Report on the Integration of Socio-economic Sciences and Humanities (SSH) in Horizon 2020

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List of Abbreviations

Abbreviation	Explanation
DG CNECT	Directorate-General for Communications Networks, Content and Technology, European Commission
DG RTD	Directorate-General for Research and Innovation, European Commission
EC	European Commission
ERC	European Research Council
EU	European Union
FP	European Framework Programme for Research and Technological Development.
Horizon 2020	The EU Framework Programme for Research and Innovation 2014-2020
ICT	Information and Communication Technologies
NCP	National Contact Point: National official representative to the Framework Programme in Member, Associated Countries and Third Countries.
NET4SOCIETY	International Network of the National Contact Points for Socio-economic Sciences and Humanities
R&I	Research and Innovation
SSH	Socio-economic sciences and the Humanities

1. Introduction

Horizon 2020, the EU's framework programme for research and innovation for the time period of 2014 to 2020, shall play a central role in the accomplishment of the Europe 2020 strategy for smart, sustainable and inclusive growth. The Regulation for Horizon 2020 foresees that socio-economic sciences and humanities (SSH) will be an integral part of Horizon 2020 and a cross-cutting issue throughout the whole programme. SSH are to be embedded in all pillars of Horizon 2020. They are an essential element of the activities needed to tackle each of the societal challenges and will contribute to enhancing the impact of research results. Specific support to SSH will be provided by the Societal Challenge 6 "Europe in a changing world: Inclusive, innovative and reflective societies".

In order to monitor the integration of SSH in Horizon 2020, to identify those parts of Horizon 2020 that explicitly include SSH research dimensions and to guide National Contact Points (NCPs), researchers and other stakeholders towards funding opportunities for SSH in Horizon 2020, NET4SOCIETY has compiled this report on SSH integration in Horizon 2020. The report therefore provides an indication on what kind of SSH-relevant topics are likely to be taken up in the different programme parts of Horizon 2020 in the coming seven years.

This publication is based on a preliminary report on "SSH integration in Horizon 2020" that NET4SOCIETY published in July 2013 and on the NET4SOCIETY publication "Opportunities for Researchers from the Socio-economic Sciences and Humanities (SSH)" (December 2013). For this report a qualitative textual analysis of the Horizon 2020 Specific Programme was carried out. This is complemented by an analysis of SSH relevant topics in the first Horizon 2020 Work Programmes.[1]

This report begins with a description of the approach of embedding SSH in Horizon 2020. The structure of the main part of the document is then determined by the degree of SSH integration in the different Horizon 2020 programme parts. Instead of following the numerical order of the different parts in Horizon 2020 (*I. Excellent science, II. Industrial leadership, III. Societal challenges, IV. Non-nuclear direct actions of the Joint Research Centre*), this report starts with the part that includes "top down" topics and the highest amount of SSH research dimensions, the *societal challenges*. It continues with the "Key enabling technologies" of the *Industrial leadership* part. In the following chapter, SSH aspects in *Excellent science* are presented (mostly "bottom up" opportunities). Last but not least, the programmes "Science with and for society" and "Spreading excellence and widening participation" are analysed.

Some parts of Horizon 2020 are not covered in this analysis. The programme parts "Access to risk finance" and "Innovation in SMEs" (both part of *Industrial leadership*) are omitted, as they neither define top-down research areas that could be analysed with regard to SSH aspects nor do they present programmes of particular attractiveness for SSH researchers, such as the ERC or the Marie Skłodowska-Curie Actions. Part IV *Non-Nuclear Actions of the Joint Research Centre (JRC)* is not included, as the activities in this part do not present funding opportunities for SSH researchers in general but rather describe how the JRC will contribute to the other parts of Horizon 2020.

The report finishes with conclusions of the analysis and a number of recommendations.

[1] The analysis of the Work Programmes 2014/15 is partly based on information of the European Commission, DG Research, Unit B.6.

2. "Embedding SSH" – Implementation aspects

To a certain amount, socio-economic aspects were already a cross-cutting theme in the 7th Framework Programme. However, the approach in Horizon 2020 to pursue the embedding of SSH in all specific objectives (read: programme parts) of the Framework Programme is a novelty. This new approach requires specific activities. In fact, the implementation of interdisciplinary research programmes is a challenge in itself. Traditionally, career patterns and academic institutions are structured along disciplinary lines. Interdisciplinary projects are usually more time-consuming as they need additional efforts to establish an integrated team and concept. Interdisciplinary funding programmes need to invest extra efforts to the programme design and to organising the evaluation of interdisciplinary proposals.[2]

To meet this challenge of embedding SSH in interdisciplinary projects, the EU Commission foresees several measures for supporting the embedding of SSH in Horizon 2020.

One measure concerns the cooperation within the European Commission. The different units within the Directorate-General for Research and Innovation (DG RTD), but also within other Directorates-General like the DG for Communications Networks, Content and Technology (DG CNECT), shall work closely together in designing interdisciplinary topics including SSH research aspects. In particular, an important role falls to DG RTD unit B.6 "Reflective Societies" as the unit responsible for embedding SSH research.

Those topics that are relevant for SSH researchers have been **"flagged" as SSH relevant on the participant portal.** The degree of SSH integration in these topics varies. Some topics are clearly dominated by (or even restricted to) SSH research aspects and aim at the SSH research community. Other "flagged" topics include – among other research aspects - a significant part of SSH research dimensions. Some of the topics that are "flagged" only include minor SSH research dimensions. The flagging is supposed to support SSH researchers in identifying funding opportunities throughout Horizon 2020. It is based on a Commission internal analysis of the Work Programme topics. This analysis serves also as essential basis for the selection of evaluators and for the monitoring of SSH embedding.

One central measure is **the inclusion of SSH experts** in the design of the research topics and in the evaluation of projects. The Horizon 2020 Advisory Groups play an important role when it comes to selecting the topics of the Work Programmes. The EC aims at including SSH experts in all Advisory Groups. Currently 14% of all members of Horizon 2020 expert groups have a background in SSH.[3] While the first Work Programmes covering 2014 and 2015 have been elaborated before Horizon 2020 Advisory Groups were formally established, their relevance will increase for the second round of Work Programmes (2016/17). Further to this, the EC intends to involve SSH experts in the evaluation of proposals – in particular for the topics that were identified by the Commission as being SSH-relevant. Efforts were undertaken to specifically motivate SSH experts with the help of National Contact Points for Societal Challenge 6 to register in the EC's database of independent experts for European research and innovation.

The EC has announced to establish a **monitoring system** with regard to embedding SSH in Horizon 2020. This could allow for adopting corrective measures, if problems occur. On various occasions, Commission representatives have stressed that "embedding SSH" is a "learning process"[4] and that it might not work perfectly in the first round of Work Programmes. Further details on the design of the monitoring system have not yet been communicated.

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[2] See also the NET4SOCIETY policy brief „Pulling it together – on Interdisciplinary Research Design" (2013): http://www.net4society.eu/_media/PB_N4S_FINAL.pdf

[3] See Presentation Kurt VandenBerge, EC, DG RTD: http://www.horizont2020.de/media/content/Vandenberghe_Auftakt_WS7.pdf

[4] See speech by Commissioner Geoghegan-Quinn on 24.09.13 in Vilnius: http://europa.eu/rapid/press-release_SPEECH-13-740_en.htm

3. SSH in Horizon 2020 Part III *Societal Challenges*

Part III "Societal Challenges" responds directly to the policy priorities identified in the Europe 2020 strategy. It aims to stimulate the critical mass of research and innovation efforts needed to achieve the Union's policy goals. All the envisaged activities shall take a challenge-based approach, bringing together a critical mass of resources and knowledge across different fields, technologies and scientific disciplines. The activities shall cover the full cycle from research to market.

In order to address these challenges, research of an interdisciplinary character is needed that takes into account various aspects – including the "human factor" and knowledge from social sciences and humanities e.g. on behaviour, lifestyle changes, public awareness and acceptance, values, socio-economic and cultural preconditions for innovation as well as socio-economic and cultural impacts of innovations.

3.1 Challenge 1 "Health, Demographic Change and Well-being"

General description

The broad objectives of the challenge include effective health promotion, supported by a robust evidence base, prevention of diseases, contribution to well-being and to containing costs. Improved understanding of health and disease will demand close linkage between fundamental, clinical, epidemiological and socio-economic research. Effective sharing of data and the linkage of these data with real-world large scale cohort studies is also essential, as is the translation of research findings into the clinic, in particular through the conduct of clinical trials. It is a societal challenge to adjust to the further demands on health and care sectors due to the ageing population. If effective health and care is to be maintained for all ages, efforts are required to improve and speed-up decision making in prevention and treatment provision, to identify and support the dissemination of best practice in the healthcare sector, to raise awareness and to support integrated care.

SSH aspects in Challenge 1 (Specific Programme)

Challenge 1 contains Social Sciences and Humanities aspects in all of its activity lines – a large share of the research aspects listed necessitate the integration of SSH. There is no specific activity line solely dedicated to SSH but there is a frequent reference to the SSH aspects to be integrated in specific sub-areas of the programmes. Three activity lines (1.1.1, 1.4.1 and 1.4.2) put a specific focus on SSH and explicitly state that SSH will be needed to contribute to the research topics listed. However, SSH contributions are easily detectable in other activity lines as well - although not clearly stated.

To summarise, SSH relevant aspects in Challenge 1 focus mainly on issues of developing health and wellbeing indicators, promoting health and disease prevention, support to policy-making, attention to patients, improving healthcare systems, involving all health providers in the research cycle, prevention of health inequalities, demographic change.

The following passages from the various activity lines of Challenge 1 contain SSH aspects:

<u>Activity line 1.1. Understanding health, well-being and disease</u>

1.1.1. Understanding the determinants of health, improving health promotion and disease prevention

SSH aspects:

- Development of comprehensive health and well-being indicators in the Union based on existing data sources and indicator systems. Environmental, behavioural (including life-style), psychological, organisational, cultural, socio-economic, biological and genetic factors, in their broadest senses will be studied.
- Innovative approaches to exposure assessment are needed using new-generation biomarkers based on 'omics' and epigenetics, human biomonitoring, personal exposure assessments and modelling to understand combined, cumulative and emerging exposures, integrating socio-economic, cultural, occupational, psychological and behavioural factors. Improved links with environmental data using advanced information systems will be supported.
- Existing and planned policies and programmes can be assessed and policy support provided.
- Improved behavioural interventions, prevention and education programmes can be developed.

1.1.2. Improving surveillance and preparedness

SSH aspects:

- New or improved methods for surveillance, diagnosis, early warning networks, health service organisation and preparedness campaigns are needed for the modelling of epidemics, for effective pandemic response as are efforts to maintain and enhance capabilities to combat drug resistant infectious disease.

Activity line 1.2. Preventing disease

1.2.1. Developing effective prevention and screening programmes and improving the assessment of disease susceptibility

SSH aspects:

- Testing and validation of screening methods and programmes
- Identifying individuals and populations at a clinically relevant increased risk of disease
- Personalised, stratified and collective strategies for efficacious and cost effective disease prevention

Activity line 1.3. Treating and managing disease

1.3.2. Transferring knowledge to clinical practice and scalable innovation actions

SSH aspects:

- Clinical trials for transferring biomedical knowledge to application in patients and support for these will be provided, as well as for the improvement of their practice.
- Enhancing the use of databases and electronic health records as data sources for trials and knowledge transfer

Activity line 1.4. Active ageing and self-management of health

1.4.1. Active ageing and independent and assisted living

SSH aspects:

- Multidisciplinary advanced and applied research and innovation with socioeconomic, behavioural, gerontological, digital and other sciences is needed for cost effective

user-friendly solutions for active, independent and assisted daily living (in the home, the workplace, public spaces, etc.) for the ageing population and people with disabilities taking into account gender differences.

- Development of technologies and systems and services enhancing quality of life and human functionality including mobility, smart personalised assistive technologies, service and social robotics, and ambient assistive environments.
- Research and innovation pilots to assess implementation and wide uptake of solutions will be supported.
- Involvement of end-users, user communities and formal/informal carers will be emphasised.

1.4.2. Individual awareness and empowerment for self-management of health

SSH aspects:

- Research into socio-economic factors and cultural values, behavioural and social models, attitudes and aspirations in relation to personalised health technologies, mobile and/or portable tools, new diagnostics, sensors and devices for monitoring and personalised services
- Solutions will be developed and tested with the use of open innovation platforms such as large scale demonstrators for social and service innovation.

