



Expert Advisory Group recommendations on 2018-2020 Work Programme

Horizon 2020: Societal Challenge 6
Europe in a changing world –
Inclusive, innovative and reflective societies



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Scope, process and acknowledgements

For the implementation of Horizon 2020 - the European Union Framework Programme for Research and Innovation - account shall be taken of advice and inputs provided by independent advisory groups of high level experts set up by the Commission from a broad constituency of stakeholders, including research, industry and civil society, to provide the necessary inter-disciplinary and cross-sectoral perspectives, taking account of relevant existing initiatives at Union, national and regional level' (art. 12 of Horizon 2020 Regulation).

The European Commission has therefore established an Expert Advisory Group (EAG) composed of 28 persons (see complete list in Annex) for providing recommendations on the 2018-2020 work programme of Societal Challenge 6 "Europe in a changing world – Inclusive, Innovative and Reflective Societies" (SC6)¹. The Expert Advisory Group (EAG) has been tasked with providing advice on relevant objectives and scientific, technological and innovation priorities pertaining to all activities within SC6.

This report complements but also somehow transcend the previous report of the EAG entitled "Resilient Europe" that provided advice for work programme 2016-17².

Ahead of the finalization of this report, the EAG had three meetings in Brussels on 17 February, 21 April and 19 May 2016. The report was finalized and sent to the European Commission on 31 May 2016.

At the first meeting, Ms Kerstin Sahlin was elected by the group as Chair, Mr David Arnold as Vice-Chair and Mr Jeremy Millard as Rapporteur. The Board had the task to coordinate the work of the EAG by chairing the meetings, to unleash the collective intelligence of the group and to manage the process by assembling and synthetizing the large amount of written and oral comments from all the members.

The result of this work is presented in this report. The European Commission (DG RTD and DG CNECT) acknowledges and thanks all the EAG members and especially the Board for their excellent contribution.

¹<http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=2951&NewSearch=1&NewSearch=1>

²<http://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/SC6-Advisory-Group%20report%20for%202016-2017.pdf>

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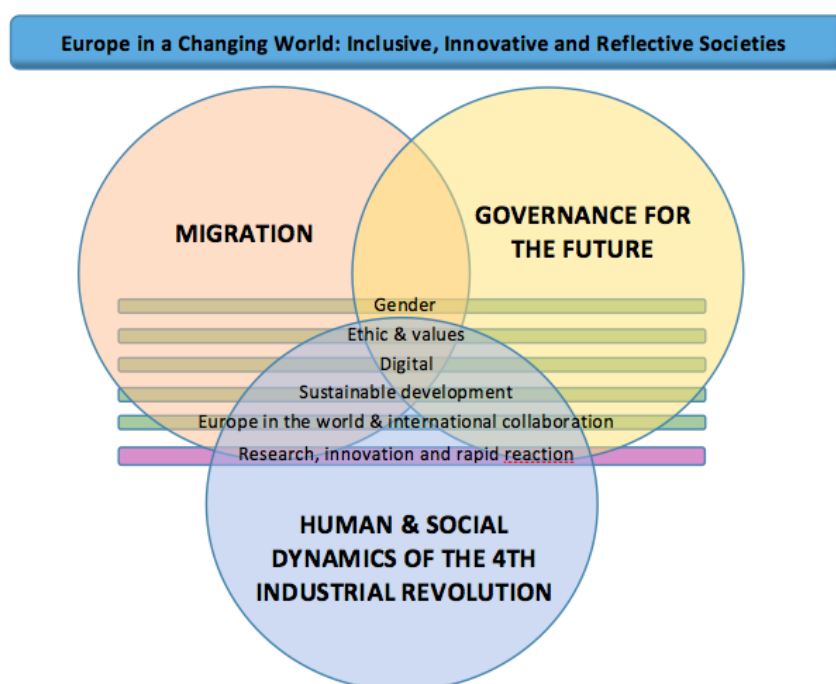
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Executive summary

The rationale and objective of Societal Challenge 6 (SC6) is to foster greater understanding of a culturally and socially rich and diverse Europe and how it needs to adopt new paradigms for change in a context of unprecedented transformations amid growing global interdependence. Although the challenges are great, so too are the opportunities to turn these into European strengths through European diversity and creativity across all areas of the economy, society, culture and governance. SC6 is a core component of the research, innovation and technological development actions foreseen within Horizon 2020 in responding to these challenges to promote sustainable development and to address people's concerns about their livelihoods, safety and social cohesion.

The SC6 Expert Advisory Group has been asked to provide advice on relevant scientific, technological and innovation priorities pertaining to all activities within SC6 for the H2020 Work Programme 2018-20. This report contains their full consensual recommendations on the three major themes: migration; the human and social dynamics of the Fourth Industrial Revolution; and governance for the future. In addition, five cross-cutting issues are identified and recommendations are offered concerning the types of research and innovation to be carried out, as shown in the diagram.



Research and innovation for SC6

The nature of Social Sciences and Humanities (SSH) requires a strong prioritisation of systematic, inclusive, inter-disciplinary, cross-national and rigorous comparative analyses to assist in identifying the factors shaping current social, cultural, economic and environmental dynamics. There is the need for a continued focus on ICT as the critical infrastructure and to handle increasingly large data sets in both SSH research and innovation. In addition, supplementary research and innovation approaches are recommended where appropriate:

- Participatory research and innovation
- Rapid reaction research and innovation
- Modelling and improving the relationship between research, innovation and policy
- Use-inspired basic research.

A strong emphasis on international cooperation in the context of SC6 is required, given that such collaboration is necessary for Europe to successfully address the serious challenges it faces, and as an essential building block of the European Research Area. There is also a need to build on existing approaches deployed in SC6 by rethinking some of the ways research and innovation are undertaken, such as:

- A continuing focus on social innovation but also developing this to encompass both inclusive and frugal innovation, as well as inclusive business approaches.
- Design thinking and behavioural approaches.
- Institutional innovation.
- The potential of ‘radical innovations’ as unanticipated, game-changing answers to address complex and interdisciplinary societal challenges, and seen in contrast to incremental innovation.

Three major themes have been identified

Migration

Modern European society is the product of millennia of migrations both inwards and outwards and this process continues. Current migration challenges and opportunities need to be considered in this light as the most recent examples of the processes that have created the communities in which Europeans live and work. Understanding migration within, to and from Europe must recognise that the world is interconnected, transnational and constantly changing, and that this results in many different – and interrelated - forms of human mobility. European societies in particular can be characterised as hybrids, and processes of change, partly following from migration, as hybridisation. Research and innovation should explore how policy makers and practitioners can design effective and sustainable migration interventions.

Specifically, research and innovation actions should focus on:

- The lessons of the past, given that the current wave of migration into Europe has numerous historical antecedents, so that understanding these better will equip Europe in developing effective solutions for the future.
- Understanding human mobility and migration drivers and dynamics, given that these are complex and ever changing in terms of the groups involved, their locational origins, migration pathways and receiving societies.
- Cultural and integration research to examine the cultures of both migrant communities and of the receiving societies, which will also enable better interventions to be designed, for example for teaching to foster integration.
- The impacts of migration in order to unpack the often media-driven negative public debates in Europe, to examine actual ‘negative’ and ‘positive’ impacts and place these in the broader European as well as international context.

The human and social dynamics of the Fourth Industrial Revolution

The term 'Fourth Industrial Revolution', although widely used, needs careful unpacking in an SSH context. The Expert Advisory Group recognises this latest socio-technological paradigm shift enabled by ICT as a general purpose technology for many new technology breakthroughs having potentially profound economic, social, cultural and environmental impacts. For example, the potential blurring of lines between the physical, digital and biological spheres. The pace, scale and scope of change presaged is argued to be unprecedented, even in comparison to previous industrial revolutions. They touch upon virtually every aspect of modern living, and in particular already seem to be having profound impacts on human and social behaviour, the lived experience of being 'in work', and how society is organised.

Specifically, research and innovation actions should focus on:

- Historical perspectives so that lessons learnt during previous industrial revolutions can provide evidence for policy makers and practitioners to develop effective solutions for the future that recognise the human and social needs of people.
- The drivers and dynamics of the Fourth Industrial Revolution, its policy background, governance implications and its societal challenges and impacts.
- The creative industries and cultural heritage, including as a driver of technical innovation.
- Ensuring that risks and benefits are widely distributed and shared, in relation to growth and employment, industrial structure and externalities, and negative and positive outcomes.

Governance for the future

Governance in Europe, not least in relation to migration and the ushering in of the Fourth Industrial Revolution, is at a crossroads. This can be seen in terms, for example, of democracy, the need to balance short-term efficiency with long-term effectiveness, multi-level governance arrangements, Europe's international roles and relationships, public value, and the tensions between harmonisation and heterogeneity. Europe is being buffeted by both internal and external forces, and the political system is under severe strain. SSH research is necessary to assist in both understanding why Europe finds itself in this situation, as well as to point to evidence-based policies that are also ethical and just.

Specifically, research and innovation actions should focus on:

- An investigation and analysis of lessons that can be learnt from the evolution of European governance at all levels in order to develop a more resilient Europe for the future, for example in relation to identity, diversity and culture.
- European governance challenges and opportunities, with a focus on trust, trustworthiness and legitimacy, radicalisation and terrorism, policy- and decision-making, as well as legal and regulatory frameworks.
- The digital transformation of governance, given that the application of ICT and related new technologies has changed the way the public sector and the wider issues of governance operates and is structured. Even more profound impacts can be expected in the future, not least because of the challenges and opportunities occasioned by the Fourth Industrial Revolution.
- ICT-enabled public sector innovation and open governance, as these are central tenets of new forms of governance being pursued by most Member States and at European

level. In particular, there are three priority research and innovation needs: the open government setting; government as a platform; and the likely impacts and take up of emerging technologies.

- The changing roles and relationships of European governance to meet the challenges of tensions between plurality, stability and change, and the acceptance that government itself does not have a monopoly on the innovations required to address Europe's societal challenges. Instead, government needs to improve and extend its collaboration with other societal actors, as well as with other governments and societies outside Europe.

Five cross-cutting issues

The following five issues cut across all the research and innovation recommendations made above.

- **Gender:** The framing of gender in H2020 needs to be both sharpened and strengthened as a dynamic concept which puts researchers at the forefront of questioning gender norms and stereotypes, and addresses the evolving needs and social roles of women and men. Depending on the field of research, it entails an analysis of gender, sex or both.
- **Ethics and values:** These are fundamental issues across all H2020 research and innovation actions, for which SSH has specific responsibility to ensure they are both recognised and acted upon. It is important to strengthen and adapt European fundamental rights and values, as well as its responses to different types of inequality. These need to be related to Europe's social economic model, and it is important to ensure that European ethical principles are embedded in all aspects of research and innovation.
- **Digital:** H2020 supports innovation, research and technological development, with the latter focused on digital technologies in the form of ICT and on the new technologies of the Fourth Industrial Revolution that ICT underpins. In this context, an important role of SC6 is to ensure that SSH is present at all stages of the research and innovation chain with a focus on value creation and accelerating the development of technologies for innovative products, processes and services where ICT is the critical enabler.
- **Sustainable development:** As key cross-cutting H2020 objectives, climate action and sustainable development are also relevant to SC6, which can contribute to combatting and mitigating climate change by integrating climate action into specific policy activities, developing capacity, and strengthening the regulatory and policy framework. In terms of the broader scope of sustainable development, Europe's medium and longer-term objectives align well with the UN's Sustainable Development Goals, 2016-2030. These provide the guiding principle for balanced long-term global development consisting of the three pillars of economic development, social development and environmental protection, so that if any one pillar is weak then the system as a whole is unsustainable
- **Europe in the world and international collaboration:** Europe requires in-depth and cutting edge knowledge concerning developments elsewhere in the world in order to be a dynamic actor and ensure its input to the changing international order. This is necessary both in order to project European influence and soft power, but also for mutual learning given that most societal challenges are global in extent and require international collaboration.

1. Introduction

1.1. Purpose of the report from the SC6 Expert Advisory Group

The rationale and objective of Societal Challenge 6 (SC6) is to foster greater understanding of a culturally and socially rich and diverse Europe and how it needs to adopt new paradigms for change in a context of unprecedented transformations amid growing global interdependence. Although the challenges are great, so too are the opportunities to turn these into European strengths through European diversity and creativity across all areas of the economy, society, culture and governance. Innovative policies and actions are thus required to provide new solutions in support of a Europe which is inclusive, innovative and reflective. SC6 is itself a core component of the research, innovation and technological development actions foreseen within Horizon 2020 in responding to these challenges to promote sustainable development and to address people's concerns about their livelihoods, safety and social cohesion.

The SC6 Expert Advisory Group has been asked to provide advice on relevant scientific, technological and innovation priorities pertaining to all activities within SC6. Three major research, innovation and technological development themes are presented in this report: migration; the human and social dynamics of the Fourth Industrial Revolution; and governance for the future. In addition, five cross-cutting issues are identified: gender; ethics and values; digital; sustainable development; and Europe in the world and international cooperation. The contents of the report are designed as high-level expert recommendations for the next H2020 Work Programme 2018-20, and represent the full consensual view of the Expert Advisory Group. They build on and exploit work in relevant areas undertaken earlier in H2020 as well as in previous Framework Programmes, and are also linked to work envisaged under other Societal Challenges and with other significant European policies and actions.

1.2. Research and innovation for SC6

An adequate understanding of how both European societies in particular, as well as human societies more generally, are structured and function is of utmost importance as this underpins all aspects of economic, social and environmental development and sustainability. Thus, there is a need for research, innovation and technology development that increase our knowledge about the current and historical developments of European societies and that directly develops solutions for the future.

In the context of H2020, the nature of Social Sciences and Humanities (SSH) requires a strong prioritisation of systematic, inclusive, inter-disciplinary, cross-national and rigorous comparative analyses to assist in identifying the factors shaping current social, cultural, economic and environmental dynamics. This is needed to develop models, theories and explanatory typologies and, in turn, to inform policy makers and practitioners. This includes a continued focus on ICT as the critical infrastructure and the need to handle increasingly large data sets in both SSH research and innovation. It is also important that SC6 contributes significantly to all stages of the research and innovation chain, as well as how these create value for European societies by supporting an acceleration of both existing as well as future and emerging technologies which can create products, processes and services for innovative

solutions to meet the requirements of the Europe 2020 Strategy. As part of this, it is recommended that SC6 research and innovation undertakes, where appropriate³:

- Participatory research and innovation, for example in the context of migration, employment studies, the use of new technologies, governance issues, etc. This is important for scientific rigour given the need to understand and foreground the motivations, behaviours and experiences of different societal actors. It is also ethically important, as a way of empowering all such actors by enabling them to co-produce research and innovation and feed into policy recommendations.
- Rapid reaction research and innovation that is responsive to real-time policy needs. Two dimensions are particularly important: the opportunity for policy-makers to help identify and shape research questions based on their on-going data and analysis needs; and the possibility of more flexible procedures for commissioning research and innovation on a rapid basis.
- The relationship between research, innovation and policy, for example by examining and modelling their relationship, including the range of different impacts and how research and innovation can be used as scientific knowledge, data and evidence, and the conditions promoting the successful exchange of knowledge. This also has deep implications for the future of governance at every level and not only in H2020.
- ‘Use-inspired basic research’ which recognises that the involvement of professionals from specific application areas enables those domains to benefit more rapidly from technological or other innovations as they mature and the innovations are likely more quickly to find real application and markets⁴.

A re-emphasis of international cooperation, both within and beyond Europe, in the context of SC6 is required, especially given that this has in practice been less important in the early period of H2020 compared to FP7, and because such collaboration is an essential building block of the European Research Area. Given the complexity of the societal challenges faced by Europe, there is also a need to build on existing approaches deployed in SC6 by rethinking some of the ways research and innovation are undertaken. A number of avenues need to be explored which in particular focus on new forms of policies, developments and innovations that can enhance fairness and inclusion in Europe, including through inclusive innovation and inclusive business models.

First, social, inclusive and frugal innovation. Research and innovation should focus on new types of model that aim to distribute benefits as widely as possible across society, for example by building on existing work developing social-business models and examining particular types of open innovation such as inclusive and frugal innovation. Having successfully received much support through research programmes over the last ten years, concepts of social innovation are now relatively well established in Europe and are also becoming important globally. Social innovations aim to directly address unmet social needs in new ways by developing or enhancing new products and services through the direct engagement of the people who need and use them, typically through a bottom-up process. Now, effort should focus on inclusive innovation as a type of social solution which specifically targets excluded and marginalised people. Frugal innovation, in turn, aims to do this ‘frugally’, i.e. using minimal resources by developing highly innovative business models that can do much more for much less specifically for poor people and without exploiting them, but also to help meet circular economy and

³ Parts of this paragraph are taken from the International Conference on “Understanding and Tackling the Migration Challenges: the role of research”, 4-5 February 2016: <https://ec.europa.eu/research/conferences/2016/migration-challenge/index.cfm>

⁴ Arnold, D (2008) Cultural Heritage As a Vehicle for Basic Research in Computing Science: Pasteur's Quadrant and a Use-Inspired Basic Research Agenda, Computer Graphics Forum, Volume 27 - Issue 8 (pp. 2188-2196)

other economic and social goals. Frugal innovation is of great potential importance for European industry, especially in times of increasing global competition and relative resource scarcity. Europe can learn much from other parts of the world about inclusive and frugal innovation, for example from India where the related concept of Jugaad innovation has a long tradition, but there are also traditions in Europe which need research and innovation support.

