allea

Delivering
Horizon Europe

Executive Summary

ALLEA, the European Federation of Academies of Sciences and Humanities, welcomes the European Commission's Communication on the Strategic Plan implementing Horizon Europe, the EU's next research and innovation framework programme.

We are fully supportive of the realisation of a strong and well-resourced framework programme creating world class conditions for science and research to flourish in the coming decades. We look forward to furthering our dialogue with the European Commission on shaping Horizon Europe.

To position European research successfully in a competitive global environment we believe it is of vital importance to consider the following points in the finalisation and implementation process of Horizon Europe:

- Focus on funding excellence and 'blue sky thinking' through successful instruments like the European Research Council (ERC).

- Continue and intensify support for research mobility through programmes like Marie Skłodowska-Curie Actions (MSCA) or ERASMUS.

- Arrange for fair and equal distribution of funds on the different clusters of Pillar 2 in Horizon Europe.

- Follow a broad understanding of innovation which goes beyond technological innovation and hence supports interdisciplinarity, and which recognizes the value of humanities and social sciences in a less technocratic and instrumental way.

- Establish an independent, critical and continuous assessment of 'Missions' in Horizon Europe.

- Continue 'Institutional Partnerships' from Horizon 2020.

- Ensure the Framework Programme is 'open to the world' and allows for broad participation of Associated Countries.

Delivering Horizon Europe

Following the European Commission's invitation to share our views on the EU's next research and innovation programme Horizon Europe (2021-2027), and taking into account discussions during the EU Research & Innovation Days in Brussels on 24-26 September 2019, ALLEA wishes to emphasise its priorities for the strategic development and implementation of Horizon Europe.

As ALLEA has stated previously, Horizon Europe should be squarely aimed at making research and innovation in the EU as attractive as possible. Horizon Europe should be aiming to create the conditions for research and innovation to flourish in the EU in the coming decades.[1]

ALLEA welcomes the current partial agreement that the EU Institutions have come to and supports swift further agreement on the remaining articles including the budget and association. ALLEA welcomes the Commission's initial suggestion for Horizon Europe's budget and is supportive of the increase that the European Parliament has called for.

Horizon Europe should provide considerable support to those parts of Horizon 2020 that have proven particularly successful. The European Research Council (ERC) is the premier frontier research funder in Europe. It is the most valued element of Horizon 2020 amongst the research community, and this is recognised in the Lamy Report.[2]

It has provided an outstanding vehicle for discovery and bottom-up research that has been the leading light in raising the value and prominence of the EU's research funding on the world stage. The ERC also enables blue sky thinking to be promoted, rather than a response to pre-defined (and potentially out-of-date) research agendas. It is our firm recommendation that the ERC needs more funding to continue to attract and develop the very best researchers in the EU. We find compelling the recommendation of the ERC's Scientific Council that the ERC's budget should reach the level originally intended of 5% of Europe's national research agencies, which would provide the ERC with a minimum budget of €4 billion per annum.

Research mobility is invaluable for exchanging ideas and establishing networks of contacts that last over many years. The Marie Skłodowska-Curie Actions (MSCA) have played an important role for many years in encouraging mobility. We welcome Horizon Europe incentivising and supporting such mobility across the life-course of research careers, and particularly that it starts at the early career stage. We would encourage that the added value they bring in providing bottom-up funding across the research and innovation domains be recognised by additional funding being provided for these actions.

In terms of Horizon Europe's budget, we are fully supportive of calls such as LERU's that the funding across the clusters in Pillar 2 should be more equally spread.[3] In particular we are keen to see an increase in funding for Cluster 2 – 'Culture, Creativity and Inclusive Society'. We believe this will help foster synergies between the clusters and the cross- and inter-disciplinary research and innovation that Horizon Europe is aiming to foster. In delivering such interdisciplinarity, we have previously raised concerns with how 'innovation' is understood within the Commission and Framework Programmes. It is important that 'innovation' is understood broadly.

1 See ALLEA et al. Statement: Living Together. Missions for Shaping the Future (December 2017), and ALLEA Position Paper: Developing a Vision for Framework Programme 9 (July 2017): https://allea.org/horizon-europe/

2 Report of the Independent High Level Group, Investing

in the European future we want (July 2017): 'the ERC has become a global beacon of scientific excellence'(p. 13).

3 https://www.leru.org/files/Publications/10-key-LE-RU-messages-for-Horizon-Europe.pdf

As the Lamy Report suggests:

Innovation is more than technology. EU innovation policy must be based on a definition of innovation that acknowledges and values all forms of new knowledge – technological, but also business model, financing, governance, regulatory and social – which help generate value for the economy and society and drive systemic transformation (p.12).

