

The Automatic Measurement of Sustainability Implications in Design

Research in the Telesymbiosis project has established a testing dataset for automatically evaluating design information related to sustainability performance. This dataset originates from a randomized experiment involving 27 participants, organized into 9 teams, each tackling 2 consecutive design tasks. The dataset comprises 18 design team conversations alongside their corresponding 18 final design submissions. The final design descriptions underwent evaluation by three expert judges across two dimensions of creative performance and three dimensions of sustainability, achieving good levels of interrater agreement.

Inter-rater agreement scores, as assessed via Cronbach's Alpha, are as follows:

For the First Design Solution:

- Natural Environment: .963
- Social Equality: .785
- Creativity & Innovation: .897
- Novelty: .909
- Effectiveness: .797

For the Second Design Solution:

- Natural Environment: .986
- Social Equality: .744
- Creativity & Innovation: .968
- Novelty: .962
- Effectiveness: .862

Three Dimensions of Sustainability

Rating instruction: Rate the following design solution for their sustainability on a scale from -5 to 5, where higher values denote better sustainability performance. A score of -5 indicates that the suggested solution entails severe damage in the domain of interest, as by inflicting severe harm to the natural environment. A score of 0 indicates that the proposed solution does not relate to the sustainability dimension of interest, or has mixed effects. A score of 5 indicates an exceptionally positive impact on the respective sustainability dimension, such as enabling endangered natural environments to flourish. Use the following definition as a basis of your sustainability evaluation. Provide a score between -5 and 5.

The protection of natural environments is a fundamental aspect of sustainability, involving the preservation, restoration, and promotion of livable ecosystems. This encompasses preserving biodiversity, halting and reversing resource degradation, and maintaining the natural systems that support life. The approach includes safeguarding and improving the quality of the abiotic environment, addressing water, air, and soil conditions. Likewise, it involves protecting the biotic environment, encompassing domesticated and wild species such as animals, plants, and fungi, along with their habitats. Mitigating the effects of natural disasters is another aspect, emphasizing proactive measures to enhance resilience. Managing pest populations involves employing ecologically sound methods, while conflicts with wildlife are addressed through prioritizing non-lethal approaches. Efforts are directed towards reduc-

ing and preventing environmental pollution, and promoting the use of renewable energy. This approach encompasses minimizing waste production and advancing the sustainable use of natural resources, ensuring their responsible management and conservation. The concept further encourages sustainable consumption and production patterns, aiming to minimize the human ecological footprint, and the combat of human-made climate change.

Social equality and empowerment are foundational aspects of sustainability, centered on nurturing an inclusive, supportive, and fair social environment. This concept values diversity, committing to equal rights and opportunities for everyone, regardless of gender, ethnicity, age, language, beliefs, physical abilities, or country of origin. It addresses issues such as poverty, hunger, and risk exposure, promoting health, wellbeing, and safety for all of humanity. This framework enables individuals to benefit from community expertise in the form of education and life-long learning, promoting everyone's access to resources, services, and decent work. It involves fostering open, effective, and peaceful communication within and between cultures, emphasizing the building and maintenance of mutual trust, respect, and partnership. This approach encourages harmonious and collaborative social interactions, justice for all, and the presence of accountable institutions. It safeguards individual freedoms, rights, opportunities, participation, empowerment, and welfare for all community members and cultures. Furthermore, it underscores the importance of protecting the rights and well-being of vulnerable individuals and groups, emphasizing inclusivity and social justice in developing thriving societies.

Creativity and innovation can be pivotal catalysts for sustainability, enabling groundbreaking solutions that are novel and highly effective in addressing contemporary challenges. This approach emphasizes the creation of original and unique solutions, which deviate from the status quo and break with past habits that have contributed to the sustainability challenges faced today. By nurturing creative capacities, this approach helps people actively contribute to shaping a better future. It extends to the design of innovative job profiles, driving economic growth, and catalyzing productivity improvements. The approach aids in building resilient infrastructure and promoting sustainable industrialization. Moreover, it facilitates the redesign of cities and transportation systems in more sustainable ways. It encourages innovative strategies in resource utilization and facilitates the development of new technologies to address pressing issues. The approach underscores the importance of multi-stakeholder collaboration, leveraging artificial intelligence and other cutting-edge technologies to collaboratively craft radically improved solutions for the future. Overall, this approach embraces creativity and innovation as transformative forces that may hold the key to achieving enduring sustainability.