Second, inclusive business emphasises sustainable solutions that go beyond philanthropy and expand access to goods, services, and livelihood opportunities for low-income communities in commercially viable ways. Innovation is the key for success for inclusive business companies, because the margin per unit is typically low given customers are the poor. Frugal innovation, inclusive innovation, social innovation and co-creation are all specific pathways to develop inclusive business strategies. These are implemented by companies from advanced economies together with people both within and beyond Europe living in low-income communities, the latter as 'co-partners' for designing new goods and services to be sold in low-income markets.

Third, design thinking and behavioural approaches are holistic frameworks that attempt to understand the 'full architecture' of why and how a product, service or initiative is developed and used. They constitute an evolving and experiential practice pushing the boundaries, learning, experimenting and applying successful approaches as they develop. Design thinking is a paradigm shift away from traditional top-down, expert- and often technology-driven innovation traditions, but is instead human-centred in social, emotional and functional terms. Borrowing insights from the ethnographic and anthropological traditions, behavioural understanding lies at the base of design thinking in its attempts both to understand and influence people's actual as opposed to theoretical (often economically determined and 'rational') behaviour. One of the now widely disseminated behavioural frameworks is the so-called 'nudge' approach which recognises that, although traditional attempts to change behaviour by regulation are of course important, often more effective is the power of social norms and social networks in behaviour patterns.

Fourth, although innovation is commonly understood as a process of change in products, services and processes, institutional innovation is designed to change how organisations operate and are governed. It questions the underlying framework conditions of public and private institutions, whether formal or informal, at the local as well as the global level. It can affect democratic institutions as much as corporate governance and the informal rules that influence individual and collective behaviour.

Fifth, the potential of 'radical innovations' defined as unanticipated, game-changing answers to address complex and interdisciplinary societal challenges, are seen in contrast to incremental innovation as a paradigm shift in the practices that can fundamentally transform the ways in which we do things and we co-exist in the world. Radical innovations are often disruptive in that they require the interaction of experts from different disciplines as part of a new organisational culture. They also address intangible transitions, beyond economic criteria, through engagement with societies beyond only academic communities. Such transformations require incentives and support for interdisciplinary teams that work bottom-up, combining challenge-driven research with research-driven innovation. The human factor is at the core of radical innovations requiring a broad understanding across all fields of science.

2. Migration

Modern European society is the current manifestation of millennia of migrations both inwards and outwards and this process continues. Current migration challenges and opportunities need to be considered in this light as the most recent examples of the processes that have created the communities in which we live and work. Understanding migration within, to and from Europe must recognise that the world is interconnected, transnational and constantly changing, and that this results in many different – and interrelated - forms of human mobility. European societies in particular can be characterized as hybrids, and processes of change, partly following from migration, as hybridisation. A recent European conference explored how European research can support policy makers in designing effective and sustainable migration policies. To this end, past and current research on migration – including on integration, circular migration, migration and development, data and statistical modelling – was presented and debated from a policy perspective.⁵

2.1. Lessons of the past

Research and innovation should address the types and antecedents of migration as a universal global phenomenon throughout history. Knowledge of different waves and modes of migration and their consequences need to be analysed with historical, cultural and comparative perspectives, which is essential for understanding current European challenges and opportunities and thus the ability to successfully address them.

The question "why is this a 'crisis' now?" must be seen in this context and directs attention to the complexity of migration, i.e. globalisation and its impact on the circulation of both people and information. No single event but intertwined processes need to be understood as causes of migration. 'Cause and effect' types of explanation are rarely possible or unambiguous, and there is also a dearth of relevant data. It is also important to recognise both the short-term and long-term expectations concerning the impact of migration, and of the time-scales over which migrant groups might become embedded fully-functioning citizens in their new environment. This, in turn, is often reflected through the shaping of public opinion and the predominant narratives of migration, especially as conveyed by politics and the media.

Trying to unravel the drivers of migration directs attention to the historical and socio-political contexts in which the phenomena of migration and refugee movements take place or have taken place in the past. Historicising and contextualising migration and refugee movements facilitate the disclosure of the societal dynamics and the motives of individuals and groups involved in the current migration and refugee phenomenon. History also shows that challenges and the need for action may be quite different for handling acute short-term situations, as currently experienced in Europe, compared to longer term societal development and responses. Europe should not forget that what is now considered European cultural heritage is of course formed as a result of earlier waves of migration, and could be studied as one of the consequences and impact of migration.

Previous European migration movements were much bigger than today's, such as at the close of the Second World War. In geographic terms, Europe's currently perceived crisis needs to be seen in the context of hundreds of thousands of refugees from the Crimea and the Donetsk region, nearly 3 million Syrian refugees in Turkey and other neighbouring countries, as well as the 3 million Afghan refugees in Iran. Societies change over time and are continuously

⁵ International Conference on "Understanding and Tackling the Migration Challenges: the role of research", 4-5 February 2016: <https://ec.europa.eu/research/conferences/2016/migration-challenge/index.cfm>.

recreated with migrants as part of this process. Migrant groups do not reproduce solely as migrants groups over time, as one of the consequences of migration is intermarriage or intermixing, gradually producing a new population and society.

An often important socio-cultural factor which needs exploring is the religion of migrants. This may be considered as a form of 'protection' during the first initial period of settlement in the host society, but can evolve within the context of the host society as well as result from the changing attitudes of migrants themselves. Why and how do such religious changes take place, and with which social and political effects? This also has an important gender dimension given the different ways in which gender is considered in different religions.

2.2. Understanding human mobility

The SC6 work programme should recognise the holistic structure, essence and dynamic mechanisms of migration. The term migration covers many diverse types and actors, such as refugees, asylum seekers, family re-unification, economic migration, intra-European migration, external migration to and from Europe, etc. These need to be distinguished, but the interplay between them is also important within the overall concept of 'human mobility'.

The specification of actors involved in the current European migration and refugee challenge is needed to understand the societal dynamics of these phenomena. This will help in the examination of the multiple and interlocking issues related to migration and refugee movements upon diverse sectors of society. These include all aspects of inclusive, innovative and reflective societies, such as ways of life, integration, assimilation, culture, history, diversity and multi-culturism, refugee movements, diaspora, post-colonial relationships, demography, labour, education and other issues. In turn, these issues involve and impact different actors in diverse ways, for example:

- Young people and children
- Families, both separated and re-united
- Unaccompanied minors
- Intellectuals, artists and creative professionals
- Skilled labour
- The gendered categories of actors.

2.3. Migration drivers and dynamics

SC6 research and innovation should examine the whole process of migration; why people decide to move, what are they driven by and attracted to, how migration decisions are taken, the routes followed, and not least the impacts on the locational origins of migration, intermediary locations and destination locations. Drivers might often have multiple manifestations, for example the lack of work in one location can induce a would-be migrant to move to a destination location where work is likely to be found. War and acute disruption in one location can drive residents towards more peaceful locations. A potential migrant's awareness of her/his own situation has been dramatically increased in recent years by the availability of new ICT, especially mobile and smart phones as well as social media. This has also affected their feelings of 'relative deprivation' (comparing one's situation with what it could be in another country), as well as of possible migration destinations and routes, for example through transnational networks (e.g. friends and relatives that may facilitate travel and establishment abroad).

2.3.1. Drivers of migration

A large and intertwined mix of migration drivers can be important and need to be better understood, including for example:

- Geopolitical transformations, such as war, terrorism, dysfunctional states and political persecution, most recently in the case of Syria but also in other conflict and tension zones outside Europe. Migration is increasingly used as a weapon in the new geopolitical power game by different states and groups. There are also conflicts and crisis in Europe and its neighbourhood: Ukraine, Caucasus, the Middle East, and the MENA countries.
- Environmental and climate change factors, especially when these affect basic survival and even general standards of living.
- Economic interests in natural resources.
- Poverty (although it is often not the poorest who migrate as migration has high costs), economic aspiration, lack of work (for example for educated and skilled young people), lack of or poor social and other services including education, health and basic infrastructure. Such reasons might also be linked to the attractiveness of diaspora communities for members of the same background, such as the Chinese quarters in many European towns and cities.
- Cultural, religious and ethnic tensions.
- Discrimination of minorities and disadvantaged groups within Europe as drivers of mobility, for example the intra-European migration of the Southeast European Roma.
- The possible role of colonialism and capitalism which, some argue, has attempted to impose predefined models of democracy on conflict and tension zones, largely to ensure their own interests rather than those of the colonised countries themselves.

Research and innovation are also needed into the abundant and complex mixes of reasons why migrants attempt to move to potential host locations, including for example:

- Peace and stability, especially for migrants from conflict zones outside Europe many of whom might later be accepted as asylum seekers if they are fleeing persecution of various types.
- Perceptions concerning the ways of living, employment and even gender relations in potential host societies, which might be regarded as a life quality factor for migrants.
- Socio-economic migration, to find work, education, housing, good social and other services, etc.
- Cultural and ethnic migration to join existing affinity communities, whether as majorities or minorities, where the potential migrant would feel culturally at home and achieve a better quality of life, for example in the diaspora communities mentioned above.
- Family reunion as the largest single factor explaining immigration in Europe today, with between one quarter and one third of the total.
- Attractive or feasible migration routes from the locational origins of migrations to destination locations, whether legal or illegal, the latter perhaps facilitated by people smugglers and traffickers.

2.3.2. Migration dynamics

Migration is a dynamic process which needs to be seen within a time dimension and can sometimes last a lifetime or even many generations. In this context, there may be many different forms of migration, such as temporary, permanent, return or replacement. Barriers to migration may also be important, such as the issue of whether borders are open or closed

and the different political and legal regimes in each country or region *en route*. After the immediate post-1945 migrations across Europe, the current migration has been the largest experienced in quantitative terms whilst also raising many qualitative and often ambiguous issues. The former requires better data and statistical analysis, whilst the latter requires nuanced discussion and analysis. Given that post-Soviet countries have specific issues with democratisation and are still state and culture building, there may be particular economic and political/democratic concerns compared to Central East Europe and Western European countries.

There are often significant impacts on the localities losing migrants which need to be examined. For example, especially in the context of socio-economic migration, serious issues around the concepts of 'brain drain', 'brain gain' and 'brain waste' can occur when the mainly young, economically active and often male migrants leave either permanently or temporarily to find work and education. However, this is a contested scenario, which does not take account of the different locational origins of migration, for example whether from Asia, the Near East or Africa. In situations where migrants are the main income earners, many send financial remittances home to their families on a massive scale, hugely surpassing overseas development aid, with a view to later returning back to the origins of their migration or arranging for their families to join them in the destination location. 'Social remittances', as ideas and models conveyed by migrants back to non-migrants in the origin society, can also be highly important.

There are implications for societies *en route*, such as Turkey and Greece in the present context. In the case of Turkey, many current migrants from the Middle East share similar values, and even before the current conflict there was a socio-economic and cultural dynamic between these societies, including industrial and business activities, familial relations, strong social ties and many cases of intermarriage. It might be useful to envisage different types of 'migration pathways' as migration can take a long time and may never be final.

Migration destinations are often determined by networks of former migrants as well as by the perceived benefits of migration, although sometimes migrants have little choice where they in practice find themselves, depending typically on political as well as socio-economic factors. There are significant European-wide, national as well as local implications for Europe as a major destination of migrants, concerning for example:

- 'Integration' and 'assimilation' as some of the most important challenges and goals of migration policy. Both can be disputed terms, as can many others in the migration debate, so need careful analysis. A broad definition of integration might be to become and to feel accepted as a member of a society. However, there is concern that 'integration' is seen by some as a prejudicial process implying the take over of one culture by another where it is not seen as a two-way process. In contrast, others see it as a melting pot which mixes values and cultures leading to a new culture of common values and beliefs supported by sufficient understanding and communication to survive. In contrast, 'assimilation' is sometimes used to stress even more profoundly such take over of one culture by another, but may also be seen as producing a society which is influenced by the ways of life of both immigrant and host.
- It might be useful instead to see this perennial debate in the context of inclusion and/or exclusion. The notions of meeting of values or cultural encounters point to the more equal influences of cultures. However, it is also clear that migrants are typically a minority in the host society and thereby become heavily exposed to the culture of that

society, while natives are often only anecdotally exposed to the culture of the migrants' countries of origin.

- Specific attention should be paid to the situation in cities where tensions and potential solutions are often most visible, for example over limited resources and services. There are many actors involved in the process of intercultural dialogue in cities, such as the city administration, city councils, political parties, religious establishments, labour unions, etc. Existing case studies of European cities are not always comparable and therefore research and innovation are needed to learn lessons and develop viable solutions.
- Past strategies, case studies and failures to integrate migrants from outside the EU need research. For instance, the UK in the past has mobilised housing associations to implement its strategy to integrate migrants from Commonwealth countries, and the Norwegian integration experience has had some successes, both of which could provide relevant reference material for researchers, innovators and policy makers.
- Inter-cultural and multi-cultural values, policies, practices and their implications need to be examined, alongside intergroup relations, to address the major issues impacting both migrant and host societies. The terms 'multi-culturalism' and so-called 'separate communities' are particularly contested topics in many countries, so what these actually mean needs to be addressed on both a conceptual as well as empirical level. Systematic data is needed here as elsewhere.
- Reflection upon the issue of 'inter-culturalism' that refers to the interaction, inter-exchange as well as inter-mixing of cultures and actors, also related to life styles, societal values and the pluralisation of national identity.
- The concept of 'transnational citizenship', i.e. the disconnection of civil rights from nationality. The societal space in which civil rights are implemented might be considered to be the transnational space of interaction between actors rather than the national society.
- Social welfare systems, the labour market, etc., which can be put under great pressure given the strong regional disparities within the EU, for example, between Northern and Southern Europe, between Western and Eastern Europe, as well as within individual countries.
- There also appears to be an increasing challenge of 'involuntary' migration or 'abused' migrants, for example through human trafficking and enforced labour of especially vulnerable people like groups of women and children.
- Migration also has implications for demographic change, both in terms of the locational origins of migrations and of the destination locations. In the former, in some contexts the loss of young, often educated and creative people (graduate unemployment is high in many developing countries), can seriously weaken the remaining population. In the latter, long-term demographic change of the existing population in Europe is underway, resulting from increases in life expectancy and lower population reproduction rates, even with increases in the retirement age. This raises issues about fiscal policy, pensions, economic productivity, etc., producing the so-called 'ageing society'. Inward migration, especially of young economically-active people, can be one important solution to this challenge.
- Compared to the US, for example, Europe is often perceived as a less enabling environment for entrepreneurs who wish to 'exploit' the opportunities generated by economic transformation. Whether this perception is real or not, it has resulted in the migration of some of the best brains and most skilled entrepreneurs away from Europe, especially younger ones. Moreover, the most skilled migrants from outside the EU may not be migrating to Europe for the same reason.

Internal migration within Europe as a growing process should also be examined, especially amongst young people. This can often be seen as a positive process since it enables people to choose where to live and work independently from their birth nation. More opportunities might be equated with more liberty, so the current youth can perhaps be seen as the first truly European generation. The questions for research include the impact of internal migration and the new challenges arising, such as a multicultural society, the transformation of family and local communities, undermining the rationale for public education as one nation pays for the benefit of another, the right to vote, national insurance, etc. This phenomenon is also linked to the changing economy and affects future governance.

Post-migration research and innovation should also be an important focus in providing insights into the issue of migration and values. This might include the multi-disciplinary examination of:

- The changing 'ways of life' of both migrant and host communities living in 'different' countries, as these changes from both perspectives.
- How migrants can enhance the quality of life of the host country by bringing new ideas, cultures as well as new skills and competences.
- How refugees, migrants, asylum seekers and the 'brain drain', for example, reflect the many different circumstances of the individual and their own free will in very different contexts. These might range from escape from danger to the attraction of a good education. Migration from Europe can also involve wealthy, often elderly, groups moving to warmer more luxurious locations, perhaps in 'gated communities', or as so-called 'tax exiles'.
- The threat of alienation and even radicalisation of a small number of second and third generation migrants, populism in host societies in the context of the financial crisis and austerity conditions in many countries, and the perception of 'flawed' European foreign policies over the past ten to fifteen years. This is leading, on both the extreme left and right of politics, to the growth of new social movements, and in some cases the formation of vigilante groups and the use of violence.
- Post-secularization and the so-called 'bitter moments' of European history, for example as seen in the recent clear shift from a modern laicism-driven society into an increasingly nationalistic and religious-driven society, with consequences even at the level of some countries' founding constitutions. These represent potentially existential challenges to European values and culture. For example, how to protect and defend the EU's founding principles of justice-fraternity values which some see as threatened by large numbers of diverse migrants; how to identify migrants who arrive as 'infiltrators' with possible radicalisation intentions, and what measures can we take, not just in terms of physical walls but also culturally and politically?
- Post-secularization is also a field of research that allows the exploration of dichotomies (political, cultural, etc.) between countries which are open to cultural diversity. This might be done, for example, through religion (both by calling religion to the fore, as in constitutional changes) or by totally excluding it from the public dimension (as in symbols, excluding or prohibiting certain ways of living).