Identified by Joseph Schumpeter as the critical dimension of economic change, innovation is today best understood as the way in which the varied aspects of society are transformed, be they cultural, governance, business or technological.[4] If society is to flourish and develop, then we cannot look at these different aspects in isolation, but need to see their interactions and synergies. That is why transformational research through the clusters has to draw on the variety of research methods and insights of different disciplines working together. In relation to Horizon 2020, our concern has been that the Commission has understood research and innovation to take place to a large extent as part of an overly simplistic linear process through Technology Readiness Levels (TRLs) where certain parts of Horizon 2020 are focused on achieving certain TRLs. This linear and 'one size fits all' approach to research and innovation is inappropriate and unhelpful. Innovation is not limited to business and economic opportunities but it is also fundamentally about how a variety of social actors imagine things differently in which the humanities and social sciences have a very strong contribution to make.

We are concerned that the Commission's Strategic Plan for Horizon Europe appears to struggle to achieve an integrated view of the challenges that Horizon Europe proposes to tackle. For example, the general orientations for each cluster identified by the Commission poorly match the challenges the Commission indicates we face. The Commission identifies demographic change as "one of the

best examples" of the drivers shaping major social, economic, political, environmental and technological transformations of human activities, processes and perceptions. There is, however, no mention made of it in the Health Cluster general orientations and only two asides made in the more detailed annex for that cluster.

Similarly, the text does not incorporate perspectives that would bring in understandings of attitudes, behaviours and ethics of health and, equally important, wellbeing. In general, the clusters as written in the general orientations read largely similar to Horizon 2020 rather than presenting a step change in ambition or description.

We believe therefore there is room for improvement in the shaping of the clusters and particularly the Work Programmes and calls that the Commission will come forward with in due course. To aid this work, we have taken a couple of the annex texts of the European Commission's paper 'Orientations towards the first Strategic Plan implementing the research and innovation framework programme Horizon Europe'[5] and made alterations to illustrate how they could be more openly drafted and help to foster diverse perspectives across the research and innovation sector in the appendix below.[6]

Such narrow understandings hampered Horizon 2020's ability to be an open research and innovation programme that could speak to all disciplines, participants, companies and countries, and most importantly meant that innovative and impactful research was not always supported where it could. This is particularly the case for the humanities and social sciences. The Commission's own Horizon 2020 SSH Monitoring Reports show that the Commission has not been successful in embedding these disciplines in Horizon 2020's societal challenges. The value of the humanities and social sciences

---

4 This was made clear in the session on Prosperity in the recent Research and Innovation Days, September 2019.

5 https://ec.europa.eu/research/pdf/horizon-europe/ec_rtd_orientations-towards-the-strategic-planning.pdf

6 For a multi-perspective and interdisciplinary approach to health-related challenges see joint ALLEA-FEAM-KNAW initiative on "Health Inequalities in Europe": https://allea.org/health-inequalities/

need to be understood in a far less technocratic and instrumental way so that there is considerably more opening for critical analysis and open-ended inquiry especially in the Societal Challenges Pillar. The Commission's heavily technocratic approach to the societal challenges led to Horizon 2020 calls containing off-putting language and inadequate understanding of the issues faced, which inhibited the stronger involvement of researchers from the humanities and social sciences. We believe there is significant further work to be done for Horizon Europe not to fail in the same way.

We do, however, acknowledge and welcome the Commission's commitment that the inclusion of the humanities and social sciences is a prerequisite for addressing societal challenges and that the Strategic Plan is a first step in a process of engagement. We wish to make two concrete recommendations to aid this process. Firstly, that the Commission must continue to produce annual SSH Monitoring Reports. We would welcome a public commitment from the Commission this will be the case.

Secondly, we recommend that the evaluation stage of proposals more appropriately covers the breadth of the humanities and social sciences. There cannot be a single SSH evaluator. Humanities and social sciences are, in fact, a set of diverse disciplines covering an exceptionally broad range. These are varied disciplines that require proper evaluation by people with relevant expertise. We also believe that the briefing provided to evaluators is insufficient. For example, the Commission has said that evaluators receive specific guidance on how to embed issues like SSH. The main evaluator page on the Participant Portal has a small section on SSH which provides no real illumination on how to embed SSH, which can be evidenced by proposals being supported through Horizon 2020 with no SSH contribution despite being flagged as an SSH topic on the Portal as the Commission's own SSH Monitoring Reports highlight.[7]

We also consider that if interdisciplinarity is central to a call and this includes embedding SSH then this must be included in the 'credibility of the proposed approach' section of the Evaluation Summary Report. This is because if interdisciplinarity is core to Horizon Europe then the credibility of any proposed approach must be based upon it. One way forward might be that there is a presumption in favour of inclusion of scholars from the humanities and social sciences in every application submitted, subject to the possibility of reasoned justification as to why this has not happened or did not need to happen in a particular case.