Activity line 1.5. Methods and data

1.5.1. Improving health information and better use of health data

SSH aspects:

- Development of data processing, knowledge management, modelling, visualisation, ICT-security and privacy related issues

1.5.2. Improving scientific tools and methods to support policy making and regulatory needs

SSH aspects:

- Support research and development, integration and use of scientific tools, methods and statistics for rapid, accurate and predictive assessment of the safety, efficacy and quality of health interventions and technologies including new drugs, biologics, advanced therapies and medical devices
- Support for improved risk assessment methodologies, compliance frameworks, testing approaches and strategies relating to environment and health
- Development of relevant methods for assisting the assessment of ethical aspects

Activity line 1.6. Health care provision and integrated care

1.6.1. Promoting integrated care

SSH aspects:

- Cooperation between the providers of health and social/ informal care to support the management of chronic disease, incl. patients with disabilities, outside institutions
- In the context of demographic change, R&I to improve the organisation of long-term care delivery as well as policy and management innovation will also be supported.
- Implementing new and integrated care solutions

1.6.2. Optimising the efficiency and effectiveness of healthcare provision and reducing inequalities by evidence-based decision making and dissemination of best practice, and innovative technologies and approaches

SSH aspects:

- Comparative analyses of the reform of public health systems in Europe and in third countries and assessments of their mid to long-term economic and social impacts
- Analyses of future health workforce needs both in terms of numbers and required skills in relation to new patterns of care
- Research on the evolution of health inequalities, of their interplay with other economic and social inequalities and on the effectiveness of policies aiming to reduce them in Europe and beyond
- Assessment of patient safety solutions and quality assurance systems, including the role of patients on safety and quality of care

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 1

The Work Programme 2014/15 in Challenge 1 "Health, Demographic Change and Well-being" contains 51 Topics in total. Of these, 18 Topics were flagged as SSH relevant, which adds up to a share of 35%. All of these 18 Topics include major SSH aspects. The budget share for SSH in this challenge can be estimated to add up to 37 million € (3% of the total budget)[5]. Two of these topics explicitly call for the inclusion of socio-economic disciplines, while three topics call for inter- or multidisciplinary consortia. The addressed SSH research dimensions regard mainly aspects of behaviour and lifestyles, ethical and legal aspects, socio-economic aspects and impacts of health systems/ promotion strategies, and health policies.

In more detail, the SSH aspects in these first calls in Challenge 1 regard the following research dimensions:

Call – "Personalising health and care"

SSH aspects:

- Trends and determinants of health (behavioural, environmental, occupational, nutritional and other modifiable lifestyle factors, gender), determinants and pathways characteristic of healthy ageing (PHC-1-2014)
- Development of personalised health promotion/ disease prevention, behavioural, ethical, legal and social implications (PHC-5-2014)
- Evaluation of prevention programmes: outcomes, quality-of-life, equity and cost-effectiveness and ethical considerations; taking into account different political, economic and societal contexts (PHC-6-2014)
- Socio-economic outcomes of healthcare intervention in the elderly (PHC-17-2014)
- Service robotics for assisted living: needs, societal expectations, acceptability (PHC-19-2014)
- Developing new models for health care systems, measurement of quality-of-life, cultural background and different socio-demographic groups as factors (PHC-23-2014)
- Self-management on health: research into socio-economic factors, cultural values, behavioural/ social models, attitudes, economic aspects of prevention (PHC-26-2014)

[5] The budget share of SSH is estimated in the following way: The budget of SSH-dedicated topics is counted fully. In addition, for topics with major SSH aspects, 10% of the budget was counted. The same method was also applied for the following chapters.

- Health policy development and regulation, driving factors for health/ well-being and their economic and social impact (PHC-31-2014)
- Inter-sector cooperation (environment/ health): interplay between politics & economics; economic and social benefits, impact on reducing inequalities (PHC-4-2015)
- Link between behaviour changes and consequences of ageing (PHC-21-2015)
- Psychological and social determinants of healthy ageing/ mental well-being, socio-economic stressors (e.g. loneliness, poverty) (PHC-22-2015)
- New care models based on personalised medicine: behavioural, ethical, legal, social, economic implications, gender dimension (PHC-24-2015)
- ICT systems for care: organisational and social barriers; ethical and gender issues (PHC-25-2015)
- ICT supported health self-management: socio-economic factors, behavioural and social models, attitudes, economic aspects (PHC-27-2015)

Call – "Co-ordination activities"

SSH aspects:

- Diabetes treatment/ prevention: lifestyle & behaviour changes, policies (HCO-5-2014)
- Research into health research activities and innovation (HCO-14-2014)
- Cooperation between science and society in health research (HCO-15-2014)

3.2 Challenge 2 "Food Security, Sustainable Agriculture, Marine and Maritime Research and the Bioeconomy"

General description

The specific objective of the challenge is to secure sufficient supplies of safe and high quality food and other bio-based products, by developing productive and resource-efficient primary production systems, fostering related ecosystem services, alongside competitive and low carbon supply chains. This will accelerate the transition to a sustainable European bio-economy.

The need to provide a sustainable, safe and secure food supply for the European and an increasing global population is the challenge that Europe will be facing. Furthermore, Europe will need to ensure sufficient supplies of raw materials, energy and industrial products, under conditions of decreasing fossil carbon resources, while maintaining its competitiveness. Bio-waste represents a huge problem and cost, despite its high potential added value.

SSH aspects in Challenge 2 (Specific Programme)

All in all, SSH aspects are present in the majority of Challenge 2 activity lines. They include the following issues:

- Fostering ecosystem services by integrating agronomic, environmental and social goals into sustainable production and consumption
- Socio-economic research and forward looking activities in relation to the bio-economy strategy, including development of indicators, data bases, models, foresight and forecast, impact assessment of initiatives on the economy, society and the environment
- Social, economic and environmental benefits and the modernisation of the bio-economy associated sectors and markets supported through multi-disciplinary research, driving innovation

- Broad approach to innovation ranging from technological, non-technological, organisational, economic and social innovation

The following passages from the various activity lines of Challenge 2 contain SSH aspects:

Activity line 2.1. Sustainable agriculture and forestry

Support for more productive, environmentally-friendly resource-efficient and resilient agriculture and forestry systems is achieved by appropriate knowledge, tools, services and innovations. These systems should supply sufficient food, feed, biomass and other raw-materials and deliver ecosystems services while at the same time supporting the development of thriving rural livelihoods.

2.1.2. Providing ecosystem services and public goods

SSH aspects:

- Research activities will contribute to a better understanding of the complex interactions between primary production systems and ecosystems services and will support the provisions of public goods (including cultural and recreational value) and services, through the delivery of management solutions, decision-support tools and the assessment of their market and non-market value.

2.1.3. Empowerment of rural areas, support to policies and rural innovation

SSH aspects:

- New concepts & institutional innovations to ensure cohesion of rural areas and prevent economic and social marginalisation, foster diversification of economic activities
- Ensure appropriate relations between rural and urban areas, as well as facilitate knowledge exchange, demonstration, innovation and dissemination and foster participatory resource management
- Explore ways in which public goods in rural areas can be converted into local/ regional socio-economic benefit

  Socio-economic and comparative assessment of farming/ forestry systems and their sustainability performance

2.1.4. Sustainable forestry

SSH aspects:

- Produce bio-based products, ecosystems, services and sufficient biomass, with due consideration to economical, ecological and social aspects of forestry as well as to regional differences
- Activities will focus on the further development of sustainable forestry systems which can address societal challenges and demands.

Activity line 2.2. Sustainable and competitive agri-food sector for a safe and healthy diet

Addressing consumer needs for safe, healthy, high quality and affordable food, while considering the impacts of food consumption behaviour and food and feed production on human health, the environment and the global ecosystem.

2.2.1. Informed consumer choices

SSH aspects:

- Consumer preferences, attitudes, needs, behaviour, lifestyle, education and the cultural component of food quality
- Communication between consumers and the food chain research community and its stakeholders
- Social innovation will respond to societal challenges, and innovative predictive models and methodologies in consumer science will deliver comparable data and lay the ground for responses to Union policy needs.

2.2.2. Healthy and safe foods and diets for all

SSH aspects:

- Nutritional needs, a balanced diet and the impact of food on physiological functions, physical and mental performance
- Food safety innovations, improved tools for risk and risk-benefit assessment and for risk communication and improved food safety standards

2.2.3. A sustainable and competitive agri-food industry

SSH aspects:

- Research on the needs for the food and feed industry to cope with social, environmental, climate and economic change from local to global
- Innovative and sustainable resource efficient technologies and processes that will strengthen the innovation potential of the European food supply chain, enhance its competitiveness, create economic growth and employment and allow the European food industry to adapt to changes

  Traceability, logistics and services, socio-economic and cultural factors, animal welfare and other ethical issues

Activity line 2.3. Unlocking the potential of aquatic living resources

The overall objective is to manage aquatic living resources to maximise social and economic benefits/ returns from Europe's oceans, seas and inland waters.

2.3.1. Developing sustainable and environmentally-friendly fisheries

SSH aspects:

- Measuring the socio-economic effects of management options
- Shared use of maritime space with other activities, particularly in the coastal zone, and its socio-economic impact

2.3.2. Developing competitive and environmentally friendly European aquaculture

SSH aspects:

- Understanding the socio-economic dimensions of the aquaculture sector to underpin cost and energy efficient production matching with the market and consumer demands, while ensuring competitiveness and attractive prospects for investors and producers.

Activity line 3.5. Cross-cutting marine and maritime research

2.5.2. Developing the potential of marine resources through an integrated approach

SSH aspects:

- Advances in the field of eco-innovation, such as new products, processes and the application of management concepts, tools and measure to assess and mitigate the impact of human pressures on marine environment

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 2

The Work Programme 2014/15 in Challenge 2 "Food Security, Sustainable Agriculture, Marine and Maritime Research and the Bioeconomy" contains 50 topics in total. Of these, 19 topics were flagged as SSH relevant, which adds up to a share of 38%. Four of these 19 topics are dedicated to SSH research, eight topics include major SSH aspects, and 7 topics are only of minor relevance for SSH. The budget share for SSH in this challenge can be estimated to add up to 40 million € (7% of the total budget). One topic explicitly calls for socio-economic disciplines, while two topics demand for inter- or multidisciplinary consortia. The addressed SSH research dimensions regard mainly economic aspects of agriculture/ fisheries, management tools, consumption, socio-economic dimensions of food security, and agriculture.

In more detail, the SSH aspects in these first calls in Challenge 2 regard the following research dimensions:

Call – "Sustainable Food Security"

SSH aspects:

- Livestock production: Business models and management systems, economic aspects (Competitiveness, international trade, supply chains), socio-geographic and demographic changes (SFS-1-2014/15)
- Aquaculture: tools for spatial planning, management tools, forecasting and modelling tools (SFS-11-2014/15)
- Protein-rich food: market potential, consumer & regulatory issues (SFS-15-2014)
- Food security: impact of policies, consumption trends incl. long-term socio-economic drivers, socio-economic modelling, economic issues (financial markets, credits, competitiveness) (SFS-19-2014)
- African agro-food systems: development of strategic action plan, including economic factors, anthropological and cultural aspects (SFS-06-2014)
- Economic and social dimensions of discards in fisheries (SFS-09-2014)
- Malnutrition of elderly: ethical, socio-economic and cultural aspects (SFS-16-2015)
- Small farming: supply chains, governance needs, foresight (SFS-18-2015)
- Policy impact of food quality and food procurement policies (SFS-20-2015)

Call - "Blue Growth: Unlocking the potential of Seas and Oceans"

SSH aspects:

- Socio-economic developments in the offshore economy, business models (BG-5-2014)
- Economic sustainability of fisheries/ aquaculture, markets, supply chains, social awareness (BG-10-2014)
- Ocean health: communication with society (BG-13-2014)
- Preservation and sustainable exploitation of Atlantic marine ecosystems: socio-economic dimension (BG-1-2015)
- Climate change impacts on fisheries: assess economic risks, cost-efficient adaptation and mitigation options (BG-2-2015)

Call – "Innovative, Sustainable and Inclusive Bioeconomy"

SSH aspects:

- Operational framework for public goods provided by agriculture: links with economic activities, policy support (ISIB-1-2014)
- Bioeconomy: engaging society in a platform for informed debates (ISIB-8-2014)
- social innovation in agriculture/ rural development, methods for evaluation of social innovation, role of policy instruments and incentives (ISIB-3-2015)

3.3 Challenge 3 "Secure, Clean and Efficient energy"

General description

The specific objective of the challenge is to make the transition to a reliable, affordable, publicly accepted, sustainable and competitive energy system, aiming at reducing fossil fuel dependency in the face of increasingly scarce resources, increasing energy needs and climate change.