2.4. Cultural and integration research

In the world of the early 21st century, the Humanities and the Social Sciences, besides their intrinsic value, are important means to address the challenges created by the on-going social and economic transitions particularly in three fields. First, to face the culture of migrants it is necessary to be secure in one's own culture, as well as to understand the culture of the migrant. Second, to provide both knowledge and understanding of the wider European

heritage, as well as that of migrant communities, is a task and challenge for research and innovation as well as for the educational system. Third, independent of these two closely interconnected challenges, the Humanities as curators of the cultural heritage of the continent, are curators of a resource of great importance for the further development of the economic potential of the creative industries.

2.4.1. The culture of migrant communities

Knowledge about the cultures and societal conditions of migrant communities is necessary on two levels. On the one hand administrative measures for an immigrant community have to understand that community without being perceived as hostile. On the other hand, the society that is expected to integrate new communities, has to understand them to avoid hostility bred by anxieties borne from ignorance. Both goals require research into the background of the currently arriving communities. For this purpose we need procedures which enable the monitoring of the social and cultural background of the new arrivals. On a very fragmentary level, such knowledge is already being collected. For example, on the most pragmatic level, planning for the integration of the new arrivals into the labour force requires resilient knowledge about the educational level of those arrivals. However, given that knowledge is currently collected in an uncoordinated manner by some national agencies, a stringent monitoring programme is needed.

This research requires a combination of Social Sciences and Humanities' knowledge and methods. The Humanities, in particular can provide the knowledge needed to understand the background of migrants, which is based upon research into the culture from which they come. For this purpose, a two-step monitoring approach is needed. For all countries, or distinct regions within countries, which are currently sending immigrants into the EU, background studies of the currently relevant characteristics of their cultural and social systems are required. This should be prepared in a form that makes it possible to derive relatively quickly the information needed to design interview modules which can be applied to migrants to obtain a better understanding of their background. These background studies can be operationalised as educational modules described in section 0.

This background should include, but not be restricted to, information about:

- The current social system of the countries of origin.
- The concrete state of the religious communities within the respective societies and their interrelationships.
- The 'self-evident' cultural assumptions within the immigrant communities and the interrelations between these communities.
- The view the various communities within these countries have of their own past and their cultural tradition, contrasting these views with the understanding of them held by the outside world.

Such an examination of the original cultures of the migrant populations needs to be supplemented by an analysis of the modalities of adaptation into receiving societies. In this context, contributions are needed, for example, from the political sciences (in order to study the mobilisations of the associations in civil society), from sociology (for the study of the social attitudes of the immigrants but also the role of religious organisations in their process of integration), and from anthropology (to take into account the question of the daily interactions with the populations of the host country).

1. The modalities of installation in the host societies. How do migrants fit into the culture of the receiving society? How do they organise their existence in this new environment (work, neighbourhood, marriage, etc.)? How do they build their new identity? How do they articulate their initial identities with the culture of the country where they live? Are there differences between the populations welcomed according to their cultural, religious or historic background? Do social, sexual or religious variables play a role in the processes of integration?
2. The three types of actors involved in migrant integration in the receiving society. First, immigrants' associations, which often allow their members to maintain a transnational link with their country of origin, but which, at the same time, develop for them demands of recognition in the receiving society. Second, the strategies of religious organisations towards the migrants. Third, the state administration and the public policies of integration (see below).
3. The historic stages and processes of integration. It is important to raise the question of the work of the generations. How do populations transform their relationship to the host societies? It would be useful to question the hypothesis of a linear and harmonious acculturation of the settled populations. Research and innovation should also examine the phenomenon of the 'resistance' of the second and third generations to the integration process.

2.4.2. The culture of the receiving society

The integration of migrants into the receiving society should be considered as both a challenge and as an opportunity to integrate them from the outset, not into the traditions of one of the Member States of the EU, but into the EU as a whole. This could also be seen as an opportunity to create a more general understanding of the European tradition and culture which is more than just the sum of the traditions of Member States, as well as to stimulate such understanding across the Member States themselves.

On the conceptual level, it is generally the case that the Humanities and the Social Sciences are still primarily studied within the national frameworks within which they were shaped during the 19th and 20th Centuries. Many European countries have looked at their textbooks for secondary and primary education bi-nationally to emphasise commonalities rather than past conflicts, particularly in the teaching of history. However, more is needed. Many such efforts have so far focused on the suppression of traditions of conflict and rivalry, but a more positive approach is required, i.e. the intentional presentation of the integrative aspects of European culture. This should include a stronger emphasis on the huge effects migrations have had on the development of European culture and society, both as refugees and other groups leaving their countries of origin to escape unfavourable conditions or outright persecution. It should focus on members of the cultural and other elites that today are often considered as an integral and central part of the national cultural heritage of their target countries. In addition, consideration should be given as to how culture influences the social, political and economic functioning of the different societies affected by migration. Europe's identity is broader than the sum of individual nations. Like any other identity, however, it does not only include, it also separates. It is also important to understand what is different between Europe and its neighbours, and what constitutes the sum of the national identities converging in Europe.

Research dedicated to the identification of such traits of a European culture which is more than the sum of its cultural parts, can deal with the whole breadth of the Humanities:

- The importance of the trans-national mobility of cultural elites in the past, in literature, music as well as the visual arts.
- Migrations into the centres of industrial development, many of which created problems of integration and which are similar to the ones we encounter today.
- The integration of whole communities, persecuted in their countries of origin, into a new country.
- Are there polarisation effects on society and how can cultural and other forms of resilience be developed?

The study of migrations also needs to take into account the public policies of states towards populations recently arrived, but also the reactions of populations in the host country. At this level, it is probably necessary to develop comparative analyses.

- First, the construction of integration policies. Several types of policies have already been analysed, for example related to employment, to housing and to town planning. It is also necessary to take into account artistic policies (for example how are immigrants represented in museums and cultural centres?), media policies (for example, what image do the media present of their presence,) and in terms of educational policies research and innovation should focus on the question of the 'rearmament' of the values of Europe and its constituent nations.
- Second, the reception of immigrant populations. The question of the integration of the immigrants has aroused, and continues to arouse, diverse reactions in Europe. Two types of research and innovation could be developed at the level of civil society: a) the modalities of welcome of the immigrant populations, through a study of the strategies of certain militant organisations, but also through ordinary interactions (such as marriage and neighbourhood relations); and b) the modalities of rejection of immigrants, for example through new discursive productions and new militant and populist mobilisations.

2.4.3. Teaching to integrate

Both in order to integrate migrants into the EU, as well as to spread stronger feelings of identity with and social inclusion within Europe among the migrant population, new approaches to teaching should be promoted. An orchestrated effort is needed to propagate Europe's cultural heritage through modern teaching technologies on all educational levels.

For the immigrant populations this requires:

- Digital teaching modules which introduce the migrants to Europe's culture, presented from a viewpoint transcending national traditions.
- The preparation of these as templates to be adapted to the languages of the migrants' various countries of origin, as needs arise and change.
- The creation of such resources should be supported by incentives for the creative industries, in close synchronisation with cultural and educational systems.
- The adaptation of these to all levels of education, teaching and training, as well as the self-teaching of the adult immigrant population.

In exactly the same way, there is a need to improve the integration of research and innovation results into the integrative results of earlier migrations within Europe. This can be used at all

levels of the educational system to improve the understanding of Europe as a continental society as the result of successfully overcoming regional differences and controversies.

See also section 3.3.4. on the European cultural heritage as a driver of technical innovation.

2.5. Impacts of migration

In addition to examining those impacts of migration which are seen immediately (such as language, culture, housing, work, etc.), it is important to look at longer-term impacts, alongside other potential micro, meso and macro impacts. In particular, research and innovation are needed to better understand, measure and, if possible, forecast the impacts on the demography of an ageing society, on the labour force, on growth in general, on public finances, on social and public services, and on remittances. Like the short-term impacts, such medium and longer-term impacts on societies, whether on the locational origins or destinations of migrations, are often hotly contested politically and are typically polarised into either negative or positive debates. If the short term impacts can lead to difficult situations in the receiving country (such as raising unemployment and adding costs to the public finances), the long run evolution should be more positive in the context of an ageing society. Nevertheless, the long-term impacts are influenced by the capacity of the receiving society to absorb the shock of immigration waves without suffering a major structural shock. Getting a better balance and understanding of the policy and other implications is thus an essential research topic. In this respect, modelling and measuring the short and long term economic impact of migration and the transition from the short to the long term is essential.

The debate often polarises around the question of whether migrants are a 'drain' on the host society or a 'boost', and what makes the difference. Potential negative impacts are often cited as the undoubted strain on local resources, services and infrastructures, as well as migrants taking available jobs away from the host labour force by accepting lower wages and poorer working conditions, at least initially, notwithstanding national and EU regulations on these issues. This might, it is sometimes claimed, lead to a labour market 'race to the bottom'. On the other hand, it is noted that such migrants are often prepared to take otherwise essential but temporary, seasonal and what might be described as 'unpleasant' jobs, that the host population is not prepared to do, thus filling an important gap in the labour market. A general issue in this context is the 'bias of technological progress' and that educational systems in receiving societies typically produce too many unskilled people, so that the inflow of unskilled migrants adds still more unskilled labour supply. A better understanding is required about which characteristics of Europe's legal, social (social security) and educational/training systems make our societies more or less resilient to migration waves, which are themselves diverse in terms of level of education and entrepreneurship.

In contrast to the often pervasively negative view of migration impacts held by much of the general public, the positive impacts of mobility and migration for European business, innovation and cultural richness need examining. For example, given that migrants tend to come from societies that lack resources relative to Europe, many can become start-up entrepreneurs exemplifying inclusive and frugal innovation approaches which Europe generally lacks. Thus, it is important to critically examine the current overly negative framework, discourse and media-inspired narrative of migration in Europe. In this context, research and innovation actions could investigate the possible advantages in tilting the balance from a static Europe made up of more or less well defined nations into a more fluid Europe in constant change, transformation and renewal.

As noted, the public discourse tends to undervalue the positive impact of migration for Europe as a whole. One aspect of the European project is to foster mobility and decouple individual aspirations from national citizenship, for example through the Erasmus programme which has provided opportunities for millions of young Europeans to travel, study and then work and live wherever they decide across Europe. They now represent one of the main engines of entrepreneurship and innovation, although their rights are not always equally recognised in all countries. The recent economic crisis has accelerated the process. Large numbers of young people have left countries with high unemployment looking for better job opportunities elsewhere. In addition, millions of pensioners have relocated to other Member States for a better lifestyle. Mixed marriages between European and non-European citizens are also increasing, reflecting human mobility steered by globalisation. This type of migration perhaps demonstrates the value of competition between cities and regions to attract the best talent⁶. It might also be seen as global competition to increase standards of tolerance, multi-culturalism, creativity and innovation, and is perhaps the best counter strategy against populism.

New technologies and especially social media, are also having significant impacts on migration, for example in relation to refugees currently trying to reach Europe, both for collecting information as well as organising themselves. They also create considerable risks in terms of privacy and data protection. This needs to be an important area of migration research as it can also provide enormous economic opportunities. Currently, there are virtually no European ICT companies successful exploiting this potential, so research and innovation are needed which can assist in creating a new generation of social media able to:

- Replace the unreliable information currently provided by people smugglers with objective sources of information, for both refugees contemplating the trek to Europe and those that have already arrived.
- Facilitate the establishment of social media in such a way that SMEs representing Europe's cultural diversity can market local-language-optimised solutions based on a common infrastructure.
- Keep the resultant data safe in an area where privacy can effectively be protected by European legislation.

2.6. Cross-cutting issues

The following five issues potentially cut across all the research and innovation recommendations made above for the major theme of migration.

2.6.1. Gender

There needs to be a specific cross-cutting focus on gender, not only as a standalone issue. In many situations, women are the most vulnerable individuals among refugees, both as treated by the group and in the way European policy responds. Women are also more likely to be left behind or to be trafficked, whilst young single male refugees often travel alone and are more likely to become alienated and drawn into criminal activity. The transformation of migrant and refugee communities in Europe is a specifically gendered topic which needs to be researched separately. The complexities of tendencies such as the radicalisation and populism of individuals in different communities cannot be understood without a gender dimension.

⁶ Florida, R (2005) *The Flight of the Creative Class: The New Global Competition for Talent*, HarperBusiness, HarperCollins

A gendered perspective should not only focus on women. There are many young single male refugees who need to be included into society in a productive manner, so that their abilities can be used and enhanced, their welfare secured, and the stability of European societies can be maintained. However, it is clear that in some cultures and ethnicities, women are the family carers and this has been widely used as a positive strategy, so that for example financial resources are entrusted to them. This implies that research and innovation needs to include a wide range of different approaches to tackle the 'integration' topic.

2.6.2. Ethics and values

European ethics and values are being severely tested during the present large scale migration, leading to a questioning of European identity and its peoples' understanding of and reaction to increasing diversity. Migration leads to a 'meeting' and sometimes a 'clash' of values. Migration, both in Europe and more generally, needs to be seen in the context of global inequalities, for example the global South-North divide, as well as the situation of the so-called emerging economies. Socio-economic inequalities and regional disparities (including in the European regions) are important, for example in relation to migration in general as well as the migration of vulnerable groups like the Roma in addition to immigrants from outside Europe.

Such inequalities, whether as the causes or consequences of migration, also have fundamental meaning for European values and culture, for example in relation to:

- Justice, both as perceived in terms of 'natural fairness' and morality, and in formalistic legal terms, as well as their mis-match and potential conflict.
- The ethical dimensions of migration which require political philosophical analysis and research into the manner in which Europe is responding to the refugee/migration crisis. This includes, for example, Europe's fundamental values, the historical and philosophical developments and legal foundation of these values, as well as their contemporary contestations and re-conceptualisations.
- Human rights, for example as challenged by the 'spectre of death' at EU borders as a provocation to European values. The current state of the definition and implementation of human rights based on UNHCR norms in relation to recent developments at these borders, and the important role of civil society, need to be examined.
- Issues of democracy, as currently understood and practiced in Europe, where there were already concerns about the 'democratic deficit' before the current migration 'crisis', and how these need to change in the context of millions of migrants without any formal democratic rights.
- Solidarity, also with civil society, both among EU Member States and with non-EU countries, in addition to being a political principle in its own right within a globalised environment. This might also be related to EU treaties for dealing with other countries, as for example through the UN system.

2.6.3. Digital

Digital tools have at least four important impacts on current European migration which require a cross-cutting research and innovation effort. First, they ease and facilitate the flow of

migrants, making it much easier for migrants to plan and coordinate their journey, for example using smart phones. Second, ICT makes it easier for the authorities to track and trace migration flows, as well as for those providing services to plan and deliver these in often difficult and sometimes acute situations. For example, in operating Turkey's disaster and emergency management responses in catering for millions of refugees using modern logistical systems. Third, digital as well as traditional media create awareness amongst recipient populations regarding migration as an issue, as well as for those living in potential source locations regarding the potential benefits of migration. Digital technologies can also provide highly flexible and inexpensive educational and training materials to assist migrants arriving in host societies to improve their integration into the labour market and in the wider society.

2.6.4. Sustainable development

It is argued that global sustainable development goals, which include poverty eradication and respect for human rights, are being undermined by the European emphasis on border controls and security concerns, both in terms of political priorities and financial and technical assistance.⁷ All EU Member States signed the United Nations' Sustainable Development Goals (SDGs) in 2015, acknowledging the positive contribution of migrants and migration to sustainable development. Migrants can be key development actors and migration needs to be made to work for sustainable development and for the benefit of both migrants and receiving societies. Focused SC6 research and innovation is thus required to examine how development potentials can be achieved. The implementation of the SDGs is an opportunity for Europe to reemphasise the need for rights-based EU external migration policies and to promote coherence with longer-term development objectives.

2.6.5. Europe in the world and international collaboration

Migration is an international and global issue which cannot be addressed only within Europe or by European policies alone. International collaboration with both governmental and non-governmental bodies is thus essential for better understanding and therefore more effective policies and policy implementation. Geopolitical changes can often trigger migration movements, so it is important to study what geopolitical consequences follow from all aspects of migration, both in Europe and in the source locations of migrants. What does migration mean for Europe as a world actor and what does it mean for the external view of Europe?

Migration policy needs rapid, flexible and long-sighted measures starting with policy innovation, changes in governance (e.g. when does an immigrant get the right to vote?) and programmes to equip people and all institutions and companies to deal with the change.

Good practice examples in managing migration flows in single EU or non-EU countries should be considered. Important governance and policy issues requiring a research and innovation focus include, but are not restricted to:

- Addressing the WEF⁸ risk analysis of high-level geopolitical and societal risks which includes profound social instability, large-scale involuntary migration, state collapse or crisis, interstate conflict and the failure of national governance. These require governance and policy responses at all levels, not least internationally.

⁷ <http://concordeurope.org/2016/01/18/migration-development-spotlight-report-launch/>

⁸ World Economic Forum (2016) Global Risks Report 2016, 11th Edition.