Within the clusters, large consortia are very difficult to put together, especially for early career researchers, and are not a proof that innovation or impact will be achieved. A range of smaller grant sizes must be included in Horizon Europe. This will help fund more impactful research as well as helping raise the success rates currently seen in Horizon 2020. This range of funding available is likely to also support a wider range of participants across the EU being supported as there is more scope to build excellence and understanding of applying for and securing EU funding.

In this vein, we welcome Horizon Europe including a strong spirit of building excellence whilst taking into account that the EU should not be considered the funder of first resort but of added value. There are a number of ways this might be possible. We believe providing significant further funding for mobility programmes will be vital in developing exchange between researchers in the EU and the connections and experience necessary to build excellent research proposals. In addition, we believe that a two-stage application process, which had a simple first stage and then provided support between the first and second stage would be most helpful in building excellence. We also recommend that funding outside of Horizon Europe is provided to help establish local capacity where it is required in building up expertise in research management offices to help build and shape applications with researchers. This is of importance in countries which have been less successful in Horizon 2020.

7   http://ec.europa.eu/research/participants/data/ ref/h2020/grants_manual/pse/h2020-evaluation- faq_en.pdf

One of the major innovations in Horizon Europe will be the new missions. We wait to see how these will develop in due course. It is important, however, that a research and innovation programme such as Horizon Europe supports research and innovation. Missions have the potential to be a useful addition to Framework Programmes, however, we are encouraged that a positive assessment will be required after three years to see whether they continue. We expect such an assessment to be fully independent of the Commission.

Horizon Europe intends also to have a major overhaul of what will now be described as 'Partnerships'. We welcome the joined-up approach that the Commission is developing and look forward to further consultation on this. Nonetheless, we are deeply concerned that the Commission's Orientations document for the first Strategic Plan makes no mention of HERA (Humanities in the European Research Area) and NORFACE (New Opportunities for Research Funding Agency Cooperation in Europe). Both of these initiatives must be maintained as Partnerships going forward into Horizon Europe.

We remain fully supportive of ensuring that Horizon Europe is 'open to the world'. In this light, we welcome the prioritisation that this has been given through the reorganisation of he European Commission's Directorate-General for Research and Innovation. Horizon Europe is a major global research and innovation platform, which brings significant advantages to the EU through its attractiveness to partners across the world. We encourage that this aim is maintained as Horizon Europe is finalised and in particular, we wish to see all Associated Countries being able to participate across all of Horizon Europe including the monobeneficiary schemes such as the ERC and MSCA.

Annex 1

Staying Healthy in a Rapidly Changing Society

People's health and care needs are different, depending on their age, gender, stage of life and social conditions, among other things. It is widely recognised that social factors – the 'social determinants of health' - are major drivers of individual and population health and that these drivers operate from before birth and across the life course, and as such are important for understanding how to remain healthy and avoid ill-health, and how these efforts evolve and are required to evolve in a rapidly changing society. The social determinants of health include people's material and social circumstances including housing, income and education, as well as lifestyle factors such as diet, physical activity, tobacco use and alcohol intake. Understanding how health relates to and is impacted by these social factors is key to developing sustainable approaches to improving health and wellbeing over the longer-term and reducing the inequality of ill-health between population groups.

An individual's physical and mental health and well-being can be influenced by their individual situation as well as the broader societal context they are living in. Health education and behaviour are important factors. Currently, more than 790,000 deaths per year are due to risk factors such as smoking, drinking, physical inactivity, and obesity. These patterns of behaviour are often deeply embedded in people's everyday lives, their interactions with each other and their understandings of what it means to be happy and healthy – and changing them is proving to be a major policy challenge. To date, interventions have typically focused on education and/or skills-training. At best, such interventions have only a limited impact on the targeted behaviour/s, with effects fading quickly and failing to translate into meaningful reductions in disease risk.