Creativity Metrics

An approach is considered highly **novel** (with a maximum novelty score of 5) when it does not currently exist in real life or science fiction, and when other study participants have not conceived of the option. Conversely, an approach is deemed not novel (scoring 1) when it represents a common solution to the given problem and is already evident in real life.

An approach is considered highly **effective** (with a maximum effectiveness score of 5) when it is a feasible and efficient means of fulfilling the task requirements. Conversely, an approach is considered not effective (scoring 1) when the suggested solution fails to address the given problem due to ineffectiveness and/or practical infeasibility. In the context of our randomized experiment used for data acquisition, the task requirement entails designing an *innovative* mobility solution that *transports people* from a starting point to a destination in *comfort* and *safety* and with *little expended effort* on their part.

Automatic Assessment

The automatic assessment of design information is achieved through sub-evaluations using technologies like GPT and SentenceBERT. To ensure accuracy and transparency, the process incorporates sentences from the three overarching definitions, listings of human needs from the [Needs-Based Outcome Assessment \(NOA\)](#) framework, and sub-goals from the [2030 Agenda of the UN Sustainable Development Goals](#) in the model queries.

This comprehensive approach helps ensure that, across varying design analysis frameworks, every goal is considered and available for automatic assessment. The aggregation and integration of information depends on both conceptual decisions and empirical utility and has not been finalized at this point.

In the following, color-codings indicate different sources of evaluation used for automatic assessment:

- **Black:** Sentences from the original sustainability definitions as used by the human expert raters.
- **Brown:** Human needs distinguished in the NOA framework.
- **Green:** Sub-goals from the 2030 Agenda of the 17 UN Sustainable Development Goals.

The overview is comprehensive, including all sentences from the definitions, all listed NOA needs, and all SDG sub-goals.

The *protection of natural environments* is a fundamental aspect of sustainability, involving the preservation, restoration, and promotion of livable ecosystems. This encompasses preserving biodiversity, halting and reversing resource degradation, and maintaining the natural systems that support life.

to promote a livable and balanced natural environment, preserving biodiversity, as well as the natural systems and processes that support life (NOA – Natural Environment)

6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

SDG Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development

15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts

15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems

The approach includes safeguarding and improving the quality of the abiotic environment, addressing water, air, and soil conditions.

to safeguard and improve the quality of the abiotic environment, including water, air, and soil (NOA – Natural Environment)

11.6 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

12.4 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

SDG Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

Likewise, it involves protecting the biotic environment, encompassing domesticated and wild species such as animals, plants, and fungi, along with their habitats.

to preserve and protect the biotic environment, including the habitats of both domesticated and wild species (NOA – Natural Environment)

14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products

15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species

15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation

15.c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

Mitigating the effects of natural disasters is another aspect, emphasizing proactive measures to enhance resilience.

to mitigate the effects of natural disasters (NOA – Natural Environment)

1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

11.b 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

2.4 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

Managing pest populations involves employing ecologically sound methods, while conflicts with wildlife are addressed through prioritizing non-lethal approaches.

to manage and control pest populations using ecologically sound methods (NOA – Natural Environment)

to prioritize non-lethal methods of managing conflicts with wildlife (NOA – Natural Environment)

Efforts are directed towards reducing and preventing environmental pollution, and promoting the use of renewable energy.

to reduce and prevent environmental pollution (NOA – Natural Environment)

6.3 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

SDG Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

7.1 By 2030, ensure universal access to affordable, reliable and modern energy services

7.2 By 2030, increase substantially the share of renewable energy in the global energy mix

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination

This approach encompasses minimizing waste production and advancing the sustainable use of natural resources, ensuring their responsible management and conservation.

to minimize waste production and promote the sustainable use of natural resources (NOA – Natural Environment)

14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of “The future we want”

15.1 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

The concept further encourages sustainable consumption and production patterns, aiming to minimize the human ecological footprint, and the combat of human-made climate change.

