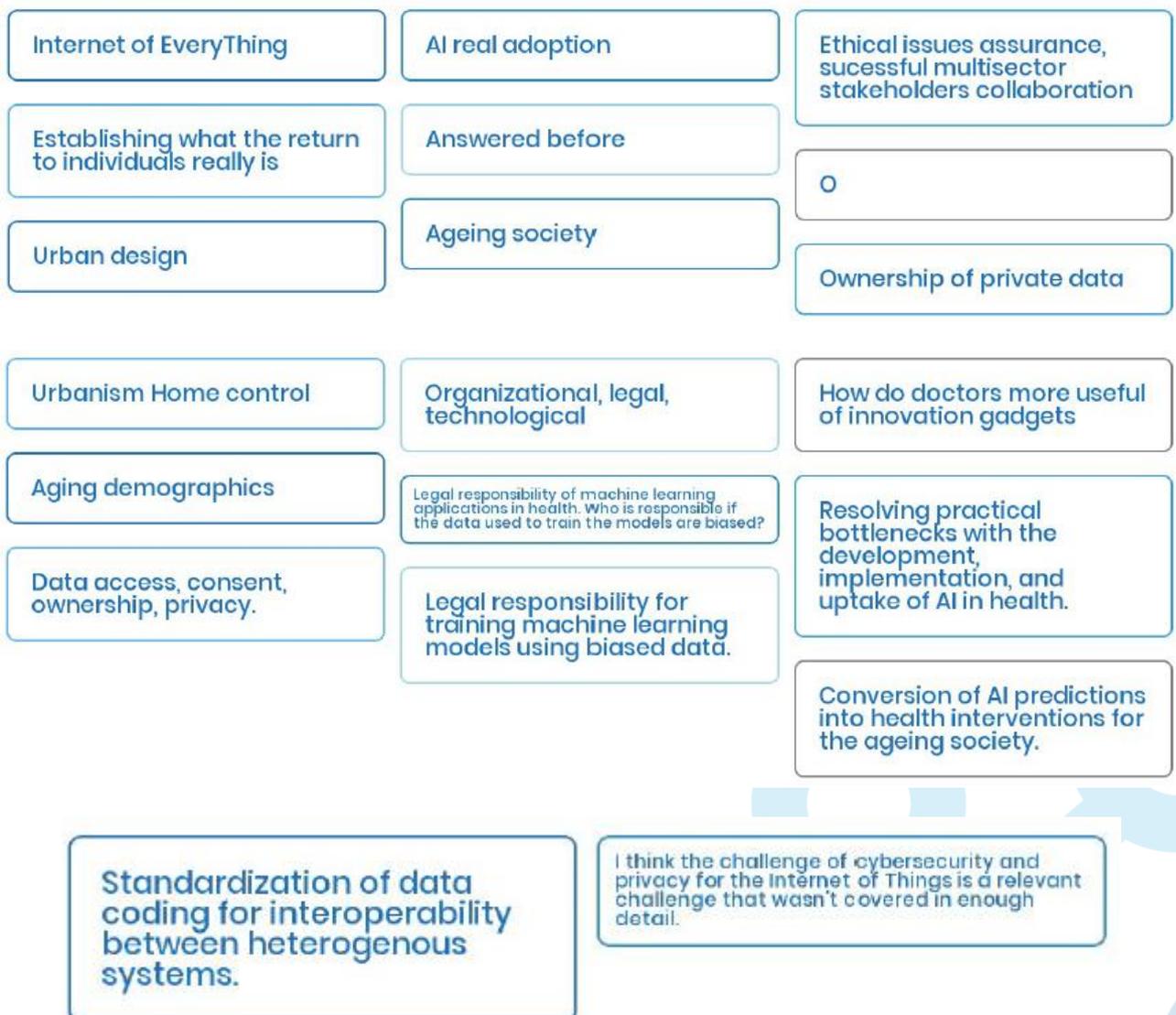


As we see from figures 3, 4, 5 and 6, the biggest evaluation contrast of challenge relevance to the city is in the challenge „A European Union that protects: Protection of the weakest members of society ...“.