A multidisciplinary approach is required to bring key insights to the physical, social and environmental challenges of promoting healthy behaviour. Risk factors are part of people's wider lifestyles and cultures. These factors are often laid down in childhood and adolescence, where they are shaped by an individual's family background and their emerging sense of identity (their gender, social class and ethnic identity). An individual's dietary habits, for example, can be shaped both by their material circumstances – and their income in particular – and by their cultural background; like other health behaviours, our diet can be deeply expressive of 'who we are' (our identity) and 'where we come from' (our cultural heritage). Changing these deep-seated aspects of oneself requires culturally-appropriate interventions based on co-production models of research and intervention, with researchers working in partnership with the communities whose behaviour they are trying to change.

Poor circumstances in early life and through childhood can compromise health across life, increasing the risk of disease in later life. Low income levels, for example, can affect the extent to which individuals and communities are able and minded to prioritise health outcomes over other competing goals (such as furthering their level of disposable income, or increasing their participation in leisure and social activities). Through interdisciplinary collaborations, and a greater understanding of life course perspectives, we can understand how health is shaped across people's lives and how interventions to improve people's social trajectories can achieve lifelong benefits in terms of educational attainment, employment and income as well as in health. Longitudinal studies, particularly birth cohort studies which track children from birth (and, increasingly, from in utero) could underpin this game-changing research, with extensive networking and collaboration between researchers working on these studies across Europe and beyond.

Further understanding the role of system approaches to tackling the determinants of health will be crucial. System approaches recognise that people's health has multiple causes and therefore requires multi-pronged policies. The field of tobacco control, for example, should consider corporate behaviour as well as actions by national government, public health agencies and the public. Social science research is the central resource in the tobacco control field, both in mapping the determinants of tobacco use and in assessing the impact of the policies and interventions to reduce it. Surrounding all of this, is the need for better understanding the significance of the wider, and often long-term care systems, on which individuals rely, and how these vary across culture, geography, socio-economic status and generation. The provision of non-medical but nonetheless necessary care is one of the most profound challenges to remaining healthy and well, and better understanding and supporting the role played by families and communities in the provision of this care is vital for the sustainability of measures designed to improve health and wellbeing over the longer-term. Personalised solutions have tended primarily to focus on the individual and not the partnership – inclusive of family, community and service providers – required to deliver care in a changing society.

A rapidly changing society can present both opportunities and challenges to an individual's health; can support and make necessary the evolution of health management techniques. In order to reduce health inequalities and support healthy and active lives for all, it is crucial to be mindful not only of the potential for innovation and transformation in health management and of health systems, but of the social, political and environmental processes which may support or hinder health transformation, or indeed the changes that make it necessary. Understanding, for example, the potential of digitisation or 'big data' requires a deeper understanding of the social, geographical and generational approaches to and perceptions of taking a more active role in choices about one's healthcare, and social processes such as power,

autonomy, and the role of the state. Lessons can be learned from the historical study of what processes seem to help or hinder the translation of scientific and clinical knowledge into changes in attitudes to and practices in health care. Moreover, rapid change to the environmental and political contexts in which we operate can place increasing demands on an individual's resilience and make it challenging to keep pace. The impacts of climate change, including flooding and heatwaves, for example, can affect people's physical and mental health. It can also fundamentally threaten people's sense of psychological security in their home and in the stability of their local environment and local weather systems. Research into understanding and addressing these threats to individual, community and global wellbeing will be crucial in the years to come.

Finally, a greater understanding of the varied ways in which individuals, communities, and societies interpret, understand, experience and respond to challenges around remaining healthy is critical to exploring the impact that health can have on the wider experiences of individuals across their lives, from the ability to retain independence and to obtain meaningful work, to the ability to engage in leisure activities of their choosing.

R&I aims at supporting citizens in pursuing healthy and active lives by providing suitable and tailor-made solutions, including for people with specific needs. Targeted impacts are:

1. Citizens adopt healthier lifestyles and behaviours, make healthier choices (such as healthier food choices) and maintain for longer a healthy, independent and active life with reduced disease burden, including at older ages or in other vulnerable stages of life. They are able and empowered to define, better understand, monitor and manage their own physical and mental health and wellbeing, and interact with their doctors, health and care providers and their wider support networks, including families and communities.

2. Health policies and actions for health promotion and disease prevention are knowledge based and targeted to citizens' needs, recognising the wider determinants of health and wellbeing, and the complex choices that individuals make throughout their lives vis-à-vis their health outcomes.

3. Citizens´ trust in knowledge-based health interventions and in guidance from health authorities is strengthened, including through improved health literacy, resulting in increased engagement in and adherence to effective strategies for health promotion, diseases prevention and treatment, including increased vaccination rates and patient safety.

4. Citizens are protected from health risks due to misinformation, manipulation and fraud, including the sale, purchase and use of substandard, falsified or inappropriate medicines.