- Although increasingly typified and regulated as a ‘brain-drain’ of highly skilled workforce, the skill sets of migrants into Europe that have historically been encouraged by European governments to offset local shortages in the labour market, have also included low-skilled or semi-skilled labour. The greater the encouragement and facilitation of the migration of high-skilled workers, the more likely it is that this will undermine the perception of Europe as a responsible global influence. These inter-relationships need to be understood in the context of the international agenda.
- For example, the need to rethink the EU’s Africa policy. High growth rates in the last 15 years have led to the belief that Africa, the world’s poorest continent, will become ‘the China of the 21st Century’. At the same time, the African population will double by 2050, and this is likely to increase its migration potential. In a context marked both by an above average pace of economic expansion and a booming population, an ageing European Union (EU) will be directly confronted at its doorstep with all major developments, positive or negative, affecting the African continent. In view of such challenges, Europe needs to define an ambitious strategy, beyond its traditional role of main development aid donor, to contribute more effectively to African development and to create the conditions for it to become sustainable, whilst not denying the likelihood that some African migration might be beneficial for Europe. In contrast, China embarked at an early stage on large-scale economic cooperation with Africa. The proposed EU-EAC Network aims to promote a tripartite cooperation system between the EU, Africa and China to create a favourable framework for sustainable development. It argues that the EU’s and China’s comparative advantages can complement each other for the mutual benefit of all three parties.
- Creeping restrictions on the free movement of EU citizens, such as the Roma deportations since 2010 onwards, as well the proposed restrictions of access to social welfare for EU migrants in EU member states, as in Germany and the UK.
- The role of Turkey in Europe’s and the broader Middle East’s refugee crisis.
- The destabilisation taking place in the Caucasus, Moldova and Ukraine.

The important actors also need to be considered when examining the governance of migration, not just the nation state and supranational institutions, but also for example:

- Civil actors (e.g. grassroots movements, local actors/societies, NGOs, etc.)
- Human rights agencies (local, transnational, etc.)
- Representatives of migrants.

3. The human and social dynamics of the Fourth Industrial Revolution

3.1. Understanding the societal context of technological and economic development

The WEF (2016) defines the Fourth Industrial Revolution in the following way: *“The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is*

*characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres”.*⁹

The term ‘Fourth Industrial Revolution’, although widely used, needs careful unpacking in an SSH context. Those working in the field use it to refer to the full array of socio-economic, geopolitical and demographic developments that are impacted by the technological revolution, both in its third and fourth manifestations. The pace, scale and scope of change under the Fourth Industrial Revolution is argued to be unprecedented, even in comparison to the Third, and will touch upon virtually every aspect of modern living. Whilst some changes in the Fourth Industrial Revolution may be evolutionary in isolation, in aggregate it is hard to conclude that the overarching societal and human impact will not be revolutionary and therefore in critical need of a timely and robust SSH analysis. From the perspective of research and innovation on reflexive, inclusive and innovative societies, these topics should be addressed in relation to their impact on human life and the quality of the society in which they are embedded and which they should serve – i.e. their role in creating the sort of society to which European values and ideals aspire.

On some estimates for the Fourth Industrial Revolution, 47% of US jobs are said to be at risk from automation¹⁰, whilst the WEF estimates that by 2025, “robots could jeopardise between 40m and 75m jobs worldwide”. The WEF also estimates that “65% of children entering school today will end up working in jobs that currently do not exist.” It seems clear that in future, ever fewer low-skilled and managerial jobs will be available. The fundamental problem is what to do with a work force in excess and chronic unemployment? These issues require urgent research and innovation actions, especially in the context of one of the clear benefits of migration that migrants often undertake types of work in working conditions that existing labour forces are not often prepared to accept. Given the prognoses of many fewer jobs in future, will this continue and, if so, how will the changes play out?

Notwithstanding this, some researchers see the current apparent breakthrough of the Fourth Industrial Revolution (artificial intelligence, big data, the internet of objects, nano-materials, 3D printing, etc.) as portending a huge impact on productivity in the next decades. As in the last 40 years, GDP growth may be understated. The GDP statistic is indeed a bad indicator when it comes to measuring quality improving technical progress. Moreover, for future generations, progress in the standard of living will be less represented by the quantity of products, of which they will be progressively saturated in the developed countries, than by improvements to their quality and broadening global reach. Also important are likely to be improvements in both the quantity and quality of services provided, essentially with a large involvement of the public sector, which is generally poorly measured in the GDP, so perhaps supplementary measures are also required. Some will see this as incremental change, rather than a ‘revolution’, but nevertheless empowering significant new opportunities through innovating tailored services and personalised products that are increasingly supplied ‘on-demand’.

These issues illustrate just some of the pressing research and innovation implications at stake, not least in order to inform both policy and practice. It is clear that the new technologies underpinned by ICT are having large impacts on almost all aspects of human life, culture, welfare, lifestyle, wealth creation and employment.

⁹ <http://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond> (retrieved March 2016).

¹⁰ Carl Benedikt Frey and Michael A. Osborne (2013), *The future of employment: how susceptible are jobs to computerization?*, Oxford

3.2. Historical perspectives

Historically there is mixed evidence for characterising current and recent changes as a Fourth Industrial Revolution, so its antecedents need careful scrutiny. For example, GDP per capita growth was significant during the First and Second Industrial Revolutions, whilst since the Third there has been much lower productivity growth. However, this is a contested view, both because of different interpretations of historical data and because it sees an industrial revolution as only predicated on productivity growth. It thus ignores changes to production processes, types of work and human and financial capital, and not least the broader potentially disruptive societal effects.

More broadly, research and innovation actions are needed to better understand how ICT as the new general purpose technology (i.e. one that underpins and enables most if not all other technologies as well as how society operates and is structured) is changing society and how society is, in turn, shaping the technology. Previous general purpose technologies consisted of:

- the revolution in transport and communication, 1840-1870
- electrification, c. 1890-1940
- the rise of mass (broadcast) media, 1940-1970
- the current paradigm shift based around ICT which started in the 1970s and continues.

As proposed above, the Fourth Industrial Revolution, which is blurring the lines between the physical, digital, and biological worlds, can perhaps now be added to this list of general purpose paradigm shifts. Each of these was brought about by their own radical general-purpose technologies that had a momentous impact on the economy and society of industrialised nations. In that way, they serve as models for current developments and demonstrate how private, public and civil interests interact in creating new goods and services, new institutions, as well as new values and ways of living. Each historic case illustrates a general purpose technology that transformed the life of all households, citizens, firms, and governments, down to the lowest level. The pace of technological development in each was high, and is today increasing even faster with ICT. The geographical scope of the impacts is also increasing. For example, transport, communication, and electricity were mainly national in nature; some broadcast media had an international impact; but now ICT and the other new technologies are ubiquitously global in orientation.

In sum, the historical antecedents of technological and economic development, particularly in the context of well-being and societal development more generally, require a very strong research and innovation focus if policy makers and practitioners are to better understand and adapt past lessons to future conditions and potential, such as the transition to individual, very local, lifestyle choices and work patterns.

3.3. Drivers and dynamics

3.3.1. The Fourth Industrial Revolution and the policy background

The Fourth Industrial Revolution should be seen in the context of the current European Commission President's agenda. The so-called Juncker Priorities include jobs, growth and investment; the Internal Market; the Digital Single Market; the Energy Union and climate change; a deeper and fairer European Monetary Union (EMU); a balanced EU-US free trade agreement; justice and fundamental rights; migration; Europe as a stronger global actor; and democratic change. The new EC Innovation Commissioner for Research, Science and

Innovation has also articulated three openness priorities: open science, open Innovation and open to the world. It is also important to focus on the Europe 2020 Strategy, and in particular issues such as:

- Innovation and competitiveness; abundant and green energy versus expensive and polluting energy; as well as traditional economic values versus new sources of value.
- Sustainability: the economic growth model (for example, linear versus circular and ecological); and governance issues such as elitist and exclusive versus participative and inclusive.

Although SC6 is not focused on the technological drivers per se, they do involve a concurrent set of socioeconomic, geopolitics and demographic developments making it is necessary to be fully aware of their human and societal impacts. The main (and in many ways dramatic) technological developments driving the Fourth Industrial Revolution include artificial intelligence (AI), machine-learning, robotics, the Internet of Things (IoT), digital fabrication, nano- and bio-technologies, materials science, energy and energy storage, big data and data analytics, quantum computing and hyper-connectivity, block chain technology and drones.

3.3.2. Societal challenges and impacts

The potential for the Fourth Industrial Revolution to impact all aspects of human life and European society, economy, culture and well-being is huge, requiring a focused research and innovation effort to ensure that the right decisions are made to minimise massive negative disruptions and maximise positive new opportunities. Some likely impact areas include:

- Adaptation of jobs and working practices, including longevity and ageing societies, female empowerment, youth employment in emerging markets and flexible work.
- Collaborative economy and societies (see below)
- Innovation and creativity
- The role of the new creative industries (see sections 0 and **Error! Reference source not found.**)
- Creativity and (digital) cultural heritage through the integration of creative activities (arts) with technologies and business, for example in terms of the semantic interoperability of databases, gamification strategies and qualitative visual research and innovation methods (see below)
- Lifestyles and social media
- Big data for societal challenges (see below)
- Data ownership (e.g. individual versus the creative commons); values (consumerist and materialistic versus non-materialistic).
- Radical opportunity spaces, such as global governance (effective global governance versus a fragmented world); and individual attitudes (e.g. engaged versus opting-out).
- New international, intercultural and Internet-orientated education systems.

Uncertainties abound such as, on the one hand, one view contending that only parts of industry and a limited share of jobs are changing, and that industry and labour is also characterised by stability, thus maintaining that Europe remains faced with the traditional question of how its industry is going to meet the challenges of global competitiveness. On the other hand, such views are perhaps only looking backwards, whilst at the present time there are many indications of widespread and deep-seated economic changes, for example in

relation to the type and number of jobs, as discussed above. According to Rifkin¹¹ and others, the main areas of progress are expected in the treatment of information, knowledge, intelligence and artificial intelligence, whilst the very nature of these innovations is leading to the marginal cost of their delivery and their prices tending rapidly to zero. The free nature of much knowledge and services potentially represents an important democratisation of access to such goods and services. "This fact is rarely considered in attempts to measure inequality"¹² and growth.

European countries today create most of their wealth and have most of their employment in the service industries as compared to primary production or manufacturing, although the latter is also experiencing a renaissance based on innovations in digital fabrication and the factory of the future. However, notions of 'services' and 'manufacturing' have always been blurred, both because there are many 'service' jobs in manufacturing industry, such as administration, marketing and R&D, and because many producers of tangible products are increasingly perceiving what they sell as a 'service' rather than a 'product'. Thus, car manufacturers are selling mobility as a service, and washing machine manufacturers aim to sell clean clothes as a service. In turn, this leads to new business models in which, for example, consumers lease products rather than purchase them as they are less interested in a particular product than in the service it can provide.

Thus, it is contended by some, that seeing manufacturing industry as being in conflict with the development of service industry is a false dichotomy. Although the manufacturing sector remains dominated by large organisations, such traditional and often hierarchical structures are losing out to much smaller and more nimble units in the Fourth Industrial Revolution. A strong new trend sees much new manufacturing taking place in small units, including independent SMEs and social entrepreneurs, for example as driven by new digital fabrication (3D printing) technologies. These are often characterised by social networks (driven by social media rather than geographic location), considerations of economic survival, constant change and individual lifestyle choices, and most indeed are merging aspects of both product and service into one mindset. The interplay of these two trends and their societal implications needs careful research and innovation actions.

Other examples include many of the new sharing and collaborative economy business models which also blur the relationships between producer, supplier and consumer. Some of these imply some shift toward the 'experience economy' where experiences become more desirable than objects, especially when imagining a shorter workday, larger incomes and more leisure time. Such a shift also implies people's reflective desire to find other meanings in life than purely consumption. These developments can also have profound implications for supply chains, for the organisation of work and for the jobs to be done, which in turn will have impacts on governance and regulation, as well as on education and social security systems.

Large changes in the structure of the population (due to population ageing through increases in both the number and proportion of elderly people, birth rate reductions, and migration) will all require the provision of more and better services. These will be especially in the health and long term care sectors, in the education system and in professional training systems, all of which are starting to use big data to become increasingly personalised and potentially more efficient and effective. The first and second industrial revolutions did not greatly change the

¹¹ Rifkin, J. (2014): *The zero-marginal cost society: the internet of things, the collaborative commons and the eclipse of capitalism*. Palgrave Macmillan, New York.

¹² Edward Gleaser: *Secular joblessness*, in Coen Teulings and Richard Baldwin: *Secular Stagnation: Facts, Causes, and Cures*.

provision of such services, whilst the third and now the fourth have the potential to do so if the right regulations are implemented and the impediment to their developments overcome. In addition to service needs, life-long learning and adaptive skills retraining will be critical given that the impact of technological and other changes is shortening the shelf-life of employees' existing skill sets across nearly every industry globally. For example, what changes are required in the organisation of the educational system from basic schooling to university level? What would it mean in terms of investment and accumulation of human and social capital, as well other intangibles like AI and software, courses and digital content? More importantly, how should pedagogical methodologies be reconfigured in the context of the Fourth Industrial Revolution? What are the implications of flexible working and study for institutionalised learning? What are the implications of increasing educational mobility and provision of materials in English on cultural and linguistic diversity?

3.3.3. The creative industries and cultural heritage

An important and mainly new economic sector for Europe, which might be considerably boosted by the Fourth Industrial Revolution, are the creative industries concerned largely with the generation, organisation and exploitation of knowledge and information. There are numerous definitions, but many include such areas as advertising, architecture, art, cultural heritage, crafts, design, fashion, film, music, the performing arts, publishing, R&D, software, toys and games, TV and radio, video games, and sometimes the education and research sectors more generally. For many people, heritage is deeply embedded in issues of diaspora, identity and quality of life, and as such is strongly linked to the issue of migration.

The sector also has extensive economic potential, and a recent H2020 expert group on cultural heritage made a series of propositions around "Getting cultural heritage to work for Europe". This noted that Europe is the world's top tourist destination and that tourism is the third largest socioeconomic activity in the EU, contributing 415 billion Euros to the EU GDP and employing 15.2m citizens many of whose jobs are linked to heritage.¹³ It is estimated that there were 253,000 jobs in cultural and natural tourism in the UK in 2011 and that its combined direct, indirect and induced impact (the amount generated by the sector's purchases from other industries and the spend by workers) provided 742,000 jobs in 2014.¹⁴ Currently, cultural industries are perceived as additive value producing activities in two main areas: arts and their interfaces with industry; and creativity as a methodological problem-solving approach. However, one of the dangers of the economic value of heritage in tourism is that an artificial or sanitised version of a past culture may be established as a disneyfication of deeply held values that is neither a fair representation of the past culture nor particularly educational for visitors, in many cases keeping them apart from the underlying cultural values.

The creative industries represent and embody the challenges of the present economic-technological transition. When artists, scientists and technologists collaborate they are creating hybrid cultures where their different and compatible domains of knowledge collide¹⁵. There are good practice examples and excellent results in both the US¹⁶ and the EU¹⁷. Today's innovation process generally does not benefit from this, so research is needed to identify

¹³ European Commission, Towards an integrated approach to cultural heritage for Europe, COM(2014) 477 final

¹⁴ Oxford Economics (2013) The Economic Impact of UK Heritage Tourism Economy

¹⁵ European digital art and science network, Austria: <http://www.aec.at/artandscience/residencies/>

¹⁶ Steps to an Ecology of Networked Knowledge and Innovation Enabling New Forms of Collaboration among Sciences, Engineering, Arts, and Design, Roger F. Malina, Carol Strohecker, and Carol LaFayette on behalf of SEAD network contributors

¹⁷ <https://ec.europa.eu/digital-agenda/en/ict-art-starts-platform>

reasons blocking a multidisciplinary approach to innovations, especially concerning artistic participation. These might include: (i) today's education process in the EU is organised by subject in different academic discipline or sub-disciplines¹⁸; (ii) in the workplace, people are mainly organised around disciplines; (iii) as a result of studying and working in one discipline, those people who should drive changes often have prejudices that prevent them using the potential of people in other disciplines; and (iv) for those who do know how to work in multidisciplinary teams, there are few suitable environments for such work, plus often they are not included in innovation processes in a non-discriminatory way. Researchers and technologists rarely start projects with people from various types of fine arts, such as music, art, painting, sculpture, dance and theatre, etc. In the same way, when artists commence projects involving ICT they tend to include technologists at the end of the innovative process to perform services like programming, system administrating or hardware assembling. Such practices include a high level of discrimination towards people whose full potential might only be released through collaboration.

3.3.4. European cultural heritage as a driver of technical innovation

New digital technologies and especially social media in the context of the Third and Fourth Industrial Revolutions, have the potential to create new digital business models that exploit, disseminate and commoditise heritage content:

- Digital teaching modules, which introduce the migrants to Europe's culture, presented from a viewpoint transcending national traditions.
- The preparation of these as templates to be adapted to the languages of the migrants' various countries of origin, as needs arise and change.
- The creation of such resources should be supported by incentives for the creative industries, in close synchronisation with cultural and educational systems.
- The adaptation of these to all levels of education, teaching and training, as well as the self-teaching of the adult immigrant population.

In both the curatorial institutions – libraries, archives, museums – as well as in Humanities research, digital technologies have played an increasingly important role in recent years. For both however, innovative research as well as the economic exploitation of cultural heritage have relied on the application of technologies developed elsewhere. This passive approach to the connections between technological innovation and the Humanities and Cultural Heritage has been a missed opportunity. There is a need to develop an ambitious programme to proactively exploit the opportunities of new technical innovations.