### 3.2 1st ATHIKA Symposium on e-Health Challenge Identification and Analysis

#### results

The 1<sup>st</sup> ATHIKA symposium focused on the identification and analysis of challenges in the e-Health sector, specifically concerning the Internet of Things (IoT), artificial intelligence (AI) and data analytics, and governance and ethics (see ATHIKA deliverable 7.2.). Most participants identified some e-Health challenges which are presented below:



By summarizing the results of Partners' survey and 1<sup>st</sup> ATHIKA symposium focused on the identification and analysis of challenges, we can conclude that further ATHIKA workpackages could be developed in the context of those challenges:

- A European Union that protects: Protection of the weakest members of society, such as the elderly and low-skilled workers. With the focus to “ageing society/demography”.
- A dynamic economy: Artificial intelligence and robotics: Europe being expected both to seize opportunities and to limit possible risks. With the focus to “AI real adoption”, “Ownership of private data”, “How do doctors use innovative gadgets”, “Resolving practical bottlenecks with the development, implementation and uptake of AI in health”, “Conversion of AI predictions into health interventions for ageing society”.

## 4 Concluding remarks

This document presents the diagnostic instrument for the identification of the health smart city challenges, which further will be transformed into innovative development solutions via identified alternative scenarios. Challenge identification diagnostic instrument was developed by taking into account student capabilities to implement specific activities. Also, the primary challenges were identified by the project partners to simplify the students' task. For the next step, students can work with narrower problems under the umbrella of identified challenges of “A European Union that protects” and “A dynamic economy.”

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## 5 References

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## Annex A Challenge Selection Questionnaire



Please, evaluate this list of challenges based on the UN and the EU by their relevance to your city context in eleven points scale, when „0“ – means not relevant to my city, and „10“ means the most relevant to the context of my city.

UN Sustainable Development Goals related challenges (targets)		Not relevant to my city 0	1	2	3	4	5	6	7	8	9	10
1. End poverty in all its forms everywhere	Reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions											
	Ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance											



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	A European Union that protects: <b>Protection of social rights</b>													
	A European Union that protects: <b>Protection of the weakest</b> members of society, such as the elderly and low-skilled workers													
2. Zero hunger	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.													
	Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility.													
3. Ensure healthy lives and promote well-being for all at all ages	By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.													
	By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births.													
	By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.													

By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.																				
Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.																				
By 2020, halve the number of global deaths and injuries from road traffic accidents.																				
By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes.																				
Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.																				
By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.																				
Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate.																				
Support the research and development of vaccines and medicines for the communicable and noncommunicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade Related Aspects of Intellectual Property Rights regarding flexibilities to protect public																				



	health, and, in particular, provide access to medicines for all.															
	Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.															
	An European Union that protects: Parental leave and other social issues, including <b>health</b>															
	An European Union that protects: Food safety and the the quality of food products. Citizens expect trade agreements to respect high standards, including social and environmental ones.															
4. Quality education	By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations															
	By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy															
	By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development															
	Build and upgrade education facilities that are child, disability and gender sensitive and provide safe,															



	nonviolent, inclusive and effective learning environments for all													
	A perspective for young generation: Mobility and education													
	A perspective for young generation: To adapt training provision to new trends such as digital economy													
	A perspective for the young generation: School is a place where Europe should be taught and where the young generation can learn about europe's common values													
5. Achieve gender equality and empower all women and girls	End all forms of discrimination against all women and girls everywhere													
	Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation													
	Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation													
	Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate													



	Ensure women's full and effective participation and equal opportunities for leadership at all levels of decisionmaking in political, economic and public life																		
	Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences																		
	Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women																		
	Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels																		
	A Europe of values: Gender equality and non-discrimination																		
	A European Union that protects: The gender pay gap																		
6. Clean water and sanitation	By 2030, achieve universal and equitable access to safe and affordable drinking water for all																		
	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations																		



	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally																		
	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate																		
	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes																		
	Support and strengthen the participation of local communities in improving water and sanitation management																		
7. Ensure access to affordable, reliable, sustainable and modern energy	By 2030, ensure universal access to affordable, reliable and modern energy services																		
8. Promote inclusive and sustainable economic growth, employment	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors																		
	Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and																		



and decent work for all	encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services																			
	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value																			
	By 2020, substantially reduce the proportion of youth not in employment, education or training																			
	Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms																			
	Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment																			
	By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products																			
	By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization																			