5. Pregnancy and birth is safer, maternal mortality is reduced, preventable deaths of newborns and children under 5 years of age are suppressed, and the physical and mental health and well-being of children (and their families) is improved.

R&I can provide a better understanding of specific health and care determinants, needs, manifestations and impacts, throughout the life course, and develop more effective solutions for health promotion and disease prevention, including for needs related to chronic health conditions, physical and mental disabilities, or age-related impairments. R&I can help people, as well as communities to engage in the design, development and implementation of innovative services, policies and digital solutions, also ensuring that they are accessible, equitable and effective in preventing disease and promoting health. Key to achieving these objectives is the availability and accessibility of real-world health data, which will require appropriate support by research and data infrastructures.

This R&I orientation will support activities aiming at:

1. Better understanding of human health at various developmental stages and the individual, community and societal factors shaping, affecting, and being affected by health, including as it relates to resilience to diseases, the processes and experiences of ageing, and wider wellbeing and independence.

2. Better understanding of specific health and care needs of individuals in the management of their health, whether physical or mental, and better solutions for supporting those needs.

3. Better understanding of the health and care needs of population groups experiencing structural disadvantages, and better solutions for addressing these challenges sustainably and over the longer-term.

4. Personalised solutions for health promotion and disease prevention of individuals or stratified solutions tailored to groups, including for improved prediction and prevention of diseases before/at birth, during and throughout their life.

5. Development of digital tools, applications and other solutions, including social innovation, fostering health literacy and empowering citizens to better manage their own health and well-being throughout their life course and to protect them from health threats, including for countering health-related misinformation, manipulation and fraudulent sales of substandard, falsified or inappropriate medicines and illicit drugs.

Areas of Intervention:

This challenge requires R&I actions under several Areas of Intervention (AoI) of cluster 1 but the centre of gravity lies with AoI 1.2.1. 'Health throughout the Life Course'. It is closely linked to AoI 1.2.2 'Environmental and Social Health Determinants'

Cross-cluster issues:

Synergies with other clusters could be explored through broad crosssectoral collaboration. For example with cluster 2 'Culture, Creativity and Inclusive Societies' on health inequalities and their relationship with wider inequalities, or cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' on the role of nutrition for health (incl. human microbiome, mal- and over-nutrition, safe food), personalised diets (incl. food habits in general and childhood obesity in particular) and the impact of food-related environmental stressors on human health (incl. marketing). Other possible synergies could be explored by cooperating on digital tools such astelemedicine or smart homes with cluster 4 'Digital, Industry and Space', while also understanding the potentially negative impacts of new technologies on health through their (mis) use in society (such as accidents occurring from the use of driverless cars, for example), or with cluster 5 'Climate, Energy and Mobility' on urban health versus rural health and the wider impact of climate change on physical and mental wellbeing (for example the impact of rising sea-levels for coastal communities, and increases in extreme temperatures in urban and rural settings).

International cooperation:

Similar health challenges and needs for health promotion and disease prevention are faced by other regions and countries. International cooperation should be sought and promoted in order to benefit from new knowledge and solutions as widely as possible.

Tackling Diseases and Reducing Disease Burden

Communicable and non-communicable diseases are responsible for a large number of disabilities and premature deaths in the EU and worldwide. They also display marked and persisting social inequalities - disadvantaged groups are at elevated risk of both communicable and non-communicable disease - and they pose a major health, societal and economic threat as well as being a potential burden for those affected. Many people are still dying prematurely and suffering from these diseases. Non-communicable diseases, including mental illnesses and neurodegenerative diseases, are responsible for up to 80% of EU health care costs. These costs are spent on the treatment of diseases that are, to a large extent, preventable. And although there is huge potential from preventative measures, only around 3% of health care budgets are currently spent on preventive measures. Infectious diseases, including antimicrobial resistant (AMR) infections, for example, remain a major threat to health in the EU and global health security and AMR deaths could exceed 10 million per year worldwide according to some predictions. The emergence and spread of microbes resistant to available medicines has become an increasingly urgent and critical issue for Europe's healthcare systems. Improving the evidence base on antibiotic use and misuse by individuals is key and lessons can be drawn from agriculture, including both food animals and crops as large consumers of antibiotics and major sites of AMR, and from historical studies of behaviour change interventions that have proved (un)successful in the past across different times, geographies and contexts.