Topics for such Humanities / Cultural Heritage driven research and innovation could include, but are not restricted to:

- Manuscript Optical Character Recognition (OCR). Various projects for the automatic reading of non-printed materials, from early modern and medieval handwriting, right through to cuneiform letters, have reached a stage where production quality can be envisaged within the next decade. This research and innovation will open up completely new vistas for the Humanities. As it requires new and highly generalised concepts for OCR, much broader than small improvements in existing technologies targeted at printed material, it would also open up completely new opportunities for

¹⁸ "Examples of subjects". *Curriculumonline.gov.uk*. 2009-04-20

the automatic reading of other classes of non-printed documents, with considerable economic potential.

- New technologies for wide area scans, based on magnetic resonance, ground radar and a wide array of other approaches, have brought the systematic identification of archaeological features for very large areas close to general applicability. Besides being an innovative area, where completely new perspectives for archaeology could be combined with a significant impact on the development of these new technologies, this field will also profit immensely from dedicated funding at the organisational level. In many countries the question of intellectual and administrative property rights for wide area scans is currently a major stumbling block for the systematic application of such techniques. A European approach would help significantly to overcome this.
- While 3D printing technologies have hit the market in an experimental form already, many questions are still open. The cultural heritage sector, which almost by definition is based upon unique objects, is particularly suited to study the possibilities of these technologies for both content and educational purposes, as well as for creating business opportunities. In academic research, as well as at least in the secondary tier of educational systems, the easy accessibility of 3D-printed reproductions as needed within the schools, opens up completely new possibilities. The opportunities for museum shops and other sectors of the replica business are also obvious. A new generation of research and innovation should focus on the possibilities to exploit these technologies at the outset through their thorough integration into a ubiquitous 3D infrastructure, rather than focusing on isolated pilot applications.

3.4. Ensuring risks and benefits are well distributed

3.4.1. Growth and employment

Among the economic impacts that are expected from the Fourth Industrial Revolution, the reductive impact on employment is especially worrying, as mentioned above¹⁹. Unlike in the Third Revolution, the type of jobs that are currently at risk are those which require a certain level of qualification. This is already shown in the wage statistics: salaries for medium qualifications are stagnating or growing less strongly than those of low or high qualifications²⁰. The middle class feels neglected by politicians and looks increasingly to the political extremes for help. The questions are: where can the new jobs be created? Can they be created as fast as jobs will be destroyed?²¹ And, even if they are created sufficiently rapidly, the transition from one job to another of a different nature has always been difficult without a loss of income and an increase of structural unemployment. Over the last twenty years many policies have seemed to degrade the income of the middle classes and instead transferred an increasing amount of the new wealth that has been created to the 10%, or even the top 1%, most qualified or richest sectors of the population.²²

¹⁹ See also: Brynjolfsson, E and A McAfee (2013), *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, New York and London: Norton.

²⁰ "The result has been an increasingly polarised labour market, with growing employment in high-income cognitive jobs and low-income manual occupations, accompanied by a hollowing-out of middle-income routine jobs." Carl Benedikt Frey and Michael A. Osborne (2013)

²¹ This interrogation is not new: "due to our discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour" (Keynes, 1933, p. 3, *Economic possibilities for our grandchildren* (1930). *Essays in persuasion*, pp. 358–73)

²² Oxfam (2016) *An economy for the 1%: How privilege and power in the economy drive extreme inequality and how this can be stopped*, January 2016.

This serious context requires a very strong research and innovation response that analyses how the benefits of the Fourth Industrial Revolution are being distributed. Some innovations have potentially widespread benefits for both producers and consumers, whilst others are likely to provide most benefit to skilled producers or to a new class of consumers. All combinations of producers and consumers are possible (cf. the collaborative economy). It is clear that innovations benefiting, at the same time, a wide range of producers and consumers would be much more important for growth, employment and living standards. A number of research and innovation topics arise from this:

- Can human labour win the race against technology by means of education and training? What type of new education and training models are needed to meet a growing market demand for more social and collaborative skills to complement technological skills, given that emotional intelligence is one of the critical skill sets needed in the Fourth Industrial Revolution, and yet has been almost entirely disregarded by traditional educational and employment models?
- What is the potential extent of technological and other causes of unemployment, given that the increasing pace of technological change is likely to cause higher job turnover, resulting in higher structural and frictional unemployment rates?
- What are the implications for women's employment given that women are largely employed in precarious jobs?
- How are our present gendered stereotypes and imagination influencing the way technological development will develop in the future?

3.4.2. Industrial structure and externalities

As in the previous industrial revolutions, scale effects and competitive advantages are likely to lead to a concentration of supply in a few multinational companies. But an important research and innovation topic is whether the Fourth Industrial Revolution will be the same or different? It is critical to examine whether or not 19th and 20th century legal and regulatory frameworks remain suitable for the 21st century economy and society. On the one hand, there is a danger that we simply look backwards and try to adapt models that have worked in the past, rather than truly envision and anticipate the future needs and possibilities that the Fourth Industrial Revolution can unlock. The early enthusiasm around the sharing and collaborative economy appears to be leading in a few cases to new forms of industrial concentration and monopoly economic power. For example, early starters like Airbnb and Uber are now billion dollar global enterprises able to massively invest in new markets and, according to some sources²³, undercut and wipe out the incumbents, and then, potentially, gain monopoly power. These new multinationals, in contrast to mainstream sharing economy initiatives and the values and benefits they promote²⁴, are said to be promoting a 'race to the bottom' in terms of wages and employment conditions.

On the other hand, it is also undoubtedly the case that many examples of the sharing and collaborative economy are helping to squeeze new value out of existing (heretofore 'wasted') assets and to promote new waves of innovation. If the policy makers and regulators handle it well, there could be outcomes where benefits are widely distributed through, for example, star or network configurations based on AI. This is and can dramatically change sectors like music, entertainment, education, research and higher education.

²³ Such as Slee, T (2016) *What's Yours Is Mine* -- against the sharing economy, OR Books, New York.

²⁴ See for example Botsman, R & Rogers, B (2010) *What's Mine Is Yours* -- the Rise of Collaborative Consumption, HarperCollins Publishers.

A key question is how can the advent of a new Fordism be assured (but one based on mass customisation instead of mass production) which ensures a fair distribution of the productivity gains of the Fourth Industrial Revolution? If this fails to take place, the often evoked 'secular stagnation' might persist. To ensure this does not happen, what are the necessary reforms needed to Europe's social model? Are the reforms recommended today, and largely derived from previous industrial revolutions, still pertinent in the context of the Fourth Industrial Revolution? What are the roles of the private and civil sectors in contributing to and sustaining a new social model, and what is the role of governance?

Another research and innovation issue that should be addressed is the impact of the Fourth Industrial Revolution on the negative externalities engendered by previous revolutions, including the human costs of development and growth. This impact could be very positive if the new technologies can help develop products and services that are resource efficient and/or reduce congestion. For example, by exploiting new circular economy principles, Blue Growth (i.e. the role of the world's oceans and fresh water resources), sharing and collaborative economy principles which maximise asset use through sharing rather than ownership, etc. Apart from reductions in CO₂ emissions, improvements in standards of living can be expected if people are able to reduce drastically the time they spend in traffic jams. Indeed, the policies which are aiming to prevent pollution disasters, and which are presently very costly, try to avoid reductions in standards of living rather than increase them. In order to get the best out of the new technologies, the changes needed in societal organisation need to be better understood.

3.4.3. Negative and positive outcomes

As is evident from the above, there are potentially contrasting and highly interdependent negative and positive societal outcomes likely to arise from the Fourth Industrial Revolution. These, in turn, are of course subject to both cultural and political filters, which also require examination. There is a potential down side of the Fourth Industrial Revolution that means loss of employment, disruption of traditional institutions, changes of habit, displacement and fear for many. Research and innovation should encompass the cost of transition (e.g. loss of jobs for unskilled workers replaced by robots, and the shrinking of managerial positions thanks to automation, changes in university curricula, etc.), mitigation strategies, and political risks such as the rise of populist movements representing losers and discontents, and voluntary disenfranchisement.

Whatever happens, there will be significant impacts on welfare, jobs, work organisation, etc. For example, smart machines will soon be able to replace all sorts of workers, from accountants to delivery drivers and from estate agents and even to lawyers and other 'experts'. There are strong risks of labour force polarisation as low-skill jobs continue to be automated and this trend increasingly spreads to middle class jobs. There are many other potentially negative societal consequences:

- Data analysis work in areas such as advertising and finance is being outsourced to computers and even the authority of medical experts is being challenged.
- However, such impacts seem to depend on the type of activity – the more transactional it is, the more likely it is to be automated. If you go to a fashionable restaurant, you don't want a robotic waiter. On the other hand if you go to a fast-food outlet, you may not have a problem with punching buttons and having a burger come out of a chute.
- Further increases in inequality as automation is fundamentally the substitution of capital for labour.

- A 'race to the bottom' and a growing 'precarariat' as an emerging global class with no financial security, job stability or prospect of career progression.

On the other hand, there are also many potential positive societal outcomes which require research and innovation to underpin policies and practices:

- By absorbing the routine aspects of work, machines can release people for more creative activity or fulfilling third sector activity.
- Not all jobs are at risk. A lot of work involving personal interaction is unlikely to be affected. Few people will wish to deal with a robotic undertaker that says "I'm sorry for your loss". This is not meaningful in a human context. However, what are the consequences given that care work is currently largely feminised, badly paid but emotionally demanding?
- Tasks requiring creative and social intelligence are thus likely to be reserved for humans. However, people will have to acquire and demonstrate creative, social and emotional skills.
- There are huge potential benefits of innovation and new sources of value creation from the collaborative and sharing economy, if we handle this well in terms, for example, of forward looking forms of regulation and legal frameworks. These should, in principle, only specify good outcomes and not how these outcomes are to be achieved, otherwise innovation will be stultified. However, how these outcomes are achieved must be subject to smart regulation in terms of ensuring minimum standards of quality, no or low negative externalities, and no worker exploitation.
- There are significant potential benefits of innovation and new sources of value creation from the collaborative, co-creative and sharing economy, not least because their potential to squeeze assets both on the supply and demand sides but also as they can lead to important community building and social cohesion benefits.
- Other likely benefits include greater worker flexibility, especially if this can be coupled with greater worker security as in the Scandinavian flexi-curity systems, better and more personalised services, more potential sustainable development (such as reduced need to build more shopping malls and hotels, ability to reduce traffic via car pooling, less consumption and waste due to sharing, etc.).
- There is a lot of work in society that needs doing, not always in a market context, so the research and innovation question is how to organise society to enable this to happen. Historically, there have been many claims that jobs will disappear with no new jobs appearing (such as the Luddites in the 18th and 19th Centuries, and more recently in Jeremy Rifkin's book forecasting the end of work²⁵). All of these have so far been unfounded, but there is no guarantee that this time it will be the same.
- There are also potentially positive impacts on value and supply chains, and on the environment and sustainability more generally. In the Fourth Industrial Revolution it may be that the only economically traded (i.e. physically transported or communicated over large distances) commodities consist of i) talent (high calibre skilled people), ii) raw materials and energy inputs the occurrences of which are still geographically fixed, and iii) digital algorithms. IF so, this will have a huge and beneficial environmental impact as the number of physical goods transported over even medium distances shrinks. For example, buying a car will consist of the online customisation of the design you want, the purchase of an algorithm over the Internet, the printing of the car components locally which are then assembled by robots. And, this might only be the first step. In principle anyone will be able to design and then build their own car,

²⁵ Rifkin, J (1005) *The End of Work: The Decline of the Global Labor Force and the Dawn of the Post-Market Era*, Putnam Publishing Group.

anytime and anywhere, so why purchase anything from the car manufacturer? Such companies might cease to exist unless they adapt dramatically to what is happening and, like many other incumbents in traditional industries such as computing and media, be killed off by the forces of creative destruction. Putting this into the context of the circular economy, many other potential benefits may also be perceived.

3.5. Cross-cutting issues

The following five issues potentially cut across all the research and innovation recommendations made above for the major theme of the human and social dynamics of the Fourth Industrial Revolution.

3.5.1. Gender

Gender related issues cut across all societal implications of the Fourth Industrial Revolution, including in relation to work, education and social relations. For example, what are the consequences that care work remains largely unpaid and done by women? Why does the so-called 'glass ceiling' still often block the rise of women to positions of high power in the workplace, and why are they more likely than men to be unemployed and in precarious work? The normal academic discourse warning of a 'race to the bottom' and the formation of both a European and global 'precariat' in terms of the types of work and working conditions tends to be either non-gendered or focused on the loss of traditional male manufacturing and blue-collar work over the last twenty years. However, recent research shows that both historically and at the present time, such precarious work is much more prevalent in female employment.²⁶ This historical precariousness of paid women's work contrasts quite sharply with the contemporary relatively stable framework of male employment in both blue-collar and white-collar occupations. This, coupled with much women's work traditionally being unpaid, for example in the home, casts a new light on gendered differences in employment which requires more research, especially in the context of the Fourth Industrial Revolution.

More positively, there may be potential benefits for traditionally female oriented jobs arising from the increasing importance of emotional Intelligence in the Fourth Industrial Revolution (i.e. it is not possible to automate compassion). At the same time, it might be fruitful to explore potential ways to channel this importance into higher paying employment for women. This presupposes, in fact, that men in general do possess lower emotional intelligence than women, which is by no means established even though it may reflect current perceptions.

3.5.2. Ethics and values

What does it mean to be human in the next industrial revolution? Machines can already make decisions for us on the basis of vast amounts of data, but at least at present they can neither think nor feel that this matters, although some developments in the field of 'emotional' machine learning and AI point to possibilities. However, if we ascribe agency and intentions to our tools that they don't possess, we misunderstand several fundamental points. Humans are highly flexible and innovatory beings, and machine efficiency is a very poor model for understanding people. Cutting people out of most decision-making loops – to maximise speed, profit, protection or military success – may be a poor model for a future in which humans and machines need to work together. Research and innovation are needed to enable humans to remain in the loop, to be able transparently to assess a system's incentives and to influence its

²⁶ McDowell, L. (2016) *Migrant Women's Voices: Talking about Life and work in the UK since 1945*, published by Bloomsbury Press, London.

direction or debate its alteration. Human creativity and well-being should be core, so there is a need for reflectivity and to focus on the human condition and what it means to be human in the Fourth Industrial Revolution. The current paradigm shift requires that we question what is meant by technology. It is clear that in many ways it is socially constructed, but is also very much determined by market forces, and thus the policy and regulation (or lack of the same) which underpins this. What are the impacts on the underprivileged and marginalised, on gender issues and on inequality and access?

Are we really heading into a fully cybernetic world where space and time will be perceived not only by our own human senses in which we are simply one small part of a huge network fabric of interconnected things and information? In this context, the 1990s debates about augmented reality are now out-dated, whilst the prospects of dystopias and the 'singularity' of science fiction become more and more likely. What if advances in biomedicine, for example from the European 'Human Brain' project, open hitherto unknown doors to both consciousness and unconsciousness, and how can we organise society in such a context? Already today in the workplace, there is increasing insecurity regarding the relationship between people and advanced technology, where individuals need to learn to cope with the consequences of omnipresent machines and networks of a completely new kind. How are human values, ethics and well-being protected and promoted in such a context? What are the philosophical implications of blurring boundaries between the physical, biological, and digital sphere? An ethical dimension needs to be introduced in the exploitation, for example, of big data, bio-technologies, as well as the tensions between the citizen's right to privacy and improved security systems through routine surveillance and image analysis.

3.5.3. Digital

As examined above, the Fourth Industrial Revolution is predicated on new technology, and in particular on ICT as the new ubiquitous general purpose technology. ICT provides the common thread which underpins and enables innovation surges in many other technologies and in their economic, social, cultural and governance impacts. These technologies themselves directly enable new products, services and business models, for example by making it possible to massively extend the reach and quality of archiving and presenting cultural heritage.

3.5.4. Sustainable development

The Europe 2020 Strategy identifies smart, sustainable and inclusive growth as a means to help develop a resource efficient, greener and more competitive economy while delivering high levels of employment, productivity and social cohesion. In this context, SC6 research and innovation should aim to help build a green economy, for example through a circular economy in sync with the natural environment. It is important to assist innovators in bringing green solutions to the market by identifying the substantial business and job creation opportunities while tackling important resource efficiency challenges. These European concerns are very closely aligned with the seventeen Sustainable Development Goals (SDGs) which include strong emphasis on: zero poverty; quality education; decent work and economic growth; resilient infrastructures in the context of inclusive and sustainable industrialisation which fosters innovation; inclusive, safe and resilient cities and human settlements; sustainable consumption and production patterns; and urgent action to combat climate change and its impacts. There is also explicit focus on the use of new technology, especially ICT.

3.5.5. Europe in the world and international collaboration

Research and innovation are needed to reconfigure European policy for the turbulent world described above. Over the past four decades, the political model, including its legal and regulatory frameworks that both facilitated the global spread of technology and provided some protection against its disruptive consequences, has come under attack. It is clear that welfare states have become less generous, levels of long-term unemployment are much higher, taxation has become less progressive, and many contend that politics has increasingly been dominated by money and special interests. Whether or not these trends are conducive to inclusive, innovative and reflective societies requires urgent research and innovation actions, particularly because they are global in extent, not confined to Europe alone and in fact many may be more significant outside Europe. Thus, strong international collaboration is required to successfully address them.