SSH aspects in Challenge 3 (Specific Programme)

Challenge 3 contains Social Sciences and Humanities aspects in several of its activity lines. There is no specific activity line solely dedicated to SSH. SSH aspects are especially represented in the content of activity 3.6. There are three activity lines (3.2, 3.3, 3.5) where SSH are not featured. However, SSH (mainly economic sciences) are very important to provide arguments to define which energy conversion is more efficient, which are the more cost-competitive and sustainable technologies, etc.

To summarise, SSH relevant aspects in Challenge 3 focus mainly on issues of understanding interactions between social, economic and environmental systems, providing knowledge and tools for effective decision making and public engagement. SSH activities shall focus on the development of tools, methods, and models and forward-looking and perspective scenarios for a robust and transparent policy support, including activities on public acceptance and engagement, user involvement, environmental impact, and sustainability assessment improving the understanding of energy related socio-economic trends and prospects.

The following passages from the various activity lines of Challenge 3 contain SSH aspects:

Activity line 3.1. Reducing energy consumption and carbon footprint by smart and sustainable use

SSH aspects:

- Development of new advisory, financing and demand management services and input from the behavioural and social sciences while at the same time taking into account questions of public acceptance.

This SSH-relevant activity includes:

3.1.1. Bringing to mass market technologies and services for a smart and efficient energy use

3.1.2. Unlocking the potential of efficient and renewable heating-cooling systems

3.1.3. Fostering European Smart cities and Communities

Activity line 3.4 A single, smart European electricity grid

SSH aspects:

- Managing the interactions between suppliers & customers as well as trade energy flow
- Deployment of future infrastructure indicators and cost benefit analysis
- New planning, market and regulatory designs for smart energy grid technologies, products and services
- Testing and validation of solutions and assessment of the benefits for the system and for individual stakeholders, before deploying them across Europe
- Research to understand how consumers and businesses react to economic incentives, behavioural changes, information services and other innovative opportunities provided by smart grids.

Activity line 3. 6. Robust decision making and public engagement

SSH aspects:

- Development of robust and transparent theories, tools, methods and models to assess the main economic and social issues related to energy
- Building of databases and scenarios for an enlarged Union and the assessment of the impact of energy and energy-related policies on security of supply, consumption, the environment, natural resources, and climate change, society and competitiveness of the energy industry
- Socio-economic research for creating favourable market conditions at the regulatory, administrative and financing level for low-carbon, renewable and energy efficiencies technologies and solutions
- Measures facilitating the energy policy implementation, preparing the ground for rollout of the investments, supporting the capacity building and acting on public acceptance
- Innovation for the smart and sustainable use of existing technologies.
- Innovative organisational structures, dissemination and exchange of good practices and specific training and capacity building actions
- Consumer behaviour including that of vulnerable consumers like persons with disabilities and behavioural changes will be studied in open innovation platforms such as the Living Labs and large scale demonstrators for service innovation as well as through panel surveys, while ensuring privacy.

Activity line 3.7. Market uptake of energy innovation – building on Intelligent Energy Europe (IEE)

SSH aspects:

- Innovative market uptake and replication solutions to rollout new energy technologies in time and through a cost-effective implementation.
- Actions with clear Union added value aiming to develop, apply, share and replicate non-technological innovations with a high leverage factor in Union's sustainable energy markets across disciplines and levels of governance

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 3

The Work Programme 2014/15 in Challenge 3 “Secure, Clean and Efficient Energy” contains 50 topics in total. Of these, 16 topics were flagged as SSH relevant, but there are seven additional non-flagged topics that also include major SSH aspects. Together, the 23 SSH relevant topics add up to a share of 46%. Three out of these 23 topics are dedicated to SSH research, 13 topics include major SSH aspects, and 7 topics are only of minor relevance for SSH. The budget share for SSH in this challenge can be estimated to add up to 45 million € (4% of the total budget). Only one topic explicitly calls for socio-economic disciplines. The addressed SSH research dimensions regard mainly economic aspects of the energy system (market uptake, market development, and business models), energy policies and regulatory frameworks, and user behaviour/ perception/ acceptance.

In more detail, the SSH aspects in these first calls in Challenge 3 regard the following research dimensions:

Call – “Energy Efficiency”

SSH aspects:

- Support for sustainable energy policies (EE-7-2014/15)
- Support to public procurement of sustainable energy products, cost-benefit analysis (EE-8-2014)
- Support to stakeholders in the area of sustainable energy policies, capacity building (EE-9-2014/15)
- Use of social innovations, better understanding consumers/stakeholders perception/ behaviour (EE-10-2014/15)
- Foresight socio-economic activities on energy efficiency. Major trends in society, consumer behaviour, institutional factors (EE-12-2014)
- Foster dialogue between different stakeholders in the area of sustainable energy, frameworks for investments (EE-19-2014/15)
- Tools for planning the renovation of historic buildings (EE-3-2014)
- Establishing large-scale qualification schemes for construction workers (EE-4-2014)
- ICT solutions for energy efficiency: Validation should provide socio-economic evidence for ICT investment (EE-11-2014/2015)
- Developing new markets for industrial heating/cooling systems, organisational, managerial and business innovative models, new regulatory frameworks (EE-14-2014/2015)
- Monitoring of the EU's energy-related products policy (EE-15-2014/2015)
- Demonstrate the financial viability and sustainability of large-scale sustainable energy investments (EE-20-2014/2015)
- Developing new investment mechanisms (EE-21-2014/2015)

Call - “Competitive low-carbon energy”

SSH aspects:

- Market uptake of renewable electricity technologies, connected policies (LCE-4-2014/15)
- Distribution grid: Market models, business cases, public engagement, regulatory and social aspects, economic assessment (LCE-7-2014)
- Economic and public acceptance of technologies for energy storage (LCE-10-2014)
- Bioenergy: market uptake, regulation, policies, socio-economic aspects (LCE-14-2014/15)

- The human factor in the energy system: behaviour, attitudes, perception of risks and benefits, gender aspects, public engagement (LCE-20-2014)
- Transmission grid: market models, business cases, public acceptance, regulatory issues, social aspects, concerns about data security (LCE-6-2015)
- Energy storage systems: market and regulatory issues, socio-economic aspects (LCE-9-2015)
- Impacts of energy technologies, assessment of transformation paths and the related impacts on society and economy, of technology policy measures (LCE-21-2015)

Call – "Smart cities and communities"

SSH aspects:

- Smart Cities: Framework for quantification of economic, and possibly even social, performance (SCC-2-2014)

3.4 Challenge 4 "Smart, Green and Integrated Transport"

General description

The specific objective of Challenge 4 is to achieve a European transport system that is resource-efficient, climate- and environmentally-friendly, safe and seamless for the benefit of citizens, the economy and society.

Activities are aimed at contributing to achieving a 60% reduction of CO2 by 2050, halving the use of 'conventionally-fuelled' cars in cities and achieving virtually CO2-free city logistics in major urban centres by 2030. Activities are also aimed at drastically reducing congestion and accident costs, and virtually eradicating road deaths by 2050.

SSH aspects in Challenge 4 (Specific Programme)

The objective of achieving sustainable mobility requires the development of the knowledge on consumers' behaviour and of the understanding of transports organization. In this perspective, Challenge 4 offers many aspects of research on transport where SSH can contribute, even if the opportunities of involvement are not very well defined, particularly for Humanities. Still, we find SSH research planned within a comparatively small special activity line focussing on social sciences, highlighting socio-economic aspects, foresight and spatial and urban planning (4.4). This activity line 4.4 has no sub-items and by far the least text. The experience with the first Work Programme of this Challenge indicates that there will be a dedicated section in the Work Programme with dedicated SSH topics (relating to activity line 4.4) but that additionally there will be further SSH aspects in other areas of the Challenge as well.

The following passages from the various activity lines of Challenge 4 contain SSH aspects:

Activity line 4.1. Resource-efficient transport that respects the environment

4.1.2. Developing smart equipment, infrastructures and services

SSH aspects:

- Development of new policies, business models, concepts, technologies and IT solutions to increase capacity
- Analysis of accessibility, user friendliness and social inclusiveness

4.1.3. Improving transport and mobility in urban areas

SSH aspects:

- Development of public and non-motorised transport as well as other resource-efficient transport options for passengers and freight as a real alternative to the use of private motor vehicles, supported by greater use of intelligent transport systems as well as by innovative supply and demand management.
- Assessment of interaction between the transport system and other urban systems

Activity line 4.2. Better mobility, less congestion, more safety and security

4.2.1. A substantial reduction of traffic congestion

SSH aspects:

- Innovative solutions to facilitate accessibility/ passenger choices, incl. for the ageing population and vulnerable users and provide opportunities to reduce congestion by improving incident management and the development of traffic optimisation schemes

4.2.2. Substantial improvements in the mobility of people and freight

SSH aspects:

- Ensure flexibility and rapid responses to crisis events and extreme weather conditions by reconfiguring travel and haulage across modes

4.2.4. Reducing accident rates, fatalities and casualties and improving security

SSH aspects:

- Integration of security aspects in the planning and management of passenger and freight flows, on the conception of aircraft, vehicles and vessels, on traffic and system management and on the design of transport infrastructures and of freight and passenger terminals.
- Improve the safety of all road users esp. those at greatest risk, particularly in urban areas
- Provide useful tools for enhanced security thanks to intelligent transport and connectivity applications

Activity line 4.3. Global leadership for the European transport industry

4.3.2. On board, smart control systems

SSH aspects:

- Delivering traffic management and user information directly to in-vehicle devices, supported by reliable real-time traffic data on road conditions and congestion

4.3.4. Exploring entirely new transport concepts

SSH aspects:

- Strategic multidisciplinary research and proof of concept activities shall address innovative transport systems solutions. This will include also new services.

Activity line 4.4. Socio-economic and behavioural research and forward looking activities for policy making

SSH aspects:

- Actions to support policy analysis and development including gathering evidence to understand behaviour on spatial, socio-economic and wider societal aspects of transport
- Understanding local and regional specificities, user behaviour and perceptions, social acceptance, impact of policy measures, mobility, changing needs and patterns, evolution of future demand, business models and their implications, including scenario development and technology foresight
- Better understanding of the links between territorial development, social cohesion and the European transport system
- Reduction of social and territorial inequalities in access to mobility, addressing economic issues, focusing on ways to internalise the externalities from transport across modes, assess future requirements for skills and jobs, research and innovation development

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 4

The Work Programme 2014/15 in Challenge 4 "Smart, Green and Integrated Transport" contains 52 topics in total. Of these, 20 topics were flagged as SSH relevant, but there is one additional non-flagged topic that also includes major SSH aspects. Together, the 21 SSH relevant topics add up to a share of 40%. Four out of these 21 topics are dedicated to SSH research, eight topics include major SSH aspects, and a further eight topics are only of minor relevance for SSH. The budget share for SSH in this challenge can be estimated to add up to 34 million € (4% of the total budget). Within the call "Mobility for Growth" there is a dedicated sub-section on "Socio-economic and behavioural research and forward looking activities for policy making" that contains all the SSH dedicated topics. Outside of this section, the topic texts do not explicitly call for the inclusion of SSH disciplines or for interdisciplinarity. The addressed SSH research dimensions regard mainly user behaviour, regulatory issues, economic aspects of the transport system (markets, supply chains, business models, funding of transport systems), mobility management and new concepts, and regulatory frameworks.