Furthermore, clinical and technological advances are affecting the longevity of disease management experiences, with a greater number of people living with increasingly serious health conditions for longer periods of time. A better understanding is needed of the varied experiences of disease management: from understandings of what is meant by disease

and by extension disease management and disease burden; the mechanisms by which people cope with and manage the physical and psychological impacts of disease, varying across cultures, geographies, generations and communities; the interactions of different population groups with new understandings of disease prevention and determinants, and narratives of responsibility and fault; the implication of new technologies and the opportunities and challenges of their adoption; and the relationship between long-term health conditions and the wider life experiences of an individual - from retained independence to ability to gain meaningful work or ability to participate in leisure activities of their choosing – and the extent to which these are enabled or prevented across different contexts.

R&I aims at decreasing the burden of diseases on citizens and health care systems. Targeted impacts are:

1. Health burden of diseases in the EU and worldwide is reduced through effective disease management, including through the development and integration of innovative diagnostic, therapeutic and disease management approaches, including as they relate to the wider social and environmental determinants and impacts of health, for example in personalised medicine approaches, digital and other people centred and community based solutions for health and care. In particular, patients are diagnosed early and receive effective and cost-efficient treatment, including patients with a rare disease, due to effective translation of research results into new diagnostic tools and therapies.

2. Premature mortality from non-communicable diseases is reduced by one third (by 2030), mental health and well-being is promoted, and the voluntary targets of the WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020 are attained (by 2025), with an immediate impact on the related disease burden (DALYs).

3. Wellbeing in disease management is increased with people living happier and more fulfilling lives

and retaining greater independence, for example in their ability to gain meaningful employment and participate in leisure activities of their choosing.

4. Health care systems benefit from strengthened R&I expertise, human capacities and know-how for combatting communicable and non-communicable diseases, including through international cooperation. In particular, they are better prepared to respond rapidly and effectively to health emergencies and are able to prevent and manage communicable disease transmission epidemics, including within healthcare settings.

5. Citizens benefit from reduced (cross-border) health threat of epidemics and AMR pathogens, in the EU and worldwide. In particular, the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases are contained and hepatitis, waterborne diseases and other communicable diseases are being combated.

6. Patients and citizens are knowledgeable of disease threats, involved and empowered to make and shape decisions for their health, and better adhere to knowledge-based disease management strategies and policies (especially for controlling outbreaks and emergencies).

7. The EU benefits from high visibility, leadership and standing in international fora on global health and global health security, especially in partnership with Africa.

There is an urgent need for R&I on new prevention, diagnostics, vaccines, therapies and alternatives to antibiotics, as well as to improve existing prevention and management strategies to create tangible impacts. This will require international cooperation to pool the best expertise and know-how available worldwide, to access world-class research infrastructures and to leverage critical scales of investments on priority needs through better alignment with other funders of international health R&I cooperation. The continuation of international partnerships and cooperation with international organisations is particularly needed to

combat infectious diseases, including antimicrobial resistances, and respond to major unmet needs for global health security including the global burden of non-communicable diseases.

This R&I orientation will support activities aiming at:

1. Better understanding of diseases and their drivers, including the causative links between environmental and behavioural factors and diseases, and a better evidence-base for policymaking.

2. Better methodologies and diagnostics that allow timely and accurate diagnosis, identification of personalised treatment options and assessment of health outcomes, including for patients with a rare disease.

3. Better understanding of disease management techniques, their effectiveness across population groups, how they relate to different social and environmental contexts, and their impact on wider health and wellbeing.

4. Development and validation of effective intervention for better surveillance, prevention, detection, treatment and crisis management of infectious disease threats.

5. Innovative health technologies developed and tested in clinical practice, including personalised medicine approaches and use of digital tools to optimise clinical workflows.

6. New and advanced therapies for non-communicable diseases, including rare diseases developed in particular for those without approved options, supported by strategies to make them affordable for the public payer.

7. Scientific evidence for improved/tailored policies and legal frameworks and to inform major policy initiatives at global level (e.g. WHO Framework Convention on Tobacco Control; UNEA Pollution Implementation Plan).

Areas of Intervention:

This challenge requires R&I actions under several Areas of Intervention (AoI) in cluster 1 but the centre of gravity lies with AoIs 1.2.3. 'Non-Communicable and Rare Diseases' and 1.2.4. 'Infectious Diseases'. It is closely linked to AoI 1.2.2 'Environmental and Social Health Determinants' and AoI 1.2.1 'Health throughout the Life Course'.