Europe does not lack talent and creativity for the Fourth Industrial Revolution but does lack a market for them. However, young entrepreneurs, especially the most creative, often need to migrate to large cities, and some move beyond Europe. At the same time, the most successful high tech creative companies are struggling to grow or are likely to be bought by non-European capital as, for example, Skype. There are almost no new multinational corporations in Europe, while the US has generated Apple, Google, Facebook, and Amazon, each of which has created new global markets, partially exploiting European talent, and dominating the European consumer market. An important research and innovation issue to be addressed is why has Europe failed to create the type of multinational corporations that will retain its best and brightest brains and what are the implications – both negative and positive -- for not doing so? This may be a question of whether the upside of adopting an American style high tech model outweighs the downside in terms of culture, values and social cohesion.

The predicted end of mass employment will also have an impact on governance and democracy as we know it. Reverting the meaning of the American revolutionaries' motto, "no representation without taxation", there might be temptations to question the right to vote of people who have never paid taxes. As a result of the new digital economy, greater numbers of young people do not fit neatly into traditional job markets, whilst the increasing incidence of mobile and trans-national work makes it difficult both to pay taxes and to vote. Most of these issues also have a considerable international dimension, for example in the context of the likely Transatlantic Trade and Investment Partnership (TTIP), as well as existing WTO arrangements.

4. Governance for the future

4.1. Understanding governance for the future

Governance can be defined as the manner in which a community of interdependent actors is organised and/or organises itself through a set of formal and informal structures and relationships, typically termed institutions. In the current context, although the main governance actor is the public sector, all other legitimate societal actors have one or more roles to play, and this configuration changes both across different political and legal jurisdictions as well as through time in order to meet societal challenges. Given the processes of democracy in Europe, critics of governance arrangements point to the inherent weaknesses there are in responding rapidly to acute societal challenges the incidence of which is increasing. On the other hand, proponents counter this by contending that democracy significantly improves the effectiveness of public policy as well as its legitimacy and thus acceptance by the population. This broad debate indeed needs to be one important focus of governance research, i.e. how can the development of public policy be made more timely whilst at the same time improving both its quality and legitimacy? How are the new technologies affecting traditional institutions and the way they operate? How are younger generations, heavily influenced by new technology in their mind-set and behaviour, relating to such a change, and how can governance respond to, as well as include, these generations? How can governance become inclusive encouraging participation from all groups of society, including women? The governance issue thus needs to play a specific role in H2020 SC6 research and innovation, as it underpins all other policy areas. Research and innovation actions, therefore, should be both visionary and ambitious whilst also realistic and relevant.

The clash between the 'democracy' paradigm championed by Europe and the alternative 'autocratic' top-down governance paradigm, as for example practised in Russia and China, should be a central theme as it is increasingly becoming a global dialectic both in terms of rhetoric and *real politik*. However, it needs to be specifically placed in the context of how Europe's governance can solve the challenge of marrying efficiency and timeliness, on the one hand, with long-termism/continuity, inclusion and legitimacy, on the other. Is the present form of democratic governance in Europe still fit for purpose, and is its inherent 'short-termism' (to some extent the result of the electoral cycle) adequate given the new long-term and perhaps existential challenges Europe faces, as exemplified by the first two themes in this report?

Governance research and innovation need to examine the changing roles and relationships of the different actors, such as the public sector itself, the private sector, civil society (both formal and informal), academia and research institutions, as well as labour and employer organisations. For example, the role of the private sector, in particular multinational corporations, in shaping governance at all levels is crucial. This is not just a theoretical question, but it is clear that large corporations not only affect governance but have also become a source of innovation, for example the governance of the Internet has influence over many other forms of governance. Similarly, civil society organisations are playing an increasing role, for example acting as intermediaries on behalf of specific groups or localities which need specific attention. Social entrepreneurship is also a new source of innovation as greater numbers of young people are embracing it as the only chance to enter the job market.

One main focus area should be the notion of public value, broadly defined as the value created by society mediated through governance activities providing services, laws, regulation and other actions which are, in principle, available to all and which cannot be monopolised by sectional interest. For the present purpose public value can also be thought of as similar to

related notions of ‘public goods’ and ‘good governance’. Public value indeed needs to be seen broadly, for example both in ‘hard’ terms like utilities and infrastructures, as well as in a ‘softer’ context such as education, health and the environment, i.e. the social infrastructures. Public value should also be directly linked to Europe’s societal challenges and high value goals (such as the Europe 2020 Strategy and the Juncker Agenda), as well as to wider strategies and especially the UN’s 2030 Sustainable Development Agenda (agreed in September 2015) and the Paris Climate Change Agreement reached in December 2015. (See also section 5.4.)

Changes in governance arrangements and how these create public value are becoming more rapid and fluid both in Europe and elsewhere. For example, many non-public sector actors are increasingly involved in the delivery of public value, and these are themselves also changing. There are new types of businesses, such as the legal entity of Community Interest Companies in the UK and social entrepreneurs, the emerging role of the creative industries sector as a new unifier of creative domains and entrepreneurship, impact investing and open manufacturing sectors, as well as the role of new technologies like ICT, blockchains and social media. Moreover, in times of public finance austerity and cuts, many European countries are relying increasingly on cheaper often voluntary civil society organisations to create and deliver public services as well as to act as intermediaries with service users.

Other important governance research and innovation issues include:

- How can Europe’s governance paradigm both acknowledge and then cope with the shift from perceiving Europe as a single entity, which needs to become a more or less uniform and homogeneous structure via a process of harmonisation, towards the acceptance and accommodation of heterogeneity? Diversity, multi-culturalism and identity are key issues, and research and innovation need to assist in providing better means of addressing this challenge. This research issue is very important both as a possible solution to the societal challenge of providing better governance in Europe, and as a topic that can foster productive trans-disciplinary research and innovation efforts within and between the social sciences and the humanities. Such an approach would involve bridging the divide sometimes perceived between, respectively, ‘inclusive societies’ and ‘innovative societies’ on the one hand, and ‘reflective societies’ on the other hand.
- There are also important inter-generational elements here, given that Europe’s (including its nation states’) current form of democratic governance is not always readily understood or accepted by the Millennials generation. There appears to be a loss of interest, and even some disdain with all current forms of European governance, especially in the context of the digital revolution which we are struggling to come to terms with. A historical perspective is useful in this context given that, for example, Europe faced a similar choice and conflict in the 1930s which could provide a basis for better understanding.

4.2. Historical perspectives

Historically there have been three main forms of governance, the earliest being the top-down administrative and coercive model which has persisted through much of history, and which since the early industrial revolution then accommodated the second more market-orientated form of governance between sectional and competing interests. More recently a third main form has emerged as networked governance which combines a much more bottom-up model with greater degrees of cooperation and coordination. In practice, these three main forms and

their variants are typically seen alongside each other, and although they greatly simplify a complex evolutionary history, they are often used in this way by contemporary researchers²⁷.

Although tracing the development of European governance and administration in all its various forms should take account of their origins during the Enlightenment, developments starting in the late 1980s are perhaps the most relevant for understanding the current forms of governance as well as governance for the future. At that time, a specific but still dominant governance model appeared, i.e. 'New Public Management'. This form of governance emphasized market mechanisms, and *inter alia* how ICT could make the public sector much more efficient by adopting private sector management disciplines which had already shown how to maximise efficiency. This typically meant focusing on measurement, target setting and the outsourcing of some government functions to the private sector which was deemed to be more efficient in fulfilling them. There have been numerous reactions to this philosophy and approach, such as reemphasising the role of professionals and public sector capacity building, also supported by a stronger focus on research and innovation.

In the 2000s, other critics of New Public Management recognised a 'Public Value Management' model which linked the changes seen or required in the public sector to networked government and the need for open systems to ensure that ICT and other new tools were not only used to improve efficiency but also the effectiveness and reach of public services and governance more generally. In turn, these led to the recognition of so-called 'transformational governance' arrangement, in which ICT in particular enables the wholesale restructuring and repurposing of governance, and more latterly a very strong 'open governance' philosophy and approach. This was inducted into formal state policies by President Obama's 'Open Government Directive' in early 2009²⁸ alongside the launch of the global Open Government Partnership²⁹ aimed at establishing a global system of transparency, public participation and collaboration as the three foundations of modern governance.

The present governance arrangements of Europe need to be seen in this context, and further and deeper research and innovation are required to understand how appropriate forms of governance for the future can be designed to meet Europe's critical societal challenges. For example, how have the principles of multi-level governance in Europe, like subsidiarity, developed and what are their implications for current governance and its future development? In particular, it is clear that the governance of the EU at all levels and in all sectors is today experiencing perhaps its deepest crisis since its establishment. So understanding the way forward toward a more resilient Europe is of profound importance.

For example, reflection on the identity and culture of different regions in Europe is needed in order to develop systems of governance that are inclusive (resilient and able to utilize/employ all resources) and innovative (able to adapt to new challenges and to exploit new opportunities). Europe is diverse in terms of history, economic development, models of governance, social conditions, local culture, etc., for example when comparing Germany, Britain, France, Spain, Italy, Greece, the former centrally planned economies, and the Scandinavian countries. These differences remain even after promoting political and economic (and in some parts of Europe, monetary) integration, and other forms of harmonization. This

²⁷ For example, United Nations (2013) Governance, Public Administration and Information Technology for Post-2015 Development, United Nations Department of Social and Economic Affairs New York: http://workspace.unpan.org/sites/Internet/Documents/Governance_PA_Report.pdf.

²⁸ https://www.whitehouse.gov/the_press_office/TransparencyandOpenGovernment/.

²⁹ <http://www.opengovpartnership.org>.

heterogeneity must be understood in order to gain insight in how governance can and should develop for the future.

Because of integration and external shocks (like globalization, technological progress and the migration crisis), national and local European economies change rapidly, while social conditions are adjusted in the same direction but with a significant time lag. Existing differences therefore appear as more important and tensions easily arise. Within countries there are also tensions between private and public systems so that European integration may increase private prosperity whilst failing to provide robust systems for allocating resources for public provisions and collective needs. Can a common European 'social model' emerge in order to remedy the gaps and inconsistencies? Is more harmonisation beneficial and, if so, how can it be induced? What is the role of diversity for European resilience and how can cultural and institutional diversity be balanced with economic integration?

4.3. European governance challenges and opportunities

4.3.1. Trust, trustworthiness and legitimacy

It is important to broaden the terms of the discussion on trust which traditionally focuses only on the analysis of public trust in government. However, governance for the future needs also to address issues relevant to new forms and emerging perspectives of trust, such as 'trust in societies' and multi-dimensional trust, i.e. trust in citizens by governments and trust among people. Lessons might be learnt from other areas, such – but specifically not restricted to – the changing discussion on trust in the context of the sharing economy, which in some manifestations rests on common or shared ownership of assets. Here, for example, trust may be built through the threat of losing individual reputation especially when living in a closely connected community, whether physical, virtual or a mix of both. A recent European conference addressed many of these wider issues, including trust in others, trust of European citizens in public authorities, trust between employers and employees, and trust in a shared common European future.³⁰

It will also be important for research and innovation actions to focus on trustworthiness in governance. Quite often, there is a demand for more public trust, but what is actually needed might instead be more trustworthiness which needs to be both earned and demonstrated by government. After all, why should citizens trust untrustworthy governance or business models? Although it is impossible to build totally trustworthy governance, and this also presents dangers where some 'healthy scepticism' might be a better goal in a democratic society, it is important to examine how actors (including governments) might achieve trustworthiness. How can they legitimately, transparently and openly earn the trust of other actors, and what is the role of ICT in, for example, new conceptions and measures of trust? Is passivity by citizens an acceptable response even when governments actively attempt to become trustworthy? It is also relevant to examine the adaptive or evolutionary capacity of governance trust in order to counteract the possible disintegration of social bonds, for example under the pressure of different types of technological impact, and how these might self-regenerate and/or self-reorganise to become more resilient.

Trust in and by governments also both reflects and helps determine the legitimacy or otherwise of governance. What make decisions on public policy and the implementation of

³⁰ "Trust: European Research Co-creating Resilient Societies", Brussels, 29 - 30 October 2015: <http://www.trust-conference.eu/>

those policies legitimate in the eyes of the public? In an era characterised by the increasing diffusion of political power and supranational decision-making, traditional theories on the sources of political legitimacy seem to have lost a great deal of explanatory power. New theoretical and empirical tools are needed to understand and explain why some states seem successful in creating legitimacy, while others struggle with substantial legitimacy deficits. Is the quality of processes on both the input-side of the political system (such as transparency and citizen involvement) and on the output-side (such as the ability of states to perform basic output functions like impartial implementation of public policy and control of political and bureaucratic corruption) key when it comes to building, sustaining and supporting legitimacy? Challenges to trust in governance are also manifest in different contexts and across different groups. For example: an increasingly disenfranchised middle class and middle aged group more of whom are joining populist movements; an indifferent youth who do not trust public institutions and the societal status quo more generally; and migrants who do not know who to trust and how to take part in future governance.

A good example of the continuum of causal relationship illustrated by the trust debate is given by fiscal policy and the quality of public finances. In order to create public value, governments have to invest in tangible and intangible assets, in people and with efficiency. Investments must be financed by savings, by the governments themselves which is quite challenging, or by credit which has been the engine of growth historically. The lack of trust and the trustworthiness of governments after the crisis have closed the door to this credit channel, exemplified by Greece but also by many other countries that are structurally underinvesting. Europe's Stability and Growth Pact and the Fiscal Compact are built on this lack of trust. It is difficult to change them before restoring trust in the whole edifice of fiscal governance in Member States and in EU institutions. At the same time, public opinion is worried about the level of public debt and the constraints of the Pact, especially the impossibility to finance investment by loans. Research and innovation are needed to better understand these relationships and the role and determinants of trust in government and its ability to repay debts and launch an efficient investment programme. Public opinion is also sceptical about governments' ability to collect taxes due, in particular, from multinational firms, which of course might be one way for the public sector to start to rebalance its books.

Related key research and innovation questions to be addressed in this context could include:

- Why and how is trust in governance shifting or is mistrust just becoming more visible?
- Are there more adequate tools of governance, e.g. legal and regulatory framework or participatory democratic processes that can help increase trustworthiness and trust?
- What are the roles of justice and fairness for trustworthiness and trust?³¹
- How are public sector accountability and transparency affecting trust and trustworthiness?
- How do different forms of stakeholder involvement, participation, lobbying and advocacy affect trust and the trustworthiness of political processes?
- What are the relationship between legitimacy, accountability, responsibility, trust and trustworthiness?
- What is the impact of openness, such as implied by 'open government' and social media, on trustworthiness and trust? Is there a correlation between unprecedented levels of openness and unprecedented mistrust in government?
- Can and should trust in the governance context be measured?
- How are technologies affecting trust (e.g. block chain or social media platforms)?

³¹ See Edelman Trust Barometer <http://www.edelman.com/insights/intellectual-property/2016-edelman-trust-barometer/>

- How can trust and trustworthiness be increased in the domain of (national) security? Must openness on the one hand, and lack of transparency on the other, be balanced for governance to be effective, especially in the context of security?

There are also challenges and opportunities emerging from new forms of collaborative and open governance and participatory processes, such as participatory budgeting. In this context, ideas concerning the need for a new social contract become important. One, perhaps restrictive definition, might see such a contract as embedded in the body politic, law-giving and duties between government, citizens and other stakeholders such as business culture and the sharing of benefits.

4.3.2. New challenges and opportunities for policy- and decision-making

A key policy question to be addressed by European governance, which is also very important for innovation, concerns the creation of public value through common goods and services, and the shift from state monopoly to multi-stakeholder funding and management leading to new institutions and incentives. An important research and innovation focus should thus be European and global public goods creation³² beyond the monopoly of state provision. New approaches to govern contemporary societies are necessary, given the conjunction of creativity, new technologies and entrepreneurship, and governments will need to build platforms to support this. Such platforms in the context of the open governance philosophy will require new forms of so-called 'open policy making', i.e. as more effective policy making through broadening the range of people engaged, using the latest analytical techniques, and taking an agile, iterative approach to implementation. Open policy-making is an important part of the wider concept of 'open governance systems', which are already emerging, albeit on a small scale as scattered but prominent examples, particularly at local and especially city level where power and control is increasingly being devolved, decentralised and even, in some cases, usurped by different constellations of actors. These developments, although still incipient, can be partially captured by the concept of the government as a platform, i.e. an open environment and ecosystem with clear frameworks, guidelines, resources and supports which invites all actors to collaborate in producing public value, for example through open innovations. (See also sections 4.4 and 4.5.)

A new crisis of decision-making in Europe is emerging both from the recent migration surge as well as from the on-going questioning of the so-called 'democratic deficit' many observe at all levels of governance, which in turn impacts relationships between citizens and systems of governing. In this sense, handling challenges associated with migration may be a matter pertaining to the very nature and development of the multi-level configuration that makes up the EU. Migration, in other words, encompasses not only issues of policy and politics but also of polity and constitution. An important research focus in this context would be the extent to which the recent crises have changed policy- and decision-making in the EU, with particular emphasis on legislative politics. Research and innovation projects could focus on the effects of the crises on coalition-formation and voting-cohesion in the European Parliament and the Council as well as coalition-formation across the institutions. In addition, research and innovation could look at the effects of the crises on legislation, its nature, efficiency, and national parliamentary involvement in transposition.

³² See for example Barrett, S (2007). *Why Cooperate? The Incentive to Supply Global Public Goods*. NY, Oxford University Press.