	A perspective for the young generation: Youth unemployment																		
	An European Union that protects: Consumer rights																		
	An European Union that protects: Unfair taxation, especially to the benefit of big companies																		
	A dynamic economy: The digital economy and its implications for the acquisition of skills, the creation of new jobs, and the protection of personal data																		
	A dynamic economy: Artificial intelligence and robotics: europe being expected both to seize opportunities and to limit possible risks																		
	A dynamic economy: Circular economy and its potential benefits																		
	A dynamic economy: Incentivise research and innovation. How to improve access to finance and investment																		
9. Build resilient infrastructure, promote sustainable industrialization and foster innovation	Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all																		
	Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with																		



	national circumstances, and double its share in least developed countries																		
	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities																		
10. Reduce inequality within and among countries	By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status																		
	Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality																		
	Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies																		
	Addressing migration: The integration of migrants and cooperation with non-EU countries																		
	Addressing migration: To stop the loss of human lives in the Mediterranean																		



	Addressing migration: Call for solidarity among EU countries or emphasise the need for harmonised sea and land border controls																				
11. Make cities inclusive, safe, resilient and sustainable	By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums																				
	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons																				
	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries																				
	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations																				
	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management																				



	By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities																			
	Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning																			
	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels																			
12. Ensure sustainable consumption and production patterns	By 2030, achieve the sustainable management and efficient use of natural resources																			
	By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses																			
	By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to																			



	air, water and soil in order to minimize their adverse impacts on human health and the environment																		
	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse																		
	Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle																		
	By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature																		
	Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products																		
13. Take urgent action to combat climate change and its impacts	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries																		
	Integrate climate change measures into national policies, strategies and planning																		
	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning																		
	Fighting climate change, protecting the environment: To reduce greenhouse gas emissions																		



	Fighting climate change, protecting the environment: Development of renewable energy													
	Fighting climate change, protecting the environment: Investment in the green economy and innovation to help preserve the environment													
	Fighting climate change, protecting the environment: Waste management (especially plastics), pesticides and biodiversity, and on animal welfare.													
14. Oceans: Conserve and sustainably use the oceans, seas and marine resources	By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution													
15. Life on Land: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss	By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements													
	By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts													
16. Peace, justice and	Significantly reduce all forms of violence and related death rates everywhere													



strong institutions	End abuse, exploitation, trafficking and all forms of violence against and torture of children																				
	Develop effective, accountable and transparent institutions at all levels																				
	Ensure responsive, inclusive, participatory and representative decision-making at all levels																				
	Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements																				
	Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime																				
	A European Union that protects: Crime and security. Especially terrorism and corruption																				
	A stronger Europe in the World: Worries about cybersecurity or trade																				
	A Europe of values: An area of freedom and fundamental rights																				
	A European of values: Concerns about corruption and about the state of the rule of law in some Member States																				



	A Europe of values: Bring the European Union closer to its citizens												
	A Europe of values: Trust in the European institutions												
17 Partnership for the goals	Enhance policy coherence for sustainable development												
	Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships												
	By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building												



## Annex B Challenge identification partners' survey results

			Barcelona	Kaunas	Edinburgh	Grenoble	Average
1. End poverty in all its forms everywhere	1	Reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	7	8	5	3	5.75
	2	Ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	8	6	4	5	5.75
	3	A European Union that protects: <b>Protection of social rights</b>	8	7	2	5	5.5
	4	A European Union that protects: <b>Protection of the weakest</b> members of society, such as the elderly and low-skilled workers	8	10	1	9	7
2. Zero hunger	5	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.	5	6	1	7	4.75

	6	Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility.	8	6	1	3	<b>4.5</b>
3. Ensure healthy lives and promote well-being for all at all ages	7	By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.	2	4	1	5	<b>3</b>
	8	By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births.	2	4	1	5	<b>3</b>
	9	By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.	2	4	1	2	<b>2.25</b>
	10	By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.	2	6	3	5	<b>4</b>
	11	Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol.	8	8	8	5	<b>7.25</b>
	12	By 2020, halve the number of global deaths and injuries from road traffic accidents.	8	7	3	5	<b>5.75</b>
	13	By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes.	5	8	2	5	<b>5</b>