In more detail, the SSH aspects in these first calls in Challenge 4 regard the following research dimensions:

<u>Call – "Mobility for Growth"</u>

SSH aspects:

- Skill needs and education of aviator engineers (MG.1.6-2014)
- User needs and behaviour in the area of air transport (MG.1.7-2014)
- Societal benefits of transport safety measures, behavioural knowledge in this area, socio-economic costs of road accidents, the driver as a factor in road accidents (MG.3.4-2014)
- New concepts for Inland Waterways Transport and their cost-effectiveness and connected tools for education/ training (MG.4.4-2014)
- Policies, measures and tools to change use of conventionally fuelled vehicles (regulatory measures, demand side measures, promotion), research into mobility behaviour, social norms, business models (MG.5.1-2014)
- Knowledge on freight / service trips: economic and behavioural modelling, impacts of policies / Urban planning (MG.5.2-2014)
- Urban road congestions: link to mobility management, travel awareness; development of new concepts, regulations, awareness raising (MG.5.3-2014)
- Transport user behaviour and mobility patterns (MG.9.2-2014)
- Analysis of funding schemes for transport infrastructure (MG.9.3-2014)

- Market prospects for European transport industries (MG.9.4-2014)
- Innovative transport concept (MG.9.7-2014)
- Cost-efficiency of new technologies/ methods in the area of aviation (MG.1.1-2014)
- Supply Chain improvements: social implications (effect on employment and economy), ethical aspects referring to the transport of livestock (MG.6.1-2014)
- Economic, political, social (including the effect on employment and safety) and organisational aspects of the whole transport and logistics supply chain, business models, governance structures (MG.6.2-2014)
- Communication for mobility: comprehensive understanding of the relevant market structures and business segmentation, regulatory/legal framework (MG.7.1-2014)

Call - "Green Vehicles"

SSH aspects:

- Electric two-wheelers: cost-efficiency and regulatory issues (GV.5-2014)

3.5 Challenge 5 "Climate Action, Environment, Resource Efficiency and Raw Materials"

General description

The specific objective of the challenge is to achieve a resource-efficient and climate change-resilient economy and society, to protect the environment and ensure a sustainable supply of raw materials. Activities are aimed at contributing to increasing European competitiveness, raw materials security and improving well-being, whilst assuring environmental sustainability. The challenge supports the aim of keeping average global warming below 2 degree Celsius and enabling ecosystems and society to adapt to climate change and other environmental changes.

SSH aspects in Challenge 5 in the Specific Programme (Specific Programme)

Challenge 5 contains Social Sciences and Humanities aspects in almost all of its activity lines – a large share of the research aspects listed necessitate the integration of SSH. There is no specific activity line solely dedicated to SSH. Two activity lines (5.4.2 and 5.4.3) put their main focus on SSH and explicitly state that SSH will contribute to the research topics listed. However, SSH is very present in other activity lines as well.

To summarise, SSH relevant aspects in Challenge 5 focus mainly on issues of understanding interactions between social, economic and environmental systems, vulnerabilities and resilience of societies, providing knowledge and tools for effective decision making and public engagement, fostering eco-innovation (including social innovation), and enabling the transition to a green economy and society (such as fostering sustainable consumption).

The following passages from the various activity lines of Challenge 5 contain SSH aspects:

Activity line 5.1. Fighting and adapting to climate change

5.1.2 Assessing impacts, vulnerabilities and developing innovative cost-effective adaptation and risk prevention and management measures

SSH aspects:

- Analysis of vulnerabilities, second order effects such as migration and conflicts, costs and opportunities with regard to climate change
- Impacts of climate change on economic assets
- Evaluation of innovative, equitably distributed and cost-effective adaptation responses to climate change
- Evaluation of potential costs of geo-engineering options
- Investigation of inter-linkages, conflicts and synergies of adaptation and risk-prevention policy choices with other climate and sectorial policies
- Investigation of impacts on employment and the living standards of vulnerable groups

5.1.3 Supporting mitigation policies, including studies that focus on impact from other sectoral policies

SSH aspects:

- Assessment of socio-economic risk, opportunities and impacts of climate change mitigation options
- Assessment from impact from other sectorial policies
- Development and validation of new climate-energy-economy models, taking into account economic instruments and relevant externalities, with the aim of testing mitigation policy options and low carbon technology pathways
- Facilitation of (socio-economic) innovation by improving links between research and application and between entrepreneurs, end users, researchers, policy makers, knowledge institutions

Activity line 5.2. Protecting the environment, sustainably managing natural resources, water, biodiversity and ecosystems

5.2.1 Furthering our understanding of biodiversity and the functioning of ecosystems, their interactions with social systems and their role in sustaining the economy and human well-being.

SSH aspects:

- Monitoring/ forecasting impact of human activities (including land use change) on the environment and of environmental changes on human well-being / economies
- Improvement of understanding of complex interactions between natural resources and social, economic and ecological systems, and of the resilience/ fragility of human systems

5.2.2 Developing integrated approaches to address water-related challenges and the transition to sustainable management and use of water resources and services

SSH aspects:

- Provision of strategies, tools, technologies and innovative solutions to improve water quality, cope with imbalances between water demand and availability of supply, promote sustainable end-user behaviour
- Development of appropriate water management strategies

5.2.3 Providing knowledge and tools for effective decision making and public engagement

SSH aspects:

- Research to underpin policy decisions needed to manage natural resource, and to promote institutional, economic, behavioural and technological change
- Research to underpin development of systems to value biodiversity and ecosystem services
- Assessment of vulnerabilities and impacts
- Development of innovative ways to increase policy coherence, resolve trade-offs and manage conflicting interest
- Development of innovative ways to improve public awareness of research results and the participation of citizens in decision-making

Activity line 5.3. Ensuring the sustainable supply of non-energy and non-agricultural raw materials

5.3.1 Improving the knowledge base on the availability of raw materials

SSH aspects:

- Improve knowledge to develop governance (global rules, practices and standards) of resource exploration, extraction and processing, including economic viability and social acceptance

5.3.2 Promoting the sustainable supply and use of raw materials, including mineral resources, from land and sea, covering exploration, extraction, processing, re-use, recycling and recovery

SSH aspects:

- Investigation of economic viability of recycling and materials recovery technologies

5.3.4 Improving societal awareness and skills on raw materials

SSH aspects:

- Support development of innovative green skills
- Improve public awareness of raw materials; facilitate cultural, behavioural, socio-economic, systemic and institutional changes

Activity line 5.4 Enabling the transition towards a green economy and society through eco-innovation

5.4.1 Strengthening eco-innovative technologies, processes, services and products, including exploring ways to reduce the quantities of raw materials in production and consumption, overcoming barriers in this context and boosting their market uptake

SSH aspects:

- Support of organisational, societal, behavioural, business and policy innovation
- Strengthening participation of civil society
- Taking account of rebound effects
- Addressing the potential to move to more sustainable patterns of consumption
- Removing barriers to development / wide application of eco-innovation, creating or enlarging markets for the solutions concerned, improving competitiveness of Union enterprises

5.4.2 Supporting innovative policies and societal changes

SSH aspects:

- Research on the main barriers to market and societal change
- Contributions from the social sciences and humanities
- Development of tools, methods and models to assess and enable the main economic, societal, cultural and institutional changes needed to achieve a paradigm shift towards a green economy and society
- Research will explore how to promote sustainable lifestyles and consumption patterns, encompassing socio-economic research, behavioural science, user engagement, and public acceptance of innovation, as well as activities to improve communication and public awareness

5.4.3. Measuring and assessing progress towards a green economy

SSH aspects:

- Improvement of measurement methods and systems relevant to resource efficiency and eco-innovation
- Socio-economic research will provide a better understanding of the root causes of producer and consumer behaviour

Activity line 5.6 Cultural heritage

5.6.1 Identifying resilience levels via observations, monitoring and modelling

SSH aspects:

- Analysis of the perception of value of cultural heritage

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 5

The Work Programme 2014/15 in Challenge 5 "Climate action…" contains 31 topics in total. Of these, 15 topics were flagged as SSH relevant, which adds up to a share of 48%. Of these 15 topics, 11 included major SSH aspects and four included minor SSH aspects. The budget share for SSH in this challenge can be estimated to add up to 26 million € (4% of the total budget). Two of the topics explicitly call for the inclusion of Social Sciences and Humanities, further six topics call for the integration of socio-economic sciences and two more demand an inter- or multidisciplinary approach – without explicitly mentioning SSH disciplines. The addressed SSH research dimensions regard mainly management and governance issues, non-technological innovations, consumption, lifestyles and awareness raising, gender issues, economic assessments, support to the development of strategies and policies, and – to a lesser extent – cultural aspects.

In more detail, the SSH aspects in these first calls in Challenge 5 regard the following research dimensions:

Call – "Waste: A resource to recycle, reuse and recover raw materials"

SSH aspects:

- analysis of innovative industrial processes and services, organisational and management systems and business models, opportunities for social innovation, encouragement of sustainable consumption behaviour and lifestyle change, attention to the gender dimension, raising awareness of eco-innovative solutions and their market (WASTE-1-2014)

- Socio-economic and cultural dimension with regard to food waste, safety, legislation and costs with regard to food waste, risk and benefits analysis (WASTE-2-2014)
- Social engagement of citizens and education, waste management and its social, political, cultural and institutional aspects (WASTE-4-2014/15)
- Economic instruments, such as incentives for more sustainable production and consumption patterns, and awareness raising initiatives; development of innovative and sustainable strategies for waste prevention and management; how urban patterns, drivers, consumer behaviour, lifestyles, culture, architecture and socio-economic issues can influence the metabolism of cities; benefits to be derived from ecosystems services and green infrastructure, and their gender sensitive application (WASTE-6-2015)

Call - "Water Innovation: Boosting its value for Europe"

SSH aspects:

- Innovative Water solutions (application/market uptake); social, institutional, economic and governance aspects ensuring a more rapid uptake of solutions as well as aspects affecting market deployment and uptake (standardisation & regulatory issues), market assessment and business plan (Water-1-2014/2015)
- Tools and methodologies for integrating agriculture, forestry, climate change impacts and adaptation with climate-energy-economic models and land-use models, develop integrated strategies, integrating resource efficient land use, agricultural productivity improvements, sustainable water management and low carbon energy transition and analysing interactions with the existing regulatory frameworks in these areas and the potential barriers to implementation (Water-2b-2015)
- water resources management / connection to local knowledge, socio-economic development, cultures, policy institutions and implementing bodies, gender dimension (Water-5c-2015)

Call – "Growing a Low Carbon, Resource Efficient Economy with a Sustainable Supply of Raw Materials"

SSH aspects:

- Economic assessment of climate change impacts and mitigation and adaptation strategies (costs, benefits, risks, impacts on green growth, innovation dynamics, job creation, social cohesion); Development of socio-economic mitigation strategies, examination of policies (SC5-3-2014/15)
- Climate change research: Risks, benefits, socio-economic aspects of negative emission technologies (SC5-5-2014/15)
- Research on biodiversity and ecosystem services in an integrated socio-economic-ecological framework, development of management concepts (SC5-6-2014/15)
- Tools to assess and predict the (cost-)effectiveness of environmental restoration measures (SC5-7-2015)
- Natural resource management: forward looking analysis, science-policy interface, impact on human well-being, land-use, spatial planning (SC5-10-2014/15)
- Green economy and sustainable consumption/ production, value chains, green growth and jobs, green behaviour, economic and environmental policies (SC5-14-2014)
- Citizen Observatories: effective transfer of environmental knowledge for policy, industrial, research and societal use, with a focus land (SC5-17-2015)
- Synergies between European and nationally/regionally funded research in climate change, environment, resource efficiency and raw materials, including socio-economic sciences (SC5-19b-2015)

3.6 Challenge 6 "Europe in a Changing World: Inclusive, Innovative and Reflective Societies"

The specific objective of Societal Challenge 6 is to foster a greater understanding of Europe and its societies. Research shall help to provide solutions and support inclusive, innovative and reflective European societies in a context of unprecedented transformations and growing global interdependencies.

Research under this challenge shall address the significant inequalities that persist in the Union both across countries and within them. A central challenge in addressing these inequalities will be the fostering of settings in which European, national and ethnic identities can coexist and be mutually enriching.

Demographic change represents another major challenge for the economy, society and the sustainability of public finances.

A further aspect under this challenge is to make better use of research and innovation to foster Europe's productivity and economic growth rates that have been relatively decreasing in comparison to other world regions.

The in-built complexity of these challenges and the evolution of demands thus make it essential to develop innovative research and new smart technologies, processes and methods, social innovation mechanisms, coordinated actions and policies that will anticipate or influence major evolutions for Europe. It calls for a renewed understanding of determinants of innovation. In addition, it calls for understanding the underlying trends and impacts within these challenges and rediscovering or reinventing successful forms of solidarity, behaviour, coordination and creativity that make Europe distinctive in terms of inclusive, innovative and reflective societies compared to other regions of the world.

It also requires a more strategic approach to cooperation with third countries, based on a deeper understanding of the Union's past and its current and future role as a global player.