Cross-cluster issues:

Synergies with other clusters could be explored through broad crosssectoral collaboration, for example with cluster 3 'Civil Security for Society' on health security/emergencies (preparedness and response, medical counter measures, epidemic outbreaks/pandemics, natural disasters and technological incidents, bioterrorism), or with cluster 4 'Digital, Industry and Space' on decision-support systems or on geo-observation and monitoring (e.g. of disease vectors, epidemics). Other possible synergies could be explored by cooperating with cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' on health security and AMR (one-health: human/animal/plant health), and with cluster 2 'Culture, Creativity and Inclusive Societies' on understanding the role of society both in reducing the prevalence of disease but also in reducing the burden of said diseases once present, including as they relate to other areas of an individual's life such as their ability to gain meaningful employment and to pursue leisure activities of their choosing.

International cooperation:

Effective international cooperation is essential to reduce disease burden for example, to protect people against cross-border health threats including the rise and spread of AMR and (re)emerging epidemics, and in better understanding the determinants of and methods for addressing non-communicable diseases and their propensity to thrive and grow differently across population groups. The EU should continue its efforts to initiate and participate in cross-border coordination and integration of R&I.

To address these challenges of global dimension, it will require international cooperation to pool the best expertise and know-how available worldwide, and enable a better alignment with actions in the rest of the world. This includes international collaboration with major EU and global initiatives in the area of infectious diseases (Global Research Collaboration for Infectious Disease Preparedness, GloPID-R), non-communicable diseases (Global Alliance for Chronic Diseases, GACD), rare diseases (International Rare Diseases Research Consortium, IRDiRC), brain research (International Traumatic Brain Injury Research, InTBiR), personalised medicine (International Consortium for Personalised Medicine, ICPerMed), and -omics (e.g. the International Human Epigenome Consortium, IHEC, the 1 Million Genomes Initiative).

European Partnerships:

i) 'EU-Africa global health partnership to tackle infectious diseases': This R&I partnership would aim to increase global health security in sub-Saharan Africa (SSA) and Europe, by accelerating the clinical development of effective, safe, accessible, suitable and affordable health technologies as well as health systems interventions for infectious diseases in partnership with Africa and international funders. It will also support implementation research and health systems research for the uptake of new, improved or existing medical interventions. This partnership would be the successor initiative of the EDCTP2 partnership programme and be launched in 2021. It would be established as an institutionalised partnership based on Article 185/187 TFEU.

ii) 'Rare Diseases': This R&I partnership would aim to improve the lives of rare diseases patients. It would built on the results and experiences the ERA-Net E-Rare which was continued in the frame of the European Joint Programme on Rare Diseases (EJP RD). The EJP RD was launched in December 2018 to further help in coordinating the research efforts of European, Associated and non-European countries in the field of rare diseases and implement the objectives of the International Rare Disease Research Consortium (IRDiRC). The proposed R&I

partnership would be established as a co-funded partnership programme, starting in 2024.

iii) 'Translational health research': Several existing Horizon2020-funded partnerships involve the very same health R&I funders but are simply focused on different thematic priority areas. The proposed R&I partnerships would aim to establish a flexible and more effective coordination between programme owners (typically ministries) and programme funders (typically funding agencies) of the numerous networks established in the European Research Area (ERA) for Health and Well-being. It would focus on establishing a strategic research agenda and joint funding strategy between major European funders, public and private, on translational health R&I and be established as a co-funded partnership, starting in 2023/2024.

Missions:

The co-legislators requested a mission in the area of cancer. A mission board will advise the Commission on the specific scope and objectives of such a mission.

Annex 2

Climate, Energy and Mobility

Develop sustainable infrastructure, services and systems for smart and sustainable communities and cities

80% of the EU's population currently live in urban areas. Globally, this figure is closer to 50% but is expected to increase to 70% by 2050. The rapid growth of cities is giving rise to a range of economic, social and environmental challenges. On the negative side, cities are seen as places of social stress and inequality, political instability, inadequate provisioning and vulnerabilities as a result of climate change, or as spaces that are difficult to effectively govern because of their size, complexity or diversity. On the positive side, cities are depicted as centres of growing economic and social power, as hubs for innovation, creativity, activism and prosperity, as well as places of unprecedented possibility for sustainable living and plural governance. In the years to come, it will be essential to manage this growth sustainably, tapping the potential benefits of urbanisation while avoiding its exclusionary and environmentally damaging tendencies, learning from historical examinations of what has and has not worked in the past, and from each other, internationally and in regard to the ways in which we inhabit cities together but experience them differently.

The design, construction and management of sustainable urban environments, and the creation of sustainable infrastructure, services and systems for smart and sustainable communities and cities is of utmost importance. Digitalisation and decarbonisation will transform our approach to urban living and governance in the coming decades and they will be increasingly intertwined. And yet, the process for achieving these goals is not yet clear and the varied experiences of citizens, businesses and communities within and across urban settings requires deeper and more nuanced analysis.