14	Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.	2	8	2	6	<b>4.5</b>
15	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	7	3	2	6	<b>4.5</b>
16	Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate.	8	9	4	5	<b>6.5</b>
17	Support the research and development of vaccines and medicines for the communicable and noncommunicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all.	3	4	2	3	<b>3</b>
18	Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.	5	5	3	5	<b>4.5</b>
19	An European Union that protects: Parental leave and other social issues, including <b>health</b>	8	6	2	6	<b>5.5</b>

	20	An European Union that protects: Food safety and the the quality of food products. Citizens expect trade agreements to respect high standards, including social and environmental ones.	8	5	2	8	<b>5.75</b>
4. Quality education	21	By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations	3	8	2	5	<b>4.5</b>
	22	By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy	0	4	2	5	<b>2.75</b>
	23	By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development	7	4	2	6	<b>4.75</b>
	24	Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, nonviolent, inclusive and effective learning environments for all	3	6	2	5	<b>4</b>
	25	A perspective for young generation: Mobility and education	5	8	2	5	<b>5</b>
	26	A perspective for young generation: To adapt training provision to new trends such as digital economy	6	9	3	6	<b>6</b>

	27	A perspective for the young generation: School is a place where Europe should be taught and where the young generation can learn about europe's common values	2	7	2	6	<b>4.25</b>
5. Achieve gender equality and empower all women and girls	28	End all forms of discrimination against all women and girls everywhere	7	7	2	5	<b>5.25</b>
	29	Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation	7	8	2	4	<b>5.25</b>
	30	Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation	2	0	4	5	<b>2.75</b>
	31	Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate	3	2	3	5	<b>3.25</b>
	32	Ensure women's full and effective participation and equal opportunities for leadership at all levels of decisionmaking in political, economic and public life	7	6	1	5	<b>4.75</b>
	33	Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences	3	3	2	5	<b>3.25</b>

	34	Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women	6	6	2	9	<b>5.75</b>
	35	Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels	6	6	1	5	<b>4.5</b>
	36	A Europe of values: Gender equality and non-discrimination	8	7	1	4	<b>5</b>
	37	A European Union that protects: The gender pay gap	8	9	2	5	<b>6</b>
6. Clean water and sanitation	38	By 2030, achieve universal and equitable access to safe and affordable drinking water for all	2	0	1	5	<b>2</b>
	39	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	1	0	2	5	<b>2</b>
	40	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	7	1	2	5	<b>3.75</b>
	41	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	7	0	1	5	<b>3.25</b>
	42	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	3	1	1	5	<b>2.5</b>

	43	Support and strengthen the participation of local communities in improving water and sanitation management	2	0	1	5	<b>2</b>
7. Ensure access to affordable, reliable, sustainable and modern energy	44	By 2030, ensure universal access to affordable, reliable and modern energy services	7	5	3	6	<b>5.25</b>
8. Promote inclusive and sustainable economic growth, employment and decent work for all	45	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors	2	4	4	5	<b>3.75</b>
	46	Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services	6	5	4	5	<b>5</b>
	47	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	7	7	3	6	<b>5.75</b>
	48	By 2020, substantially reduce the proportion of youth not in employment, education or training	8	4	2	7	<b>5.25</b>
	49	Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms	1	0	2	3	<b>1.5</b>

50	Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment	5	5	2	5	<b>4.25</b>
51	By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	7	6	2	6	<b>5.25</b>
52	By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization	1	4	2	5	<b>3</b>
53	A perspective for the young generation: Youth unemployment	7	7	2	6	<b>5.5</b>
54	An European Union that protects: Consumer rights	7	6	2	6	<b>5.25</b>
55	An European Union that protects: Unfair taxation, especially to the benefit of big companies	5	7	3	6	<b>5.25</b>
56	A dynamic economy: The digital economy and its implications for the acquisition of skills, the creation of new jobs, and the protection of personal data	5	8	2	7	<b>5.5</b>
57	A dynamic economy: Artificial intelligence and robotics: europe being expected both to seize opportunities and to limit possible risks	8	7	6	8	<b>7.25</b>
58	A dynamic economy: Circular economy and its potential benefits	8	8	2	7	<b>6.25</b>
59	A dynamic economy: Incentivise research and innovation. How to improve access to finance and investment	8	8	4	6	<b>6.5</b>