SDG Goal 13. Take urgent action to combat climate change and its impacts

13.2 Integrate climate change measures into national policies, strategies and planning

13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible

13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

***Social equality and empowerment* are foundational aspects of sustainability, centered on nurturing an inclusive, supportive, and fair social environment. This concept values diversity, committing to equal rights and opportunities for everyone, regardless of gender, ethnicity, age, language, beliefs, physical abilities, or country of origin.**

to feel appreciated and treated fairly (NOA – Human Emotional Needs)

to experience a sense of belonging (NOA – Human Emotional Needs)

to promote an inclusive, respectful, and supportive social environment that values diversity (NOA – Social Environment)

to ensure equal rights and opportunities for everyone regardless of gender, ethnicity, language, beliefs, or physical abilities (NOA – Social Environment)

to distribute resources fairly and address social inequality (NOA – Social Environment)

1.2 By 2030, 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

1.b Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions

4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes

4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education

4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy

4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

SDG Goal 5. Achieve gender equality and empower all women and girls

5.1 End all forms of discrimination against all women and girls everywhere

8.5 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

10.2 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

16.b Promote and enforce non-discriminatory laws and policies for sustainable development

It addresses issues such as poverty, hunger, and risk exposure, promoting health, wellbeing, and safety for all of humanity.

to stay alive, be fed and sheltered (NOA – Human Physical Needs)

to be safe, protected from physical or mental harm (NOA – Human Physical Needs)

to maintain or improve health (NOA – Human Physical Needs)

to have access to adequate clothing, sufficient energy, and sanitation (NOA – Human Physical Needs)

to experience physical comfort and sensory well-being (NOA – Human Physical Needs)

to experience physical proximity with others (NOA – Human Physical Needs)

to experience positive emotions and sensory delight, or situation-appropriate emotions (NOA – Human Emotional Needs)

to be content with given circumstances; to look optimistically towards the future (NOA – Human Emotional Needs)

to work in a state of flow, without external hindrances or distractions (NOA – Human Developmental Needs)

SDG Goal 1. End poverty in all its forms everywhere

SDG Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons

SDG Goal 3. Ensure healthy lives and promote well-being for all at all ages

3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births

3.2 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

3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and wellbeing

3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents

3.7 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

3.8 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

3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

5.2 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

5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

16.1 Significantly reduce all forms of violence and related death rates everywhere

This framework enables individuals to benefit from community expertise in the form of education and life-long learning, promoting everyone's access to resources, services, and decent work.

to comprehend the purpose, composition, and operation of tools with minimal effort (NOA – Human Intellectual Needs)

to stay oriented and well-informed, based on truthful information that is provided in non-manipulative ways (NOA – Human Intellectual Needs)

to receive relevant information through all sensory channels while interacting with the world (NOA – Human Intellectual Needs)

to pursue work that is personally fulfilling, which provides a reliable source of income to support a decent standard of living (NOA – Human Developmental Needs)

to ensure that all individuals can benefit from expertise and skills available in the community (NOA – Social Environment)

to enable the transfer and cultivation of expertise through education, teaching, and learning (NOA – Social Environment)

SDG Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship

SDG Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training

8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all

8.b By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization

10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average

14.b Provide access for small-scale artisanal fishers to marine resources and markets

15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed

It involves fostering open, effective, and peaceful communication within and between cultures, emphasizing the building and maintenance of mutual trust, respect, and partnership.

to communicate with others and feel connected with them (NOA – Human Emotional Needs)

to facilitate open and effective communication among interaction partners, including humans, machines, and animals (NOA – Social Environment)

to build and maintain mutual trust and respect among interaction partners (NOA – Social Environment)

to facilitate sensible, ethical, and healthy behaviours, as well as constructive interactions and cooperation within the community and beyond (NOA – Political Environment)

4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development

16.a Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime

SDG Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development Finance

17.14 Enhance policy coherence for sustainable development

17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries

17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

This approach encourages harmonious and collaborative social interactions, justice for all, and the presence of accountable institutions.

to establish a political system that is fair, effective, transparent, impartial, responsive, and accountable (NOA – Political Environment)

to promote peace, security, and justice (NOA – Political Environment)

to uphold the rule of law (NOA – Political Environment)

2.c 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.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate

5.4 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

5.6 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

5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws

5.c 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

8.7 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

8.8 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

10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard

10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality

10.5 Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations

10.6 Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions

SDG Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all

16.4 By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime

16.5 Substantially reduce corruption and bribery in all their forms

16.6 Develop effective, accountable and transparent institutions at all levels

17.1 Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection

17.15 Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development

It safeguards individual freedoms, rights, opportunities, participation, empowerment, and welfare for all community members and cultures.