SSH aspect in Challenge 6 (Specific Programme)

Challenge 6 is driven by research topics on European societies and includes mainly, but not exclusively SSH research; therefore SSH research dimensions are included in all parts of Challenge 6. The Specific Programme states that specific support to SSH will be provided by this Challenge.[6] As all parts of Challenge 6 contain SSH aspects, not every aspect will be listed in detail here. Instead, a few keywords will be given for all the different activity lines to give an idea on the issues they address:

Activity line 6.1. Inclusive societies

6.1.1. The mechanisms to promote smart, sustainable and inclusive growth

SSH aspects:

- Research on citizen participation, sustainable growth and development, cultural and behavioural aspects, values, institutions, markets, tools for impact analysis, public

[6] Official Journal of the European Union (20.12.2013): Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decisions 2006/971/EC, 2006/972/EC, 2006/973/EC, 2006/974/EC and 2006/975/EC, L 347/965-1041, here: p. 976 (From hereon referred to as "Specific Programme").

policies, employment, taxes, inequalities, poverty, social integration, education and skills, competitiveness, stable economic and financial systems

6.1.2. Trusted organisations, practices, services and policies that are necessary to build resilient, inclusive, participatory, open and creative societies in Europe in particular taking into account migration, integration and demographic change

SSH aspects:

- European integration, welfare state, identities & Europeanization, diversity, participation, family, work, education, employment, mobility and migration, digital inclusion

6.1.3. Europe's role as a global actor, notably regarding human rights and global justice

SSH aspects:

- Research on Europe and other regions, globalisation, transnational actors, global governance, trade development, human rights, security, diplomacy

6.1.4. The promotion of sustainable and inclusive environments through innovative spatial and urban planning and design

SSH aspects:

- Research on the dynamics of urban societies, design and use of public spaces, cities as centres of innovation and employment, socio-ecological transition, reduction of risks and crime, social cohesion

Activity line 6.2. Innovative societies

6.2.1. Strengthening the evidence base and support for the Innovation Union and ERA

SSH aspects:

- Analysis of research, innovation and education policies, systems, and actors, development of indicators, research on incentives for the European Research Area (ERA) promoting measures, improvement of framework conditions or innovation

6.2.2. Exploring new forms of innovation, with special emphasis on social innovation and creativity, and understanding how all forms of innovation are developed, succeed or fail

SSH aspects:

- Research on innovation processes, different forms of innovation, social innovation, creativity and change, social networks, Research on public sector / services innovation

6.2.3. Making use of the innovative, creative and productive potential of all generations

SSH aspects:

- Research on innovation and demographic change, active ageing, improved services and new business and social models, policies, integration of young generation

6.2.4. Promoting coherent and effective cooperation with third countries

SSH aspects:

- International cooperation on research, coordination of policies

Activity line 6.3. Reflective societies - Cultural heritage and European identity

6.3.1. Studying European heritage, memory, identity, integration and cultural inter-action and translation, including its representations in cultural and scientific collections, archives and museums, to better inform and understand the present by richer interpretations of the past

SSH aspects:

- Research on cultural heritage (language, memory, practices, institutions, identities), analysis of interpretation / practices of cultural inter-action, integration and exclusion, identity spheres in collections, archives, museums, libraries, cultural heritage sites, culture as access to social, cultural, economic developments, understanding European identity

6.3.2. Researching into European countries' and regions history, literature, art, philosophy, and religions and how these have informed contemporary European diversity

SSH aspects:

- Research on cultural diversity and its implications for creativity, historical and future development, art, media, language, philosophy, religion, as means to interpret the social, political and cultural reality, influence on individuals and social actors

6.3.3. Researching Europe's role in the world, the mutual influence and ties between the world regions, and a view from outside on European culture

SSH aspects:

- Research on the complexity of the socio-economic and cultural links between Europe and other world regions, on the potential for improved intercultural exchanges, views in Europe on other world regions and vice versa

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 6

The Work Programme 2014/15 in Challenge 6 "Inclusive, Innovative and Reflective Societies" contains 44 topics in total. Of these, 34 topics were flagged as SSH relevant, which adds up to a share of 80%.[7] Of these 34 topics, 31 are dedicated to SSH research and three include major SSH aspects. The budget share for SSH in this challenge can be estimated to add up to 137 million € (50% of the total budget).[8] The addressed SSH research dimensions regard mainly aspects of growth and the economic crisis, including societal and political impacts, the situation of the young generation in Europe (economic, social, political), education, European identities, cultural aspects of opposition / war, cultural heritage, European foreign policies, public service innovation, social innovation.

In more detail, the SSH aspects in these first calls in Challenge 6 regard the following research dimensions:

[7] The 35 topics also includes a support action for National Contact Points of Societal Challenge 6 that is not listed here.

[8] This calculation also includes 10% of the budget for COST actions (even though COST is not a traditional "topic" and not flagged on the participant portal), since COST also involves SSH activities. The 137 million € add up to 50% of the 275.7 million € that are allocated to all calls under the challenge and the COST programme under the challenge. Budget for "horizontal activities" and "Other actions" – other than COST – are excluded from this calculation.

Call – "Overcoming the Crisis: New Ideas, Strategies and Governance Structures for Europe"

SSH aspects:

- Resilient, sustainable economic and monetary union in Europe (EURO.1-2014)
- Economic growth in Europe (EURO.2-2014)
- Impact of economic crisis on European societies (EURO.3-2014)
- Economic crisis and its political challenges, European integration (EURO.4-2014)
- urban development and work, education, housing, mobility, access to public spaces, culture and leisure (ERA-Net EURO.5-2015)
- Improving public administrations and services (EURO.6-2014)

Call – "The Young Generation in an Innovative, Inclusive and Sustainable Europe"

SSH aspects:

- Job insecurity and labour market exclusion of young people (YOUNG.1-2014)
- Impacts of youth mobility, analysis of connected policies (YOUNG.2-2014)
- Lifelong learning of young adults and connected policies (YOUNG.3-2015)
- Young people as drivers of social change (YOUNG.4-2015)
- Societal and political engagement of young people (YOUNG.5-2014)

Call – "Reflective Societies: Cultural Heritage and European Identities"

SSH aspects:

- Uses of the past, historical perspectives, cultural heritage, traditions and languages (ERA-Net - REFLECTIVE.1-2014)
- European identities, emergence of a European cultural heritage in a historical perspective (REFLECTIVE.2-2015)
- European cohesion, regional/ urban policies, perceptions of Europe (REFLECTIVE.3-2015)
- Cultural opposition in former socialist countries (REFLECTIVE.4-2015)
- Cultural heritage of war in contemporary Europe (REFLECTIVE.5-2015)
- Digital cultural assets: new models of the analysis, interpretation and understanding of Europe's cultural and intellectual history, application of humanities research perspectives (identity, culture, questions of place, historical and cultural knowledge) (REFLECTIVE.6-2015)
- Dissemination of research results in the area of inclusive, innovative and reflective societies (REFLECTIVE.8-2015)
- Mapping of existing research, developing a future European research agenda in the field of Reflective societies (Social Platform REFLECTIVE.9-2014)

Call – "Europe as a Global Actor"

SSH aspects:

- Europe and a value-based global order (INT.3-2015)
- EU's policy on global development (INT.4-2015)
- EU's crisis response mechanisms, recent conflicts (INT.5-2015)
- EU's partnership with Mediterranean countries (INT.6-2015)

- Geo-politics in the southern and eastern Mediterranean region (INT.7-2015)
- EU's relation with Eastern partnership countries (INT.8-2015)
- EU's relation with Turkey and neighbouring countries (INT.9-2015)
- EU's relation with Balkan countries (INT.10-2015)
- European cultural and science diplomacy (INT.11-2015)
- Cultural, scientific and social dimension of EU relation with Latin America / Caribbean Countries (INT.12-2015)

Call – "New Forms of Innovation"

SSH aspects:

- ICT-enabled open government: user behaviour (INSO.1-2014/15)
- Economic impact of the Innovation union policy (INSO.3-2014)
- Social innovation (INSO.5-2015)
- ICT-supported learning: educational aspects/ policies, digital exclusion (INSO.6-2014)

3.7 **Challenge 7 "Secure Societies"**

General description

The specific objective of this challenge is to protect freedom and foster security in Europe in a context of global interdependencies and sophistication of threats while strengthening the European culture of freedom and justice and its compliance.

SSH aspects in Challenge 7 (Specific Programme)

SSH issues that are relevant in this context include research on conflicts & conflict resolution, foreign & security policy, policy development, legal & illegal activities, justice, human/ fundamental rights, the rule of law, communication, media and perception, prevention, preparation, anticipation, foresight, risk analysis, risk and crisis management, societal resilience, values, privacy, radicalisation, extremism, socioeconomic, cultural, and anthropological dimensions of security , ethical & legal issues, trade issues

Activity line 7.1. Fighting crime, illegal trafficking and terrorism, including understanding and tackling terrorist ideas and beliefs

SSH aspects:

- Understanding causes and impacts of radicalisation and violent extremism and tackling terrorist ideas and beliefs

Activity line 7.5 Increasing Europe's resilience to crises and disasters

SSH aspects:

- Research will cover the whole crisis management chain and societal resilience

Activity line 7.6 Ensuring privacy and freedom, including in the Internet and enhancing the societal legal and ethical understanding of all areas of security, risk and management

SSH aspects:

- Better understanding of the socioeconomic, cultural, and anthropological dimensions of security, causes of insecurity, role of media and communication and the citizen's perceptions
- Ethical and legal issues and protection of human values and fundamental rights
- Risk and management issues

Activity line 7.7 Enhancing standardisation and interoperability of systems, including for emergency purposes

SSH aspects:

- Activities will also address aspects such as communication and human factors

Activity line 7.8 Supporting the Union's external security policies including through conflict prevention and peace-building

SSH aspects:

- Development of organisational, legal, ethical aspects, trade issues, protection of confidentiality and integrity of information
- New capabilities and solutions to support the EU's external security policies in civilian tasks
- Research on conflict resolution and restoration of peace and justice, early identification of factors leading to conflict
- Research on impact of restorative justice processes

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 7

The Work Programme 2014/15 in Challenge 7 "Secure Societies" contains 59 topics in total. Of these, 20 topics were flagged as SSH relevant, which adds up to a share of 34%. Of these 20 topics, 7 are dedicated to SSH research, 10 include major SSH aspects and three include minor SSH aspects. The budget share for SSH in this challenge can be estimated to add up to 20 million € (7% of the total budget). Two of the topics explicitly call for the inclusion of socio-economic disciplines. The SSH research dimensions addressed regard mainly aspects of radicalisation, management issues, risk and security perceptions e.g. in different cultures, support to the development of strategies and policies, conflict prevention and data protection.

In more detail, the SSH aspects in these first calls in Challenge 7 regard the following research dimensions:

Call – "Disaster-resilience: safeguarding and securing society, including adapting to climate change"

SSH aspects:

- Factors (socio-economic, psychological, political, cultural) for radicalisation and violent action (DRS-20-2014)
- Understanding the links between culture, risk perception and disaster management (DRS-21-2014)
- Development of a testing regime for emergency calls (DRS-19-2014)
- Effective adaptation strategies and systems for better risk management of vulnerable heritage materials and for mitigating damage to cultural heritage assets (DRS-11-2015)

- Resilience of critical infrastructure: human factors (i.e. radicalization), security, geo-politics, sociology, economy, etc. and increased vulnerability due to changing threats, economic indicators (DRS-14-2015)
- Critical infrastructures: analysis of risks and strength/vulnerabilities, identification of alternatives resources, socio-economic impacts of accidents (DRS-15-2015)
- Instruments, tools, and actions to address climate change security risks, contingency plans, impact of climate-driven crises on European security (DRS-22-2015)

Call – "Fight against crime and Terrorism"

SSH aspects:

- Solutions for urban security and resilience, perception of security and crime (incl. architecture, anthropology, arts, economy, law, linguistics and sociology (FCT-10-2014)
- Perception of personal (in)security of various groups (FCT-13-2014)
- Co-operation between police and citizens, "Community policing" and its social, culture, legal, ethical and gender dimension (FCT-14-2014)
- Societal dimension of crowd management (legal and ethical issues, acceptance) (FCT-12-2014)
- Strategies for profiling crimes or offenders and matching and predicting different type of crimes (FCT-2-2015)
- Management and use of suspect information including data mining, language and semantic analysis, connected ethical issues (FCT-4-2015)
- Organizational, legal and societal means for a European electronic identity ecosystem, taking into account trust and data protection, patterns in identity fraud (FCT-9-2015)
- Better understanding the role of new social media networks and their use for public security purpose (FCT-15-2015)
- Role of social, psychological and economic factors in progression into organised crime and terrorist networks. (FCT-16-2015)

Call – "Border Security and External Security"

SSH aspects:

- Analysing civilian and military efforts on conflict prevention and peace building, potential for pooling and sharing of capabilities for civilian conflict prevention (BES-12-2014)
- Human (psychological) factors in border control (BES-14-2014)
- New training methods in the field of civilian conflict prevention and peace building (BES-13-2015)

Call – "Digital Security: Cybersecurity, Privacy and Trust"

SSH aspects:

- Empowering internet users to set the desired level of privacy, based on a simple to understand visualisation of the privacy level (DS-1-2014)

4. SSH in Horizon 2020 Part II *Industrial Leadership – Leadership in enabling and industrial technologies*

The Horizon 2020 Part "Industrial Leadership – Leadership in enabling and industrial technologies" (KET – Key enabling technologies) aims at strengthening the competitiveness of Europe's businesses and will provide dedicated support for research, development and demonstration on ICT, nanotechnology, advanced materials, biotechnology, advanced manufacturing and processing and space. Interactions and convergence across and between the different technologies will be emphasised. This part will follow a technology-driven approach to develop enabling technologies that can be used in multiple areas, industries and services. Applications of these technologies to meet societal challenges shall be supported together with the societal challenges.