4.3.3. Radicalisation and terrorism

The terrorist attacks that have recently hit Europe present a stark and serious challenge to the continent's security, social cohesion and democracy. Such attacks are intended to strike at the core of European societies, national governments and EU institutions, and to question Europe's principles of religious diversity, tolerance, freedom of speech and human rights. It has been estimated that at least some 4,000 individuals have travelled from Western European countries to fight in Syria and Iraq, a war zone that has allegedly mobilised the largest number of foreign fighters since 1945, well over 20,000 in total³³. According to the Swedish government, members of the extreme right have also joined the war in Ukraine. Many governments consider returning foreign fighters as a serious domestic security threat. However, the vast majority of the current European terrorists are second and third generation immigrants coming originally from North Africa. It is also the case that radicalisation and terrorism are not simply European phenomena, nor are they new. There are currently much worse terrorist atrocities in the Middle East and elsewhere, and Europe has a recent terrorist history in places like Northern Ireland, the Basque country, Italy and Germany, whilst there are also recent examples of majority community terrorism such as in Norway.

Nevertheless, this current terrorist phenomenon in Europe has many new features, so research is needed to understand its development through a strongly historical and contextualised approach, which must also focus on providing clear evidence for policy making and effective initiatives, including through international cooperation. There is a need to undertake multi-disciplinary research on the processes of radicalisation, whether or not this leads to terrorism and, if so, how? For example, research questions might include what is known about the terrorists? How do especially young Europeans become radicalised? What are the links between radicalisation and terrorism? Why do terrorists perpetrate such acts and what are their aims?³⁴

There is also an urgent need for research on the role of social and other digital media in terms of globalising radicalisation. Individuals no longer have to physically encounter radical elements but can become radicalised online, nor do they simply need to imagine a radical future when stark images are provided by the Hollywood style production techniques deployed by some terrorist groups. New technologies enable the customisation, not only of goods but also of belief systems, so that radicalism becomes personalised, also through online courses in terrorist techniques. Many governments are launching preventive efforts to counter violent extremist narratives circulating online, but there are few or no substantial empirical findings supporting the notion of causal effects between online propaganda and violent extremism.

4.3.4. Legal and regulatory frameworks

A strong focus is needed on examining how Europe's legal and regulatory frameworks are coping with current needs and crises and how these can be adapted for future governance. Comparative research on legal systems and policy- and decision-making frameworks is required, for example in relation to how these might limit or provide opportunities for the flexibility of governance systems in relation to migration and the Fourth Industrial Revolution. In this context, research and innovation should contribute to ensuring that Europe does not simply replicate current legal and governance frameworks which may have been suitable in the

³³ Neuman, P (2015) "The New Jihadists: ISIS, Europa and the Next Wave of Terrorism", published by Econ, Berlin.

³⁴ See "Addressing Terrorism: European Research in Social Sciences and the Humanities in Support to Policies for Inclusion and Security -- a Policy Review", published by the European Commission, 2016.

past, for example in relation to trust, the sharing economy or new digital opportunities, but instead examines new approaches which could be more beneficial for a dynamic, cohesive and fair economy and society in the future. An example from past challenges might be the early years of electronic government during the 1990s and early 2000s during which public administrators merely digitised existing bureaucracies rather than examining opportunities to update them. In this context, an examination may also be needed concerning the desirability of reforming the legal institutions governing market structure, market behaviour and the organisation of business, as well as of natural resources and the environment. Rules, at national and/or European level, might have to be redesigned to foster innovation and entrepreneurship in markets that are increasingly globalised, dynamic and competitive, based on new human capital-intensive industries and aimed at environmental sustainability.

4.4. The digital transformation of governance

4.4.1. How ICT can change governance

The use of ICT and related new technologies to change the way both the public sector and the wider issues of governance, function and are structured, goes back at least to the 1980s. Initially governments embraced 'online government' which simply took ICT, largely from the private sector, into an existing system making it more efficient but without much change to its structures and *modus operandi*. The subsequent notion of 'transformative government' stressed how ICT could be used alongside other drivers to transform these characteristics of government so that they became not only more efficient but also more effective. In turn, smaller and less active, or 'lean government', enabled by ICT, was a dramatic response to the financial and economic crisis in the aftermath of 2007-8 based on austerity, downsizing and cuts to public services.

Today, research and innovation on the practice of 'open government' and 'open governance systems' using ICT tools is starting to form a cohesive conceptual framework, body of evidence and policy programme to return the attention of government to the burgeoning long-term societal challenges both Europe and the world are facing in close collaboration with non-public actors. Indeed, some of these challenges have resulted directly from the financial crisis itself and many governments' immediate response to it, but governance in many contexts is now seeking to become more proactive again by stressing the important synergies between operational efficiencies and outcome effectiveness working in harmony.

4.4.2. ICT-enabled public sector and open governance

ICT-enabled public sector innovation and new forms of governance are today central tenets of much European e-government policy at all levels: European, national and local and especially at city scale where ICT is a central driver of 'smart cities' and the 'smart' services they are offering. Strategies for public policy making and public services are focusing on becoming more open and innovative as well as efficient and effective, and indeed it is argued that these attributes are complementary, but also that the public sector cannot successfully tackle these challenges entirely on its own. It needs to collaborate with other actors, and a powerful tool in this context is ICT.

However, strong research and innovation efforts are needed to support both policy and initiatives as widespread take-up and action on the ground is lacking. For example, open

government is one of the main pillars of ICT-enabled public sector innovation³⁵, based on open data, open services and open processes. However, for this to be realised, a broader open governance framework is also necessary, which both reaches across many parts and levels of the public sector as well as to other appropriate actors outside government. In many contexts, open governance is about linking and integrating the worlds inside government, as well as linking and integrating these with the worlds outside government for the specific purpose of creating public value. ICT is a key enabler in making this possible.

Open governance also requires opening up structures and public organisations through open processes enabling transparency, accountability and trust; public participation which also supports new forms of dispersed democratic involvement; and widespread collaboration with other actors which can contribute to creating public value. In turn, this involves breaking down, or at least cooperation between, silos across different administrations, levels and locations, through sharing infrastructures, processes, data, assets, resources, content and tools. This presages huge challenges technically, politically, legally, organisationally and in terms of working cultures. The vision is a 'whole-of-government' approach embedded in and interacting with the reality of society as a whole. What is proposed is a broad 'open governance framework' strategy going forward to 2020 and beyond. Such a strategy would attempt to develop the policies and tools to put into practice an open governance vision, underpinned by appropriate research and innovation actions.

Three priority research and innovation topics are recommended:

- The open government setting: given that government cannot address societal problems on its own, it needs to collaborate openly, transparently and participatively using ICT, both within and across the public sector and with all legitimate external actors. Greater understanding is needed of how shared services (across government and with non-government actors) can be developed through co-creation, and rolled out in order to improve take-up, personalisation and impact. Standards are required for this, open by default, not only in technical terms such as semantic interoperability, but also to support quality of service standards to ensure universality and cross-border applicability where appropriate, for example through procurement, planning and decision-making. It is not clear how these objectives can be achieved and what specific roles the government should play as compared to other actors, particularly in the digital context. How to ensure that privacy and security issues are adequately taken into account also needs careful research and innovation.
- Government as a platform: for example as an open source service platform in the cloud providing government services, data and enablers as building blocks, also needs a concerted research and innovation effort, as this promises significant increases in both efficiency and effectiveness. Research and innovation need to examine both digital and non-digital platforms, as well as their inter-relationships, to support the creation of public value through co-creation with other actors, so better understanding is needed as to how government can adapt its roles as facilitator and orchestrator, to provide appropriate tools and supports including big open and linked data (BOLD), to better manage assets, and to ensure sustainability and balanced public value. Experience has shown that it is often at city level that governments are successfully experimenting with these new roles especially enabled by ICT, so research and innovation need to examine how such practices can become more widespread at a variety of governance levels and across different national, political and cultural

³⁵ European Commission (2013) "A vision for public services", prepared by DG CONNECT after an expert workshop and open public consultation: <http://ec.europa.eu/digital-agenda/en/news/vision-public-services>.

contexts. Again, due account needs to be taken of privacy and security issues. (See also section 4.5).

- Research and innovation are required into the likely impact and take-up of emerging technologies on the roles and operations of government, as well as of the public sector more generally. Many of these emerging technologies have potentially significant implications for the way governance for the future is configured and experienced, for example block chain distributed databases, artificial intelligence, robotics, the Internet of Things (IoT), quantum computing and hyper-connectivity, drone technology, etc. An examination of potential side-effects and likely unintended consequences is also required. The impact of blockchain technology in particular on governance systems could be profound and lead to the end of governance as we have known it for millennia to be replaced by, in effect, an autonomous and independent system to which everyone can contribute to and benefit from, but which no one controls. There might be immense 'democratic' benefits arising from such a scenario, but also dangers inherent in the fact that blockchains are, in effect, an impenetrable black box.

Research and innovation are also needed to understand key new tasks and challenges which are implicit in these changes, including:

- The role of data, for example as 'BOLD' (big open linked data) and data analytics that can play a pivotal role to help design policies for more inclusive, reflective and innovative societies and to foster more evidence-informed governance, as well as made available for use by companies, civil organisation and individuals.
- Transparency and data protection.
- The so-called 'digital natives', or 'Millennials', as well as future generations who have grown up with the Internet approach to society, including governance, in entirely new ways compared with the older generations.
- Possible social disintegration depending on technological developments.
- Social media and the challenge this poses for trust and trustworthiness.
- Moves towards the adoption of the 'once only' principle³⁶ so that personal data once entered into any part of the public sector can be re-used by other parts without re-entry. It has been demonstrated that this can significantly cut the costs of, for example, e-services and provide much greater convenience for users, but at the possible risk of loss of data privacy and data mis-use which also affects trust in government. The use of secure online e-signatures is likely to be very important in this context and enable users better to control their own data, including whether to allow governments or other actors to use it.
- Also moves towards 'digital by default'³⁷, whereby relevant services are only made available to users through automatic self-service digital channels. Again, huge cost savings can be made for the public sector, allowing it to redeploy resources to other areas. However, this poses real risks of increasing the so-called 'digital divide' whereby people with poor access and low incomes, education and skills are more likely to be excluded from accessing essential services, and these groups are precisely those who tend to need such services most. One possible solution is to redeploy some of the savings made to provide specific service support to such groups including non-digitally where relevant.

³⁶ European Commission (2014) Study on eGovernment and the Reduction of Administrative Burden: <https://ec.europa.eu/digital-single-market/en/news/final-report-study-egovernment-and-reduction-administrative-burden-smart-20120061>.

³⁷ *Op cit.*

- Digital services are also starting to be made available across borders at European level, and this could provide much greater convenience and access to European citizens and companies, as well as support the Digital Single Market.
- The level and quality of data accessibility across society.

The last point reveals some of the very important implications of digital technology on governance for the future, such as:

- Issues of physical access to data (open versus closed data, data in public/private realms)
- Issues of competence (who can assess data quality and the inferences made upon this data, who can inspect data, can citizens correct false data about themselves, etc.)
- The possibility of discrimination resulting from opaque data practices in governance, but also in the business sector, and how to avoid this via hard and soft law, governance by (IT) design
- Other implications of data practices for societal values, such as privacy, freedom of speech and association, etc.
- What are the opportunities and dangers of governance by (IT) design, (hidden) nudging, etc.?

There are also challenges resulting from the possibility of overreliance on big data, algorithms and expert systems in governance and public policy making. For example, AI and policy modelling algorithms raise the prospect of decisions being made which are impenetrable to human understanding and hence control. In this context, research and innovation are needed to examine the different roles that BOLD and the algorithms generated from it play. There should also be an examination of the roles played by data-generated scientific findings to provide facts and evidence, on the one hand, and the roles of opinion, vision and political persuasion on the other. The role of science providing the best evidence, and how it performs this task in an open manner (e.g. also through 'citizen science'), is critical for good governance.

Research and innovation are also needed into user-friendly digital services which help connect public administrations across Europe and facilitate the re-use of open data, open services and open processes. These open government principles should operate in an 'open governance framework' in which citizens, businesses, civil society, social partners and other stakeholders play a key role. Citizen involvement in the production of collaborative services is a priority area, and in this context open data should be seen as an untapped resource with a huge potential for building stronger, more interconnected societies. ICT is needed to support the modernisation of public services, however, for this to succeed, the open government framework needs to be supported by a strong ICT backbone, interoperability and a transformation towards re-usable, modular public services.

Thus, research and innovation should also focus on supporting the CEF (Connecting Europe Facility) programme in moving towards an 'Interconnected Europe', by promoting broadband connectivity for all European households, and by facilitating the interoperability of European public administrations. The CEF is aiming to provide Digital Services Infrastructures (DSIs), which are generic building blocks that can be re-used (such as e-invoicing and e-signatures) as well as interoperable online services for citizens, businesses and public administrations. In this context, sector-specific DSIs such as e-procurement, better Internet for children, etc., are important. If the goal is to build a European ecosystem of public services, appropriate research and innovation are required.

4.5. Changing roles and relationships in European governance

To meet these challenges there is a need for more research and innovation on the conflicts between plurality, stability and change. There are two sets of basic research and innovation questions. The first relates to the interplay between institutional cooperation and economic and social competition. The second concerns the sustainability of social and cultural habits and society models. For both sets it is important to investigate how the social sustainability of local society arrangements is affected by harmonisation within the EU and by economic and political integration within the EU and as part of the global economy. Are society models stable? Is it possible to increase integration and also have a plurality of social and cultural arrangements in each nation state? To maintain European institutions and culture, is it more promising to stabilise these arrangements across a group of countries, or within each country individually?

Research and innovation are needed to better understand and support the 'government as a platform' philosophy mentioned above. This could have the task of supporting innovation across society as a whole, and to facilitate public value creation in the most efficient and effective way possible through open and collaborative innovation. It is a strategy that places the government as a platform for others to build upon in an open environment and ecosystem that sees everyone, every community and every organisation potentially as a resource with assets to create public value. 'Assets' is a wide term encompassing for example finance, time, skills, competences, knowledge, data, tools, buildings, spaces, vehicles, materials, energy, facilities of all types and organisational capacities, many of which are enabled by ICT developments like crowdsourcing and crowd-funding. Not using assets which could otherwise be put to productive use may be seen as tantamount to 'wasting' them, so government as a platform has a task to pool and leverage the assets of others, together with its own, to address societal challenges ethically and fairly. This enables government to supplement the challenge of itself having sometimes to do 'more for less' by being able to orchestrate 'doing more with more' by helping to leverage more assets from across society³⁸.

Within this context, research and innovation should be undertaken concerning how the public sector can build its capacity in a number of specific areas. First, the ability to facilitate, orchestrate and support societal value creation regardless of which legitimate actors are involved, through for example regulation, arbitration, coordination, mediation and partnering. However, the government retains a specific set of roles, which cannot be performed by other actors, and often needs to lead or sanction such activity given that it:

- has a democratic mandate to take account of all interests in society which other actors do not have.
- must take account and balance all such interests.
- cannot choose the people it serves given that its services need to be universal, unlike other actors.
- has ultimate responsibility for public service quality and reach regardless of which other actors are involved.
- is the supplier of last resort.

Second, research and innovation are required as to how the public sector can curate the demand side of government as a platform by, for example, providing appropriate tools to enable the involvement of other actors, such as guidelines, incentives, supports, advice, data, information, knowledge, networks and ecosystems. Given that when beneficiaries and other actors are involved, such as through co-creation, collaboration, participation, self-service and

³⁸ Millard, J (2016) Open governance systems: doing more with more, in *Government Information Quarterly*, Summer.

self-support, this in effect ‘out-sources’ some public sector responsibility, so the extra burden placed on these actors needs to be eased and made as simple as possible.

Third, research and innovation should look at how society’s assets can be managed in a legal, ethical and fair manner. This involves identifying legitimate and available assets across society, and helping to orchestrate and deploy them to create public value in collaboration with the asset owners. Widely used content management systems need to be supplemented by asset management systems.

Finally, the public sector has the unique role that it is the only actor which can ensure sustainability and balanced public value so that all segments of society benefit and where trade-offs are seen as fair and proportionate. Research and innovation are therefore needed in the dual role of governance, i.e. how the public sector can balance being innovative and flexible on the one hand, with providing longer term stability and continuity which other actors cannot do, on the other. This is necessary to enable people and communities to live stable lives, as well as for the market to have confidence that unpredictable governance changes will not upset their own innovation and investment decisions.

4.6. Cross-cutting issues

The following five issues potentially cut across all the research and innovation recommendations made above for the major theme of governance for the future.

4.6.1. Gender

Governance policies, decision-making, legal and regulatory frameworks, etc., largely determine many of the system characteristics within which European society operates and is structured, both formally and informally. Much of this is historical legacy from periods when gender differences were often strongly reinforced and when women were subject to significant exclusion in most walks of life, both domestically and in the public sphere. Although many formal structures reinforcing these mind-sets have since been dismantled in Europe, much still needs to be done and many vested traditional attitudes remain which still erect significant barriers making it difficult for women to lead full, equal and active lives. Gender issues are thus central to the governance debate, not least because in almost all European countries, female politicians are in a small minority and are thus in practice largely on the edge of political power and influence, despite making up half of the population. The few exceptions include Norway where all main parties have a mandatory 40% minimum of women members of the national parliament. These issues require focused research and innovation in order to assist in changing the balance of governance power in European societies.