to achieve action goals (with the help of a product) (NOA – Human Physical Needs)

to determine what happens to one's body (NOA – Human Physical Needs)

to be mobile (NOA – Human Physical Needs)

to communicate who one is or wants to be (with the help of a product) (NOA – Human Emotional Needs)

to find solutions that align with personal values and beliefs (NOA – Human Intellectual Needs)

to be free in one's thoughts and expressions (NOA – Human Intellectual Needs)

to pursue and attain knowledge, truth, wisdom, transcendence, or a sense of purpose (NOA – Human Intellectual Needs)

to grow and develop as a person, realize one's potential, and achieve self-actualization (NOA – Human Developmental Needs)

to safeguard individual freedoms, rights, opportunities, possibilities of participation, empowerment, and welfare for all (NOA – Political Environment)

1.4 By 2030, 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

5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life

SDG Goal 6. Ensure availability and sustainable management of water and sanitation for all

6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all

6.b Support and strengthen the participation of local communities in improving water and sanitation management

10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies

16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels

16.9 By 2030, provide legal identity for all, including birth registration

16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements

17.10 Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda

17.13 Enhance global macroeconomic stability, including through policy coordination and policy coherence

Furthermore, it underscores the importance of protecting the rights and well-being of vulnerable individuals and groups, emphasizing inclusivity and social justice in developing thriving societies.

to ensure the responsible use of power for the benefit of everyone (NOA – Political Environment)

to protect the rights and wellbeing of vulnerable individuals and groups (NOA – Political Environment)

1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable

1.a Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions

3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States

4.5 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

4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries

4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States

6.2 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

8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries

8.a Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade-related Technical Assistance to Least Developed Countries

9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets

9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States

SDG Goal 10. Reduce inequality within and among countries

10.a Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements

10.b Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries,

small island developing States and landlocked developing countries, in accordance with their national plans and programmes

10.c By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent

16.2 End abuse, exploitation, trafficking and all forms of violence against and torture of children

16.8 Broaden and strengthen the participation of developing countries in the institutions of global governance

17.2 Developed countries to implement fully their official development assistance commitments, including the commitment by many developed countries to achieve the target of 0.7 per cent of gross national income for official development assistance (ODA/GNI) to developing countries and 0.15 to 0.20 per cent of ODA/GNI to least developed countries; ODA providers are encouraged to consider setting a target to provide at least 0.20 per cent of ODA/GNI to least developed countries

17.3 Mobilize additional financial resources for developing countries from multiple sources

17.4 Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries to reduce debt distress

17.5 Adopt and implement investment promotion regimes for least developed countries

17.11 Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020

17.12 Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access

17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries

Creativity and innovation can be pivotal catalysts for sustainability, enabling groundbreaking solutions that are novel and highly effective in addressing contemporary challenges.

3.b Support the research and development of vaccines and medicines for the communicable and non-communicable 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

7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support

8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

This approach emphasizes the creation of original and unique solutions, which deviate from the status quo and break with past habits that have contributed to the sustainability challenges faced today.

7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead

8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products

9.4 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

11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

SDG Goal 12. Ensure sustainable consumption and production patterns

12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries

12.3 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

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and re-use

12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

By nurturing creative capacities, this approach helps people actively contribute to shaping a better future.

to contribute something meaningful in a community (NOA – Human Emotional Needs)

to feel one is doing good and not causing harm (NOA – Human Emotional Needs)

to advance resources such as ideas, knowledge, tools, skills, cultural heritage, and means of remuneration (NOA – Human Developmental Needs)

to have the freedom of using one's resources in self-determined ways, including the creation of what one wants and the sovereign use of one's creations (NOA – Human Developmental Needs)

6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities

12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed

terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

17.9 Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation

17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts

It extends to the design of innovative job profiles, driving economic growth, and catalyzing productivity improvements.

2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products

The approach aids in building resilient infrastructure and promoting sustainable industrialization.

SDG Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

9.1 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

9.2 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

9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle

Moreover, it facilitates the redesign of cities and transportation systems in more sustainable ways.

SDG Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

11.2 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

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

11.7 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

11.5 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

It encourages innovative strategies in resource utilization and facilitates the development of new technologies to address pressing issues.

2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed

2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries

5.b Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women

6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

6.5 By 2030, implement integrated water resources management at all levels, including through trans-boundary cooperation as appropriate

The approach underscores the importance of multi-stakeholder collaboration, leveraging artificial intelligence and other cutting-edge technologies to collaboratively craft radically improved solutions for the future.

2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round

9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries

17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed

17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology

Overall, this approach embraces creativity and innovation as transformative forces that may hold the key to achieving enduring sustainability.

7.3 By 2030, double the global rate of improvement in energy efficiency

12.2 By 2030, achieve the sustainable management and efficient use of natural resources