A multidisciplinary approach is required to bring key insights to the physical, social, human and environmental challenges of developing sustainable infrastructure, services and systems. The urban space, with its concentration of people (of various backgrounds and with varied experiences), ideas and resources, can serve as a catalyst to initiate and sustain innovation in these areas but can also increase the complexity of ensuring that everyone in the city can access the wealth of opportunities presented by urban living while being equally protected from its negative aspects. The knowledge of citizens, businesses and communities will be vital to understanding the challenges and opportunities for achieving sustainability of urban environments, how we define and experience their existence differently, whether socially, culturally or economically, and how we might contribute to, adopt and make use of new approaches to their eradication or amplification.

Identities and cultures can be formed around consumption of the environment in its various forms. The connection between urban habitat and living – modes and spaces of interaction, social experiences, and the impact on wellbeing and cohesion, between and within groups – can play a role in determining how people relate to, are influenced by and have an influence on the environment around them. Societies, particularly in urban settings, are becoming increasingly heterogenous with greater cultural, socioeconomic and political diversity. The opportunities that draw people to cities – the range of people, economic opportunities and leisure experiences, ideas and creativity – are the same things that can make interacting in and governing an urban space complex and multifaceted, particularly as it relates to sustainability.

We need to develop more nuanced conceptions of public space, consumption in an environmental context, and the interactions between community, culture, nature and sustainability. New understandings of the perceived trade-offs between different values and ways of living, and the proliferation of new forms of collective and individual responsibility with respect to urban life and environmental citizenship and sustainability are required, including how and by whom such transitions to sustainable infrastructure, services and systems should be led and enforced.

Harnessing the potential of new technologies and approaches to energy, mobility and mass transit, or the sharing-economy, for example, can reduce the environmental impact of urban living, but can be experienced differently by different people both within and between cities. An expanded understanding of 'smart' technologies which transcends the digital dimension and tackles questions of distributed economic capital and social and technical expertise in diverse urban settings is required, as is an understanding of the leadership and communities of practice required to drive the adoption of such changes.

Harnessing the varied and shared understandings of different groups within and across urban spaces, and co-designing approaches to improvement with citizens, businesses and communities will be vital in identifying sustainable solutions to the physical, social, human and environmental challenges of urban sustainability, and ensuring their uptake.

Targeted impact:

Enhance understanding of urban sustainability, including the resource efficiency as well as the climate resilience of urban spaces, improving air quality, urban living, biodiversity, and governance, and exploring the physical, social human, and environmental challenges that urban habitats and living engender. Develop novel and imaginative thinking on the attractiveness of cities to citizens, businesses and communities, increasing the liveability and accessibility of cities for all citizens,

targeting diverse kinds of human and physical infrastructure (including green infrastructure and accessible mobility services), and harnessing the opportunities of new technologies and knowledge, including of a cultural and creative nature.

Potential research challenges:

- Urban land use and integrated planning, including governance and public, private and community sector innovation, urban policies, urban energy systems and mobility, decision-making tools, and new models for citizen participation, including grassroots initiatives and concepts of responsibility in environmental citizenship and environmental monitoring.

- Quality of life for the citizens, people's lifestyles and their impact on consumption, wellbeing and resources, urban social innovation, cities' and communities' circular and regenerative capacity.

- Enlarging conceptions of public space and cultures of nature to respond to increasingly diverse societies.

- Nature-based solutions and circular material, reduced life-cycle environmental footprint and pollution in cities.

- New developments in urban planning design that incorporate ecological processes including aesthetic dimensions to the spontaneous dynamics of nature and aspects of industrial archaeology such as formerly industrial areas or decommissioned infrastructure systems.

- New understandings of the ecological impact of contemporary urbanization including emerging foci of concern such as light pollution, noise, and micro-particulates.

- Imaginative approaches to the performing and visual arts that illuminate different dimensions to nature, landscape, and the built environment, including new forms of methodological innovation.

Implementation:

Potential research challenges and topics will be addressed through collaborative R&I actions, and/or as part of a potential cross-cluster Horizon Europe Mission in the area of 'Climate-Neutral and Smart Cities'. There is added value in bringing together EC-funded projects with large stakeholder platforms and the co-programmed partnership 'Built environment and construction'. There are likely to also be links to other Clusters including Cluster 1 on 'Health' and Cluster 2 on 'Culture, Creativity and Inclusive Society'.