4.6.2. Ethics and values

The role of public governance as the ‘commons’ of society, potentially representing social solidarity and cooperation, and its juxtaposition with the private realm of property, competition and consumption, is directly related to societal values and ethics, for example as related to inequalities, and how these are changing. Research and innovation actions should examine important aspects of this, for example how the European social model can be developed for the future governance of the EU at all levels, anchored in updated values of social protection, social cohesion and solidarity. Existing principles of subsidiarity and participation need to be reinforced as a precondition for a sustainable social market economy. Ethical considerations also mandate fully inclusive policies through, for example, the active

involvement of people in the formulation as well as implementation of European policies, on the basis that democratic participation in EU processes is decisive for the future of Europe as the EU tries to regain its peoples' trust. Synergy effects not only exist in partnership between EU Institutions and Member States, but also in the active involvement of other stakeholders like the social partners and civil society, including religious communities.

4.6.3. Digital

As explained in detail in section 4.4, digital technology provides the tools to transform most if not all aspects of governance and the public sector, enabling for the first time widespread collaboration and participation in public affairs, offering highly efficient and effective public services online, as well as generating and distributing big open data and big data analytics for better decision-making and as the soil of new economic activity. ICT is a critical and fundamental enabler of governance for the future, and new research and innovation actions are needed to experiment with, and better understand, in particular the implications for governance of some of the new technologies now emerging. As described earlier, these include artificial intelligence, machine-learning, robotics, the Internet of Things (IoT), quantum computing and hyper-connectivity, block chain technology and drone technology.

4.6.4. Sustainable development

Europe's 2020 Strategy identifies smart, sustainable and inclusive growth as well as the governance levers and arrangements to deliver this. In terms of the governance of sustainable development, the 2008 crisis exposed fundamental problems and unsustainable trends in many European countries. It also made clear just how interdependent the EU countries' social, economic and environmental development paths are. Greater policy coordination across the EU is necessary to address sustainable development consisting of growth, jobs, social cohesion and environmental sustainability for the future. The coordination of multi-level governance, policy- and decision-making from local to EU levels is needed to implement these overarching long-term strategies, and must be supported by appropriate research and innovation actions. Questions might include how institutional relationships between private, public and civil actors need to be arranged to make the sustainable development of modern societies possible? Which institutions are needed for a sustainable society? Which types of institutional and societal settings are needed to make governance itself more sustainable?

These European concerns are very closely aligned with the United Nations' Sustainable Development Goals (SDGs) which include for the first time a focus on promoting peaceful and inclusive societies through good governance, as well as strengthening the means of implementation through greater institutional capacity and collaboration with all relevant actors. To deliver the SDGs by 2030, innovative shifts are required which focus on the participation and inclusion of people, partnerships amongst all actors, gender responsiveness and improvements to risk and disaster management. In turn, these require capacity development and strong leadership across the public sector, as well as rethinking the scope of basic public services as defined in the SDGs, and the use of new technology, especially ICT. These governance issues underpinning the SDGs align closely with the Europe 2020 Strategy and H2020 and require that research and innovation actions directly take them into account.

4.6.5. Europe in the world and international collaboration

Increasingly, the existential societal challenges faced by Europe are shared with the rest of the world and cannot be contained within, or excluded from, European borders, whether these

include climate change, pollution, terrorism or international law and treaties. Europe as a unit needs to exercise 'soft' power in such contexts, whether or not it develops its hard power capabilities in cooperation with NATO and other allies. Research and innovation are therefore needed to address issues relevant to the role of Europe in the world, much of which should involve international collaboration, with key questions such as:

- The role of Europe in a multi-level governance environment:
 - Cross-border dimensions.
 - Local including city-levels, as well as marginal and rural areas.
 - Multicultural/cultural diversity within countries (e.g. different levels of openness towards social and cultural integration of various societies).
 - Social/political interaction between the EU and incoming aspiring Member States, such as Georgia, Ukraine and Moldova.
 - The rise of Asia: challenges and opportunities for Europe.
 - Centralisation versus decentralisation trends, and the role played by the changing societal context within countries, for example the growing importance of cities ('smart' cities) in sub-national systems, as well as the 'brain drain' phenomenon and, as a possible consequence, residual 'retired societies' at national levels.
- Conflicts, crisis and the role of the EU and other inter-governmental and trans-national organisations like the UN, the WTO, the WB and IMF, the OECD, the International Court of Justice, etc.
- Diversities of societal contexts and the relation of these with European governance and the European dimension.
- How different inequalities are handled by the different forms of government.

The pursuit of 'good governance' (see section 5.4) is, of course, relevant for the government actor, but also for corporates, civil organisations, and in fact, for all governance systems across society, including trade associations, international bodies like the UN, WTO, etc. The issue of 'fairness', tax and tax havens, especially in the aftermath of the so-called Panama papers, is also of high relevance in the good governance context. It can also be linked to the issue of ensuring risks and benefits are well distributed in the Fourth industrial Revolution theme, as well as to the cross-cutting issue of inequality, poverty and fairness. In turn, there are links to issues of justice, legal instruments, the rule of law and institutions like the European Court of Justice, and how these need to change to cope with the evolving Europe. One example might be the re-establishment of physical border controls in response to the migrant crisis.

Over recent decades, the competences of EU governance have been considerably increased. In the same period many important global issues have been entrusted to specialised International Organisations (IOs). These two trends have produced a growing need for the EU to be well represented in the relevant IO in order to promote its objectives and work together to solve global challenges, including the migration and refugee crisis. Research and innovation in the context of governance in its global dimension should also examine the deep relationship between governance, migration and economic transformation. The migration and refugee crises are ultimately the product of governance failures in both EU and non-EU countries, whilst economic transformation is a global phenomenon ultimately led by markets so only indirectly within the scope of governance. In both cases, the EU needs to work with IOs such as the UN and WTO together with all the other non-state actors. Research and innovation could highlight the nature of this system of systems as 'global system science' to assist policy makers engaged with multi-level governance.

5. Cross-cutting issues and synergies

In addition to the three major themes presented above, the SC6 EAG also proposes a number of cross-cutting issues transversing as 'red threads' across them in order to:

- Assist in both linking the three major themes together and prioritising an interdisciplinary approach.
- Help ensure a coherent Work Programme and guard against fragmentation.
- Provide an opportunity for minority views that might be outside the mainstream through opening the programme to independent and dissenting views which are often the source of system change and generators of paradigm shift.

Five cross-cutting issues have been identified: gender; ethics and values; digital; sustainable development; and Europe in the world and international collaboration. Each of these should be systematically addressed so that their inherent cross-theme synergies and interrelations can be adequately exploited. Treating them separately is likely to miss important opportunities for coherent and high quality research and innovation.

5.1. Gender

In H2020 to date, the framing of gender equality is implemented in an unclear and generally unformulated way, for example by only generally mentioning the integration of gender equality into the content of research and innovation, or related merely to diversity issues and included as just one aspect of socio-economic inequality. The structural understanding of gender in relation to inequality and as part of inter-sectionality, is mainly left untouched. Whilst gender has been incorporated into some social dimension issues, it is all too often ignored or seen as less important than other inequalities, such as age, young people, immigrants, as well as ethnic, cultural or linguistic minorities. Gender is not systematically mainstreamed into each call or through the research cycle of applications (e.g. from research and innovation planning through developing methods and tools for implementation, to evaluation). No information on monitoring gender equality is available in the research and innovation programmes, and there is a general lack of gender expertise. Neither is gender mainstreamed into the evaluation criteria which also undermines the efficacy of the constantly repeated sentence: "gender issues should be taken into consideration" in research and innovation applications. This all leads to no attention being paid to the need for transformative change in the gendered nature of institutions, norms and structures, so that institutions are described as neutral.

In the Gender Advisory Group's report for the H2020 2016-17 programme the dimensions are described as: "The gender dimension is a dynamic concept which puts researchers at the forefront of questioning gender norms and stereotypes, and addresses the evolving needs and social roles of women and men. Depending on the field of research, it entails an analysis of gender, sex or both. Gender is a key analytical and explanatory variable in research and innovation. Gender as a socio-cultural process refers to cultural values and social attitudes that together shape and sanction 'feminine' and 'masculine' behaviours, and also affect products, technologies, environments, and knowledge. Gender assumptions often go unquestioned and can unconsciously influence scientific priorities, research and innovation questions, and choice of methods. Sex refers to biological characteristics of women and men, boys and girls, in terms of reproductive organs and functions based on chromosomal complement and physiology. Sex is globally understood as the classification of living beings as male, female or inter-sexed. Sex differences relevant to research and innovation should be investigated and addressed."

Addressing these shortcomings in research and innovation actions is seen as paramount for a successful programme. For example, far from most gender challenges having been addressed, there are many other more subtle issues and system biases which may be just as pervasive and corrosive. Important issues in this context might be the relationship between gender inequalities as foundations for other forms of inequality, gender insecurity and the perceptions of women's role in different areas of life.

In terms of implementing gender sensitive issues into research and innovation projects, three areas may be important:

- Research and innovation actions addressing gender issues, explicitly and systematically embedded in projects where the issues have acknowledged relevance to the underlying research topics. Project proposals that have thought this through systematically should be more highly rated in evaluations.
- Training should include requirements to raise awareness of gender issues within the substance of the training and target an appropriately-balanced mix of trainees.
- Where the connections between gender-issues and the underlying research area are not so obvious or acknowledged, some fraction of research (possibly within independent research and innovation projects or support actions), should aim to investigate the extent to which gender issues exist but are not widely realised.

5.2. Ethics and values

Ethics and values are fundamental building blocks horizontally across all H2020 research and innovation, and SSH has specific responsibility to ensure they are both recognised and enacted. In relation to values, the European Commission stated in 2009 that “the crisis that we face is not just a financial or an economic crisis. It is also a crisis for the values of our societies.”³⁹ There has since been some disappointment that this value basis of the EU has not been adequately followed through, and it has been suggested that a fourth key priority (in addition to smart, sustainable and inclusive growth) be added to the Europe 2020 Strategy⁴⁰, i.e. implementing fundamental rights and values in a sustainable social market economy. Recognising and tackling inequalities is also an important European value, particularly when this leads to relative poverty and other forms of deprivation, marginalisation or vulnerability, resulting in the individuals effected not being able to participate fully in social, economic and cultural life. In terms of ethics, these arise in most areas of research and innovation, including in the medical field, research protocols in social sciences, ethnography, psychology, environmental studies and security research. Each of these can involve the voluntary participation of research subjects and the collection of data that might be considered as sensitive and where there is always a danger than research and innovation results can be falsified and/or misused.

5.3. Digital

H2020 supports innovation, research and technological development, with the latter focused on digital technologies in the form of ICT and on most of the new technologies of the Fourth Industrial Revolution which ICT underpins. Many H2020 and related EU actions target the development and application of key enabling and industrial technologies as well as future and emerging technologies. In this context, an important role of SC6 is to ensure that SSH is

³⁹ José Manuel Barroso. Political guidelines for the next Commission. Brussels, September 2009, p. 1.

http://ec.europa.eu/commission_barroso/president/pdf/press_20090903_EN.pdf

⁴⁰ For example: http://csc.ceceurope.org/fileadmin/filer/csc/Social_Economic_Issues/Conference_of_European_Churches_CSC_of_CEC_Contribution_to_EU_2020_Consultation.pdf

present at all stages in the research and innovation chain with a focus on value creation and accelerating the development of technologies for innovative products, processes and services where ICT is the critical enabler. It provides essential infrastructures for production and business processes, communication and transactions, as well as for societal processes such as community formation, consumer behaviour, political participation and public governance, for example by means of social media and collective-awareness platforms and tools. ICT is crucial for supporting and integrating research and innovation which takes a user-centred perspective in order to develop both monetized/competitive and non-monetised solutions.

5.4. Sustainable development

As key cross-cutting Horizon 2020 objectives, climate action and sustainable development are also relevant to SC6. At least 35% of Horizon 2020's total budget is expected to address climate action, while at least 60% is expected to involve sustainable development. SC6 research and innovation can contribute to combatting and mitigating climate change by integrating climate action into specific policy activities, developing capacity, and strengthening the regulatory and policy framework. Also highly important are the socio-economic issues associated with climate change options, such as behavioural patterns, societal acceptance and barriers to the uptake of policies or technologies.⁴¹

These European concerns are very closely aligned with the seventeen Sustainable Development Goals (SDGs) agreed In September 2015 in Paris by all 193 United Nations' Member States, including all European countries, to be achieved by 2030⁴². The United Nations defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs within the planet's physical boundaries. It is the guiding principle for balanced long-term global development consisting of the three pillars of economic development, social development and environmental protection, so that if any one pillar is weak then the system as a whole is unsustainable⁴³. The SDGs build directly on the eight predecessor Millennium Development Goals (MDGs) covering poverty, gender, education, health, jobs and environmental sustainability, but have for the first time added issues related to sustainable energy, employment, infrastructure and cities and habitation.

Also unlike the MDGs, the SDGs focus specifically on governance issues (in SDGs 16 and 17), and especially on good governance⁴⁴, the use of new technologies by governments especially for public service delivery, and building local and global partnerships and collaboration. A key issue is the better use of human and natural resources through resource efficiency measures, relating in particular to aspects of the Fourth Industrial Revolution (like the sharing, collaborative and circular economies, and inclusive and frugal innovation), as well as the use of emerging technologies in governance, for example in the context of open government and government as a platform. Specific EU policies underline these aspirations, such as the Europe 2020 Strategy, the Juncker Agenda and Commissioner Moedas' three openness priorities: open science, open innovation and open to the world.

⁴¹ <http://eurofed.stis.belspo.be/Downloads/Factsheet%20on%20Climate%20Action%20and%20Sustainable%20Development%20in%20H2020.pdf>

⁴² <https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals>

⁴³ <http://www.un.org/en/ga/president/65/issues/sustdev.shtml> (Accessed 16-11-14).

⁴⁴ 'Good governance' is characterised by the United Nations as governance which is effective, efficient, equitable, transparent, accountable, responsive, participatory and inclusive: United Nations (2013) Governance, Public Administration and Information Technology for Post-2015 Development, United Nations Department of Social and Economic Affairs New York: http://workspace.unpan.org/sites/Internet/Documents/Governance_PA_Report.pdf

5.5. Europe in the world and international collaboration

As history shows, Europe has often suffered due to the lack of sufficient in-depth knowledge concerning developments elsewhere in the world. This is necessary both to project European influence and soft power, but also for the sake of mutual learning when most societal challenges are global in extent and require international if not fully global collaboration. Some important challenges for research and innovation actions in this context might include:

- Examining how Europe can be fully 'open', both for participation from researchers and innovators outside Europe and because purely European responses to global challenges are unlikely to succeed. Diversity across Europe and transnational processes should be emphasised in many topics.
- Supporting strong partnerships with transnational actors, such as international organisations like the G8 and G20.
- A specific example might be social, cultural and economic cooperation between the EU and the Eastern Partnership countries, as this should be deepened in order to contribute to democratisation processes, to the development of markets for EU companies, and to strengthen European security. In this context, the role of Russia, for example on its border with the Ukraine, is causing unease. Other issues that could be considered in this context are sharing best practices in research, development and innovation management, as well as developing innovation strategies and the reform of research and innovation systems.
- Other countries which are very important for EU external policy include the USA, the Mediterranean countries, India and Asia, especially China. The 'rise of Asia' in particular poses challenges and provides opportunities for Europe.
- Given that Europe accounts for an increasingly smaller amount of global knowledge production, it is important to ask whether some projects in some domains can really be of excellent quality when no non-EU researchers and innovators are involved.
- For example, in China there is much effort in the domains of strategic intelligence and science policy, and in monitoring the activities of other countries in this area. This should be an area in which the EU could strengthen its efforts.
- How can Europe with its global partners increase the effectiveness of conflict prevention as well as of peace and stability measures?

6. Annex: Members of the H2020 SC6 Expert Advisory Group

	Last and first names	Nationality	Gender (F/M)
1	ADDARII Filippo	IT	M
2	ALEXANDRINO PEREIRA MORGADO Carla Sofia	PT	F
3	ANDERSEN Birgitte	UK	F
4	ARNOLD David – Vice Chair	UK	M
5	ASHEIM Geir B.	NO	M
6	BOGAERT Henri	BE	M
7	EL MOUJABBER Maroun	LB	M
8	ENKEL Ellen	DE	F
9	FARGUES Philippe	FR	M
10	GLIDDEN Julia	US	F
11	JASKUNIENE Eglė	LT	F
12	KOSONEN Riitta	FI	F
13	LATOSZEK Ewa	PL	F
14	MILLARD Jeremy - Rapporteur	UK	M
15	OLIVEIRA Pedro	PT	M
16	PETŐ Andrea	HU	F
17	PORTIER Philippe	FR	M
18	PROHL Marga	DE	F
19	SAHLIN Kerstin – Chair	SE	F
20	SAVIDAN Patrick	FR	M
21	SIMON Judith	DE	F
22	SMOLIKOVA Marta	CZ	F
23	STAVIK Jan	NO	M
24	THALLER Manfred	AT	M
25	TRUBETA Sevasti	EL	F
26	URBANCZYK Przemyslaw	PL	M
27	VAN DEN DOEL Wim	NL	M
28	VERELLEN Franciscus	FR	M