In the Specific Programme it is stated: "Where appropriate, social sciences and humanities will contribute to taking into account user needs preferences and acceptance as well as ensuring societal engagement and informed consumer choice."[9] Obvious applications of SSH in KETs might also be associated with ethical concerns with regard to technology advances.

4.1 Information and Communication Technologies (ICT)

General description

The specific objective of this area is to maintain and reinforce European leadership in technologies related to advanced, embedded and energy and resource efficient and robust components and systems, leverage European assets in processor and system architecture, and data localisation technologies, to reinforce the competitiveness of European industry in developing, mastering and shaping the next generation Internet, to strengthen Europe's position as provider of products and services based on individual and business creativity and to reinforce European scientific and industrial leadership in industrial and service robotics, cognitive and communicative systems and to take advantage of the excellence of Europe in these key enabling technologies and support and further enhance the competitiveness and market leadership of its industry.

SSH aspects in ICT (Specific Programme)

There is no specific activity line solely dedicated to SSH. All in all, not many SSH aspects are mentioned in this section. Below are some activity lines listed that contain SSH aspects.

Cross-cutting dimension:

- the interaction between humans and technology

1.1.3 Future Internet: Software, hardware, infrastructures, technologies and services

SSH aspects:

- To develop the next generation internet, research and innovation will be needed on issues such as services, cyber security, privacy, reliability and trust.

[9] Specific Programme, p. 988.

1.1.4 Content technologies and information management: ICT for digital content and for cultural and creative industries

SSH aspects:

- New tools to create, access, exploit, preserve and re-use all forms of digital content in any language and to model, analyse, and visualise vast amounts of data (big data), including linked data (intelligent and adaptive information management systems) will be developed. This includes new technologies for arts, language, learning, interaction, web design, and media.

SSH aspects in the first Work Programme 2014/15 in ICT

The Work Programme 2014/15 in ICT contains 47 topics in total. Of these, 10 topics were flagged as SSH relevant, which adds up to a share of 21%. Of these 10 topics, one is dedicated to SSH research, six include major SSH aspects and three include minor SSH aspects. The budget share for SSH in this programme part can be estimated to add up to 13.5 million € (1% of the total budget). Two of the topics explicitly call for the inclusion of SSH disciplines. Further four topics explicitly require multi- or interdisciplinary consortia. The addressed SSH research dimensions regard mainly aspects of human-machine interaction, user perspective and scenarios, interaction between internet and society, education, and business models.

In more detail, the SSH aspects in these first calls in ICT regard the following research dimensions:

Call – “Information and Communication Technologies Calls” (ICT)

SSH aspects:

- Multilingual online communication: development of a new paradigm, realistic use situations (ICT.17-2014)
- Digital Gaming: narratives, virtual character, interaction systems, human-machine interfaces, emotional models, education (ICT.21-2014)
- Human-computer interaction, user needs and behaviour (ICT.22-2014)
- Influence of hyper connectivity on human lives (on notions such as identity, privacy), norms and behaviours (ICT.31-2014)
- Social, economic and legal issues that arise from the interplay between the Internet and society (ICT.5-2014)
- Collective awareness platforms: obstacles and opportunities, incentives and motivations, governance, ethical issues (ICT.10-2015)
- Potential of new emerging technologies (e.g. 3D) to enhance human creative process, new demands for search engines (ICT.19-2015)
- Learning technologies: application scenarios, gender differences in use (ICT.20-2015)
- Internet of Things: development of business models, societal acceptance, education (ICT.30-2015)

4.2 Nanotechnologies

General description

The specific aim for the section “Nanotechnologies” is to raise the awareness of benefits and risks. Safety assessment and the management of overall risks in the deployment of these technologies will be systematically addressed. Where appropriate, social sciences and

humanities will contribute to taking into account user needs preferences and acceptance as well as ensuring societal engagement and informed consumers' choices.

SSH aspects in Nanotechnologies (Specific Programme)

There is no specific activity line solely dedicated to SSH. The SSH aspects are more present in the content of activities 1.2.2. and 1.2.3. The activity line 1.2.1. does not feature SSH. To summarise: Social sciences and humanities will contribute to defining proactive, science-based governance of nanotechnologies as well as to providing validated scientific tools, methods and platforms for hazard, exposure and risk assessment and management along the entire life cycle of nanomaterials and nanosystems, identifying the human and physical needs of nanotechnology deployment.

The explicit share of SSH is very limited in comparison to other research aspects. Behind the defined actions it is clear that some preliminary and accompanied SSH work is expected to be done. For example, the 1.2.3. activity "Addressing the human and physical needs of nanotechnology deployment" suggests identification of such needs, and the activity "Focussing on governance of nanotechnology for societal and environmental benefit, including communication strategies to ensure social engagement" suggests the identification, characterisation and evaluation of such benefit (or loss).

The following list provides an overview on SSH-relevant activity lines and the SSH aspects mentioned within them:

Activity line 1.2.2. Ensuring the safe and sustainable development and application of nanotechnologies

SSH aspects:

- Defining proactive, science-based governance of nanotechnologies
- Providing validated scientific tools, methods and platforms for hazard, exposure and risk assessment and management along the entire life cycle of nanomaterials and nanosystems, including standardisation issues

Activity line 1.2.3. Developing the societal dimension of nanotechnology

SSH aspects:

- Addressing the human and physical needs of nanotechnology deployment
- Focussing on governance of nanotechnology for societal and environmental benefit, including communication strategies to ensure social engagement.

Activity line 1.2.4. Efficient and sustainable synthesis and manufacturing of nanomaterials, components and systems

SSH aspects:

- Identification of new characteristics of management concerning new flexible, scalable and repeatable unit operations, smart integration of new and existing processes, including technology convergence such as nanobiotechnology, as well as upscaling to enable sustainable high precision large scale production of products and multi-purpose plants that ensures the efficient transfer of knowledge into industrial innovation

Activity line 1.2.5. Developing and standardisation of capacity-enhancing techniques, measuring methods and equipment

SSH aspects:

- Characterisation of specifics of market introduction of safe complex nanomaterials and nanosystems, including nanometrology

SSH aspects in the first Work Programme 2014/15 in Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing:

The first Work Programme 2014/15 for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing brings together several programme parts that are otherwise handled separately in this document. For this reason, the SSH aspects in all of these programme parts will be listed here and will not be repeated in the following chapters.

The first Work Programme 2014/15 for these areas contains 77 topics in total. Of these, six topics were flagged as SSH relevant, which adds up to a share of 8%. Of these six topics, four include major SSH aspects and two include minor SSH aspects. The budget share for SSH in this programme part can be estimated to add up to 4 million € (0.4% of the total budget). Two of the topics explicitly call for the inclusion of SSH disciplines. Further two topics explicitly require multi- or interdisciplinary consortia. The addressed SSH research dimensions regard mainly aspects of communication and interaction with society, education and economic issues (business models).

In more detail, the SSH aspects in these first calls regard the following SSH research dimensions:

Call - "Nanotechnologies, Advanced Materials and KET support actions" (NMP)

SSH aspects:

- Preservation/ restoration of cultural heritage: historical value, business models, human risk factors (NMP.21-2014)
- Eco-innovation business models, management and (re)use of new materials, models to decouple economic growth from resource constraints, cost effectiveness (NMP.34-2014)
- Communication and awareness on nanotechnologies (NMP.31-2014)
- Key enabling technologies: networking on communication and societal dialogue; synergies with Social Sciences and Humanities actors, gender issues, foresight activities; education and training needs (NMP.36-2014)
- Nanotechnology: best practices in societal, future economic and social benefits and risks of nanotechnology (NMP.32-2015)

Call for "FoF – Factories of the Future" (NMP)

SSH aspects:

- Wellbeing and autonomy of workers, education, attractiveness of factories for workers (FOF.4-2014)

4.3 Advanced materials

General description

The specific objective is boosting Europe's industrial leadership through research, technological development, demonstration and innovation in advanced materials.

SSH aspects in "Advanced materials" (Specific Programme)

There is no specific activity line solely dedicated to SSH. The SSH aspect is more present in the content of activities 1.3.4. and 1.3.5. The activity line 1.3.1. does not feature SSH.

Social sciences and humanities are expected to contribute to developing new approach based and 'no-waste' management; to developing new business models and responsible consumer behaviour; to creating new business opportunities, and including the preservation of Europe's materials with historical or cultural value.

The explicit share of SSH is very limited in comparison to other research aspects. Behind the defined actions it is clear that some preliminary and accompanied SSH work is expected to be done.

The following list provides an overview on SSH-relevant activity lines and the SSH aspects mentioned within them:

Activity line 1.3.2. Materials development and transformation

SSH aspects:

- Research to define efficient, safe and sustainable development and scale up to enable industrial manufacturing of future design based products towards a "no-waste" management of materials in Europe e.g. in the metal, chemical or biotechnological industries

Activity line 1.3.3. Management of materials components

SSH aspects:

- Research and development for new and innovative management of life cycle costs and environmental impacts through novel use of advanced materials technology

Activity line 1.3.4. Materials for a sustainable, resource-efficient and low-emission industry

SSH aspects:

- Developing new business models and responsible consumer behaviour that increase the use of the renewable resources for sustainable applications, reduce energy demand in the product's entire life cycle and facilitate low emission production, as well as process intensification, recycling, depollution, materials for energy storage and materials with potential for high-added value from waste and remanufacture

Activity line 1.3.5. Materials for creative industries, including heritage

SSH aspects:

- Applying design and the development of converging technologies to create new business opportunities, including the preservation and restoration of Europe's heritage and materials with historical or cultural value, as well as novel materials

Activity line 1.3.6. Metrology, characterisation, standardisation and quality control

SSH aspects:

- Promoting technologies such as characterisation, non-destructive evaluation and predictive modelling of performance for progress and impact in materials science and engineering

Activity line 1.3.7. Optimisation of the use of materials

SSH aspects:

- Research and development to investigate innovative business model approaches

SSH aspects in the first Work Programme 2014/15 in Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing:

The first Work Programme 2014/15 for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing brings together several programme parts that are otherwise handled separately in this document. For this reason, the SSH aspects in Advanced Material is already listed under "Nanotechnologies" and will not be repeated here.

4.4 Biotechnology

General description

The specific objective of the Biotechnology theme is to lay the foundations for the European industry to stay at the front line of innovation, also in the medium and long term, enabling the European industry to develop new products and processes meeting industrial and societal demands using preferably environmentally-friendly and sustainable production methods; and competitive and enhanced biotechnology-based alternatives to replace established ones; on the other hand, harnessing the potential of biotechnology for detecting, monitoring, preventing and removing pollution. In addition to that, developing platform technologies (e.g. genomics, meta-genomics, proteomics, metabolomics, molecular tools, expression systems, phenol typing platforms) and triggering leadership and competitive advantage on a wide number of economic sectors are indicated as other important aims related to this area.

SSH aspects in "Biotechnology" (Specific Programme)

There is no specific activity line solely dedicated to SSH. Major SSH aspects are determined as below:

1.4.2 Biotechnology-based industrial products and processes

SSH aspects:

- Assessment of the techno-economic feasibility as well as the sustainability of the developed products and processes

Cross-cutting

- User needs preferences and acceptance as well as ensuring societal engagement and informed consumers' choice on products
- Safety assessment and the management of overall risks in the deployment of bio-technologies
- Raising awareness of benefits and risks for bio-technology on general public
- Developing appropriate technical standards and technical activities in support of standardisation and regulation on bio-technology

SSH aspects in the first Work Programme 2014/15 in Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing:

The first Work Programme 2014/15 for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing brings together several programme parts that are otherwise handled separately in this document. For this reason, the SSH aspects in "Biotechnology" are already listed under "Nanotechnologies" and will not be repeated here.