9. Build resilient infrastructure, promote sustainable industrialization and foster innovation	60	Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	5	4	2	6	<b>4.25</b>
	61	Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	5	4	2	6	<b>4.25</b>
	62	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	5	5	3	6	<b>4.75</b>
10. Reduce inequality within and among countries	63	By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	7	10	2	5	<b>6</b>
	64	Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality	7	7	2	5	<b>5.25</b>
	65	Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies	7	5	2	5	<b>4.75</b>
	66	Addressing migration: The integration of migrants and cooperation with non-EU countries	8	7	2	5	<b>5.5</b>

	67	Addressing migration: To stop the loss of human lives in the Mediterranean	8	0	1	5	<b>3.5</b>
	68	Addressing migration: Call for solidarity among EU countries or emphasise the need for harmonised sea and land border controls	6	0	2	5	<b>3.25</b>
11. Make cities inclusive, safe, resilient and sustainable	69	By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	3	0	5	5	<b>3.25</b>
	70	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	6	9	3	5	<b>5.75</b>
	71	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	7	3	3	5	<b>4.5</b>
	72	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	2	3	3	5	<b>3.25</b>
	73	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	9	6	3	6	<b>6</b>

	74	By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities	8	10	4	5	<b>6.75</b>
	75	Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning	9	9	4	5	<b>6.75</b>
	76	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels	6	5	2	5	<b>4.5</b>
12. Ensure sustainable consumption and production patterns	77	By 2030, achieve the sustainable management and efficient use of natural resources	9	8	2	5	<b>6</b>
	78	By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	7	8	2	6	<b>5.75</b>
	79	By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	7	9	2	6	<b>6</b>

	80	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	7	9	5	6	<b>6.75</b>
	81	Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	7	7	3	6	<b>5.75</b>
	82	By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	7	6	2	6	<b>5.25</b>
	83	Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products	7	7	2	7	<b>5.75</b>
13. Take urgent action to combat climate change and its impacts	84	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	7	6	2	6	<b>5.25</b>
	85	Integrate climate change measures into national policies, strategies and planning	8	8	2	6	<b>6</b>
	86	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	7	8	2	5	<b>5.5</b>
	87	Fighting climate change, protecting the environment: To reduce greenhouse gas emissions	9	8	2	6	<b>6.25</b>
	88	Fighting climate change, protecting the environment: Development of renewable energy	9	9	3	6	<b>6.75</b>
	89	Fighting climate change, protecting the environment: Investment in the green economy and innovation to help preserve the environment	9	8	2	6	<b>6.25</b>

	90	Fighting climate change, protecting the environment: Waste management (especially plastics), pesticides and biodiversity, and on animal welfare.	8	9	7	7	<b>7.75</b>
14. Oceans: Conserve and sustainably use the oceans, seas and marine resources	91	By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	9	0	5	6	<b>5</b>
15. Life on Land: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss	92	By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	6	4	3	6	<b>4.75</b>
	93	By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts	6	3	2	6	<b>4.25</b>
16. Peace, justice and strong institutions	94	Significantly reduce all forms of violence and related death rates everywhere	8	6	4	5	<b>5.75</b>
	95	End abuse, exploitation, trafficking and all forms of violence against and torture of children	2	2	2	5	<b>2.75</b>
	96	Develop effective, accountable and transparent institutions at all levels	8	10	2	5	<b>6.25</b>
	97	Ensure responsive, inclusive, participatory and representative decision-making at all levels	8	9	2	5	<b>6</b>
	98	Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements	8	7	2	5	<b>5.5</b>

	99	Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime	7	0	2	5	<b>3.5</b>
	100	A European Union that protects: Crime and security. Especially terrorism and corruption	8	4	3	5	<b>5</b>
	101	A stronger Europe in the World: Worries about cybersecurity or trade	8	5	3	5	<b>5.25</b>
	102	A Europe of values: An area of freedom and fundamental rights	8	5	2	5	<b>5</b>
	103	A European of values: Concerns about corruption and about the state of the rule of law in some Member States	8	7	2	5	<b>5.5</b>
	104	A Europe of values: Bring the European Union closer to its citizens	4	7	2	5	<b>4.5</b>
	105	A Europe of values: Trust in the European institutions	5	3	6	5	<b>4.75</b>
17 Partnership for the goals	106	Enhance policy coherence for sustainable development	7	6	2	6	<b>5.25</b>
	107	Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships	8	6	1	5	<b>5</b>
	108	By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building	3	7	3	5	<b>4.5</b>