4.5 Advanced Manufacturing and Processing

General description

The objective is to boost Europe's industrial leadership through research, technological development, demonstration and innovation in advanced manufacturing and processing.

SSH aspects in "Advanced Manufacturing and Processing" (Specific Programme):

There is one specific activity line solely dedicated to SSH: *1.5.4. New Sustainable Business Models.* The activity lines 1.5.2. and 1.5.3. do not feature SSH.

Social sciences and humanities will contribute to this part through promoting sustainable, industrial growth by facilitating a strategic shift in Europe from cost-based manufacturing to an approach based on the creation of high added value products and ICT-enabled intelligent and high performance manufacturing in an integrated system and through the development of new business models.

The explicit share of SSH is very limited in comparison to other research aspects. Behind the defined actions it is clear that some preliminary and accompanied SSH work is expected to be done.

The following list provides an overview on SSH-relevant activity lines and the SSH aspects mentioned within them:

Activity line 1.5.1. Technologies for Factories of the Future

SSH aspects:

- Promoting sustainable, industrial growth by facilitating a strategic shift in Europe from cost-based manufacturing to an approach based on the creation of high added value products and ICT-enabled intelligent and high performance manufacturing in an integrated system

Activity line 1.5.4. New sustainable business models

SSH aspects:

- Development of business models in customised approaches that can adapt to the requirements of globalised value chains and networks, changing markets, and emerging and future industries; addressing sustainable business models by covering the whole lifecycle of the product and process

SSH aspects in the first Work Programme 2014/15 in Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing:

The first Work Programme 2014/15 for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing brings together several programme parts that are otherwise handled separately in this document. For this reason, the SSH aspects in "Advanced Manufacturing and Processing" is already listed under "Nanotechnologies" and will not be repeated here.

4.6 Space

General description

The specific aims of the "Space" part of the key enabling technologies are: to carry out research activities in line with the space research activities of the Member States and European Space Agency (ESA) aiming at building up complementarities among different actors, to maintain a globally leading role in space by safeguarding and further developing a cost-effective and competitive and innovative space industry (including SMEs) and research community, by fostering space-based innovation, to enhance the research-base by providing continuity in space research and innovation programmes, to make standardisation in order to optimise the investments in space sector and to exploit the space infrastructure by promoting the development of innovative products and services, to develop advanced and enabling space technologies and operational concepts from idea to demonstration in space, to ensure more extensive utilisation of space data from existing, archived and future European missions in the scientific, public and commercial domain and to support the European research and innovation contribution to long term international space partnerships.

SSH aspects in "Space" (Specific Programme):

The activity lines listed under "Space" do neither explicitly include SSH aspects, nor do they mention themes that include obvious but implicit SSH research dimensions.

SSH aspects in the first Work Programme 2014/15 in "Space"

Although an analysis of the Specific Programme as the overall framework does not reveal any SSH aspects in this programme part, there are nonetheless very few topics in the first Space Work Programme 2014/15 with SSH relevance. The Work Programme 2014/15 in Space contains 31 topics in total. Of these, 2 topics with minor SSH aspects were flagged as SSH relevant, which adds up to a share of 6%. The budget share for SSH in this programme part can be estimated to add up to ca. 1 million € (0.5% of the total budget). None of the topics explicitly call for the inclusion of SSH disciplines or for multi- or interdisciplinary consortia. The addressed SSH research dimensions regard mainly aspects of communication and data use.

In more detail, the SSH aspects in these first calls in Space regard the following research dimensions:

<u>Call – "Earth Observation"</u>

SSH aspects:

- Use of space data in Earth system science: dissemination mechanisms and reference frames (EO.1-2014)

<u>Call – "Competitiveness of the European Space Sector: Technology and Science"</u>

SSH aspects:

- Attracting interest of students towards space (Compet.10-2014)

5. SSH in Horizon 2020 Part I *Excellent Science*

The Horizon 2020 Part on "Excellent Science" aims at reinforcing and extending the excellence and competitiveness of the EU's science base. It shall contribute to the consolidation of the European Research Area. It will support individual researchers through the ERC and the Marie Skłodowska-Curie actions. The programme part "Future and emerging technologies (FET)" will extend Europe's capacity for advanced and paradigm-changing innovation. It will foster scientific collaboration across disciplines on radically new, high-risk ideas and accelerate development of the most promising emerging areas of science and technology. Research infrastructures will be further developed. These activities are inherently forward-looking and are intended to build skills and capacities in the long term. In this part of Horizon 2020, the activities are mostly of a "bottom-up", science-driven nature.

5.1 European Research Council

General description

The European Research Council (ERC) consists of no predetermined subjects or themes making it a bottom-up approach concept. It funds cutting-edge frontier research. ERC, which over the period of FP7 became an important resource for SSH in Europe, had dedicated approximately 15% of the total budget to proposals in the SSH field of research in FP7.[10]

For Horizon 2020 (2014-2020), the ERC has received a substantial increase in its budget (now €13,268 billion). Currently, 17% of the budget is foreseen for proposals from SSH domains.

SSH aspects in the ERC

SSH researchers can participate and make use of the grants available under ERC as it is specifically designed for projects across science, engineering, humanities and social sciences. The following are the four calls in which SSH researchers can participate in:

- **ERC Starting Grant**: this scheme targets promising researchers who have the proven potential of becoming independent research leaders. These calls, which are published once a year, are for researchers of any nationality with 2-7 years of experience since completion of PhD.
- **ERC Consolidator grants:** these grants are designed to support excellent Principal Investigators at the career stage at which they may still be consolidating their own independent research team or programme. The grants under this scheme are awarded for a period of 5 years where the Principal Investigator shall have been awarded their first PhD over 7 and up to 12 years prior to the publication date of the call for proposals.

[10] At the end of FP7, ERC had committed 17% of its total budget of €7,510 million to the Social Sciences and Humanities.

- **ERC Advanced Grants**: these grants move a step higher, as the researchers that fall under the remit of this scheme need to be already independently established researchers who are aiming to pursue ground breaking and high risk projects in their respective field of research.
- **ERC Proof of Concept**: those that would have already been awarded an ERC grant have a second opportunity to re-apply for additional funding under this scheme. This scheme was devised with a vision of establishing the innovation potential of ideas arising from their ERC –funded frontier research projects.

SSH aspects in the first Work Programme 2014/15 in "ERC"

The first Work Programme 2014/15 for ERC foresees calls for ERC Starting Grants, ERC Advanced Grants, ERC Consolidators Grants and ERC Proof of Concept Grants. All of them are open to SSH researchers.

5.2 Future and Emerging Technologies (FET)

General description

The specific objective of the FET programme is to open up new and promising fields of research and innovation, to foster radically new technologies by exploring novel and high-risk ideas building on scientific foundations and contribute to the European next generation industries.

To achieve this goal, FET shall promote research and technology beyond what is known, accepted or widely adopted, and shall foster novel and visionary thinking to open promising paths towards powerful new technologies, some of which could develop into leading technological and intellectual paradigms for the decades ahead.

SSH aspects in FET

FET activities consist primarily of bottom-up collaborative research in all fields. Thus, there is no specific activity line dedicated to SSH. Nonetheless, while the FET programme aims to be visionary, transformative and unconventional, the new logics for action and new opportunities of research for SSH must be considered:

(a) The support for goal-oriented and interdisciplinary collaborative research might aim to further collaboration with SSH researchers.
The FET programme appeals to radical breakthroughs with a transformative impact increasingly rely on intense collaboration across disciplines in science and technology (for instance, information and communication, biology, bioengineering and robotics, chemistry, physics, mathematics, medicine modeling, earth system sciences, material sciences, neuro- and cognitive sciences, social sciences or economics) and with the arts, behavioral sciences and humanities.

(b) The support for new emerging research themes, with benefits for society.

The activities shall give firmer shape to different logics for action, on the appropriate scale, identifying and seizing opportunities of long-term benefit for citizens, the economy and society.

In particular, both of the following activities report SSH aspects:

FET Proactive

- shall, in close association with the societal challenges and industrial leadership themes, address a number of promising exploratory research themes with the potential to generate a critical mass of inter-related projects that, together, make up a broad and multi-faceted exploration of the themes and build a European pool of knowledge.

FET Flagships

- shall, taking into full account the outcome of FET preparatory projects, support ambitious large-scale, science and technology driven research aiming to achieve a scientific and technological breakthrough in areas identified as relevant in an open and transparent manner involving the Member States and relevant stakeholders. The scientific advance should provide a strong and broad basis for future technological innovation and economic application, plus novel benefits for society.

The activities within the FET programme should be complementary to the activities of the other parts of Horizon 2020, but they could also potentially overlap.

SSH aspects in the first Work Programme 2014/15 in FET:

The first Work Programme 2014/15 for "FET" contains 10 topics in total. Of these, three topics were flagged as SSH relevant, which adds up to a share of 30 %. Of these three topics, two include major SSH aspects and one includes minor SSH aspects. The budget share for SSH in this programme part can be estimated to add up to 2.5 million € (0.4 % of the total budget). One of the topics explicitly calls for the inclusion of SSH disciplines. The two other topics explicitly require interdisciplinary consortia. The addressed SSH research dimensions regard (risk) management, political and economic dimensions, and SSH perspectives on cognition.

In more detail, the SSH aspects in the first calls in FET regard the following SSH research dimensions:

Call – "FET-Proactive – Emerging Themes and Communities"

SSH aspects:

- Global Systems Science: decision making under uncertainty, systemic risk in finance/ economics, managing growth and migration, managing pandemics, policy interactions, new approaches to citizen's participation in policies (FETPROACT.1-2014)
- Cognition: new approaches to/ integrative studies of learning, motivation, autonomy, knowledge, belief, intention, experience, understanding, social belonging, culture; impact on societal changes(FETPROACT.2-2014)

Call – "FET-Open – novel ideas for radically new technologies"

SSH aspects:

- Bottom up topic with interdisciplinary background on high risk visionary science and technology research (FETOPEN.1-2014)

5.3 Marie Skłodowska-Curie Actions

General description

The Marie Skłodowska-Curie Action‘s budget is worth an estimated €5.7billion under Horizon 2020.

Tuition and mobility of professionals in the fields of science and technology is essential for the development of the ERA. It is noteworthy that the Marie Skłodowska-Curie actions that are about exchanging knowledge and gaining new experiences from network cooperation, as well as mobility, through a bottom-up approach with no pre-defined themes, have promoted excellence and contributed to internationalisation efforts in Europe. In strategic terms, the Marie Skłodowska -Curie actions were the most international initiatives in FP7. In Horizon 2020, the identified main objectives for Marie Skłodowska-Curie are to ensure optimum development and dynamic use of Europe’s intellectual capital in order to generate new skills and innovation.

SSH aspects in Marie Skłodowska-Curie actions

As Social Science and Humanities research remains a relatively new domain in European funding schemes, with a proportionally small share of funds, Marie Skłodowska-Curie Actions have been often seen as an alternative funding source to SSH.

Therefore, involvement of “research institutions, businesses, SMEs and other socio-economic actors” in Marie Skłodowska-Curie actions should be used in the widest possible sense, including all fields of future workplaces and public engagement. Apart from that, Marie Skłodowska-Curie actions will be bottom-up. Around 11 % of the budget will be available to SSH researchers.

The following schemes are available for SSH researchers in Horizon 2020:

1. *Fostering new skills by means of excellent initial training of researchers (structured doctoral training)*

This action focuses on structuring the initial training of excellent researchers and doctoral students, providing them with enhanced career perspectives in both public and private sectors. In international, interdisciplinary and inter-sectoral training networks early stage researchers are equipped with a diversity of skills matching the demands of the labour market.

2. *Nurturing excellence by means of cross-border and cross sector mobility (Marie Skłodowska-Curie Fellowships)*

The fellowship programme will fund researchers who want to conduct a research project at an institution in another European or non-European country, thus, creating an attractive career opportunity for experienced researchers. The aim is to enlarge the researchers’ competences at universities, research institutions and businesses and to improve their career development in the public and private sectors.

3. *Stimulating innovation by means of cross-fertilisation of knowledge (Staff exchange)*

The increase of knowledge transfer and innovative ideas to the market is made possible under this action. This will be achieved by exchanging highly qualified research staff between participants in different countries, disciplines and sectors within Europe and worldwide.

4. *Increasing structural impact by co-funding activities*

The promotion of regional, national, and international funding schemes for young researchers is the main aim of this action. This further includes the setting up of new programmes as well as enlarging existing ones in order to harmonise them with European standards for working conditions.

SSH aspects in the first Work Programme 2014/15 in Marie Skłodowska-Curie actions:

In the first Work Programme 2014/15 in the area of Marie Skłodowska-Curie Actions, Calls for all the four schemes mentioned above are included. SSH researchers can participate in all of these calls.

5.4 Research Infrastructures (including e-infrastructures)

General description

The activities aim at developing excellent European research infrastructures for 2020 and beyond, fostering their innovation potential and human resources and reinforcing European policy. Coordination with the cohesion funding sources is pursued to ensure synergies and a coherent approach for the development of the research infrastructures. Synergies with Marie Skłodowska-Curie actions will be encouraged.

In Horizon 2020, Research Infrastructures (RI) will include the following activities:

- Developing the European research infrastructures for 2020 and beyond

EU funding will support the preparation phase of future research infrastructures, the implementation phase, the development of Regional Partner facilities, the operation phase and design studies for new RIs. It will support the networks and clusters that bring together and integrate, on European scale, key national research infrastructures.

Finally, support will be provided to global research and education networks, infrastructures providing virtually unlimited computational and data processing capacity and interoperable, open and trusted scientific data infrastructure.

- Fostering the innovation potential of RIs and their human resources

This activity will support R&D partnerships with industry, pre-commercial procurement by research infrastructure actors, stimulate the use of research infrastructures by industry, encourage the integration of research infrastructures into local, regional and global innovation Ecosystems.

Furthermore the training of staff managing and operating research infrastructures of pan-European interest, the exchange of staff and best practices between facilities will be supported.

- Reinforcing European research infrastructure policy and international cooperation

This activity will exploit synergies between national and Union initiatives and will facilitate the development of global research infrastructures.

SSH aspects in Research Infrastructures

The roadmap with ESFRI infrastructures[11] includes five in the area of SSH:

SHARE, European Social Survey, CESSDA, CLARIN and DARIAH

Those that are officially under implementation are SHARE, European Social Survey and CESSDA.

The use of infrastructures in SSH research will lead to new, innovative and often interdisciplinary ways of research. For example making available our cultural heritage in digital form combined with sensitive interlinking of such resources will open a new frontier for Humanities research.

SSH aspects in the first Work Programme 2014/15 in Research Infrastructures:

The first Work Programme 2014/15 for "Research Infrastructures" contains 22 topics in total. Of these, 13 topics were flagged by the EC as SSH relevant, which adds up to a share of 59 %. However, as most of the topics have a very open character when it comes to the area of research addressed, it is very difficult to calculate a budget share for SSH research infrastructures in this area. An example: the call "Developing new world-class research infrastructures" calls for design studies for new infrastructures in all fields of science and technology.

6. Spreading excellence and widening participation

General description

The aim of this programme part is to fully exploit the potential of Europe's talent pool and ensure that the benefits of an innovation-led economy are both maximised and widely distributed across the Union in accordance with the principle of excellence.

There are significant disparities across Europe in research and innovation performance. The measures in this programme part will aim at unlocking excellence and innovation and will be distinct from, and where appropriate complementary and synergistic with, policies and actions of the ESI Funds. The following main activities are included under this programme:

- Teaming of excellent research institutions and low performing RDI regions
- Twinning of research institutions
- ERA Chairs
- Policy Support Facility
- Supporting access to international networks

SSH aspects in "Spreading excellence and widening participation":

The activities in this programme do not address a specific scientific field. They are therefore as well open to SSH institutions.

SSH aspects in the first Work Programme 2014/15 in "Spreading excellence and widening participation":

[11] http://ec.europa.eu/research/infrastructures/pdf/esfri-strategy_report_and_roadmap.pdf

The first Work Programme 2014/15 in this area contains 3 topics. One topic (ERA Chairs) has been flagged as SSH relevant. However, as this topic as well as the other measures under this programme have a very open character when it comes to the area of research addressed, it is very difficult to calculate a budget share for SSH research in this area.

7. Science with and for Society

General description

The aim of "Science with and for Society" is to build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility.

A dialogue and active cooperation between science and society shall be developed to ensure a more responsible science and to enable the development of policies more relevant to citizens. The societal and political support to S&T shall be widened. Therefore the activities under this programme aim to make scientific careers more attractive, to promote gender equality in the research sector, to integrate society in science and innovation issue, to encourage citizens to engage in science and to further develop the accessibility and the use of the results of publicly-funded research. The governance of research and innovation shall be developed, potential impacts of research shall be taken into account and knowledge on science communication shall be improved.

SSH aspects in "Science with and for society"

This programme addresses a number of SSH relevant research issues, particularly in the area of Science and Technology Studies. SSH aspects include education, gender issues, the relation between science and society, science policies, governance of science, societal needs with regard to science, ethics framework, and communication.

SSH aspects in the first Work Programme 2014/15 in "Science with and for society"

The first Work Programme 2014/15 for "Science with and for society" contains 21 topics in total. Of these, 13 topics were flagged as SSH relevant, which adds up to a share of 59 %. Of these 13 topics, 10 include major SSH aspects and three includes minor SSH aspects. The budget share for SSH in this programme part can be estimated to add up to 13 million € (14 % of the total budget). One of the topics explicitly calls for the inclusion of SSH disciplines. The addressed SSH research dimensions mainly regard education, R&I systems and policies, legal and ethical issues.

In more detail, the SSH aspects in the first calls in "Science with and for Societies" regard the following SSH research dimensions:

<u>Call for Making Science Education and Careers Attractive For Young People</u>

SSH aspects:

- Science education, gender balance in science, interaction between different levels of the education system (SEAC.1-2014/2015)
- Development of higher education curricula with regard to societal engagement, gender equality, gender in R&I, science education, ethics (SEAC.2-2014)
- Support to researchers' career development (SEAC.3-2014)
- assessing 'good human resources management' in the public research sector (SEAC.4-2015)

Call for Promoting Gender Equality in Research and Innovation

SSH aspects:

- Evaluation of gender equality plans (GERI.4-2014/15)
- Evaluation of initiatives to promote gender equality in research policy and research organisations (GERI.3-2015)

Call for Integrating Society in Science and Innovation

SSH aspects:

- Development of Responsible Research and Innovation plan (ISSI.5-2014/15)

Call for Developing Governance for the Advancement of Responsible Research and Innovation

SSH aspects:

- Barriers for uptake of Responsible Research and Innovation in R&I systems (GARRI.1-2014)
- Text and Data Mining: Policy developments, legal frameworks, awareness raising (GARRI.3-2014)
- Ethics in Research: Cases of misconduct incl. socio-economic / psychological dimension (GARRI.5-2014)
- Export of non ethical practices to third countries: case studies involving local structures, impact on population (GARRI.6-2014)
- Implementation of Responsible Research and Innovation in the industry, optimal cooperation between industry and societal actors (GARRI.2-2015)

8. Conclusions and Recommendations

This report demonstrates that a number of SSH aspects are present in the different programme parts of Horizon 2020.

This is particularly true for **Part III. "*Societal Challenges"***. All Societal Challenges include SSH aspects in the respective text passages of the Specific Programme, to varying degrees. Apart from the SSH-driven Challenge 6 "Europe in a changing world: Inclusive, innovative, and reflective societies", Challenge 1 "Health, Demographic Change and Well-being" and Challenge 5 "Climate Action, environment, Resource Efficiency and Raw Materials" include the largest share of SSH research dimensions. Challenge 2 "Food Security, Sustainable Agriculture, Marine and Maritime Research and the Bioeconomy" and Challenge 4 "Smart, Green and Integrated Transport" and Challenge 7 "Secure Societies" include many SSH aspects as well. Challenge 3 "Secure, Clean and Efficient Energy" contains SSH aspects to a lesser extent. While some activity lines in the different challenges concentrate on SSH-aspects (such as activity line 5.4 "Enabling the transition towards a green economy and society through eco-innovation" in Challenge 5), within the text of the Specific Programme there is only one explicitly SSH-dedicated activity line, in Challenge 4 "Transport": "4.4 Socio-economic research and forward looking activities for policy making".

The SSH aspects that are mentioned most often throughout the challenges in the Specific Programme regard issues of behaviour, consumption and lifestyles, management and governance, public perceptions/awareness and public engagement and acceptance, policy development and decision support, policy impact assessment, social/economic innovation, market assessment & business development, economic systems and instruments. It is noteworthy that the inclusion of humanities is rather limited (with the exception of Challenge 6).

A particular large share of SSH flagged topics can be found in the Work Programme of Challenge 6 (80 %). Within the other Challenges, the share ranges between 48 % in Challenge 5 "Climate Action…" and 34% in Challenge 7 "Secure Societies". The topics of the first Work Programmes of Horizon 2020 reflect the texts of the Specific Programme and SSH aspects outside of Challenge 6 deal mostly with behaviours and lifestyles, cost-efficiency, business models, market potentials, management and governance, policy support, socio-economic contexts, user needs, and legal and ethical aspects.

Within the priority ***"Leadership in enabling and industrial technologies"***, the integration of SSH in the text of the Specific Programme is more limited. There are no dedicated activity lines to socio-economic research, or activity lines that are mainly SSH-driven. In "Nanotechnologies" and "Advanced materials" SSH research aspects seem to be more present than in other parts. In "Space", no SSH aspects are mentioned. All in all, the SSH research dimensions within this part focus on consumer behaviour, user preferences and acceptance, governance and management issues, risk assessment and management, and the creation of business models.

The share of SSH flagged topics in the first Work Programmes 2014/15 in this area adds up to ca. 12 % - with significant difference in the individual programme parts. While in "ICT" 21 % of topics are flagged as SSH relevant, only 8 % and 6 % are flagged in "Nanotechnologies…" and "Space" respectively. The SSH research dimensions of the Work Programme topics refer to user perspectives, human-machine-interaction, societal impacts of the digital age, business models, cost-efficiency, workers' needs, communication with society and education.

Within the programmes of **Part I, *"Excellent Science"***, there are no pre-defined research topics in the area of the ERC and the Marie Skłodowska-Curie Action. Therefore an analysis of SSH research dimensions cannot be undertaken for these programmes. However, it can be stated, that a number of funding opportunities for SSH researchers exist in these areas. In the case of the ERC, proposals crossing disciplinary boundaries are particularly encouraged.

This can be a chance for SSH researchers to engage in interdisciplinary research and therefore can built capacities to foster the embedding of SSH. Within the “Future and emerging technologies (FET)” Programme a similar interdisciplinary approach is applied. The SSH-relevant FET topics in the first Work Programme 2014/15 address (risk) management, political and economic dimensions, and SSH perspectives on cognition.

In part V. **“Science with and for society”** SSH research dimensions both in the Specific Programme and in the first Work Programme relate to education, gender issues, the relation between science and society, science policies, governance of science, societal needs with regard to science, ethics framework, and communication.

According to the European Commission, in total 37% of the topics in the first Work Programmes are flagged as SSH relevant, adding up to a budget share of estimated 5.3% (ca. 450 mio. €). This includes also topics in the parts “Spreading excellence and widening participation” and “Research Infrastructures” that rather fund measures to support the research system (often in an open, non-thematic way) than research itself. In the priorities “Societal Challenges” and “Lead Enabling and Industrial Technologies” the share of SSH flagged topics adds up to 34 % (including Societal Challenge 6) with a budget share of 4.7 %.

With regard to the flagging of SSH-relevant topics, approaches differ from programme to programme. For example, in Challenge 1 “Health…” all topics that are flagged as SSH relevant include major SSH aspects, while in Challenge 4 “Transport” 38 % of the SSH-flagged topics only include minor SSH aspects. There are some topics among those that are flagged as SSH relevant, that reveal only very little SSH aspects in the topic texts, such as a mere reference to cost-effectiveness or business models. In a few cases, topics with major SSH aspects have not been flagged. Therefore a simple comparison of the number of flagged topics in the different programme parts can be misleading.

A difference in the phrasing of topics and in the explicit references to SSH or to multi- and interdisciplinarity can also be observed. In few cases, such as in Challenge 4 “Transport” and Challenge 7 “Secure Societies” there are dedicated sections in calls that are explicitly calling for SSH research and which are reserved for SSH-dedicated topics (in “Transport” the section is called “Socio-economic and behavioural research and forward looking activities for policy making”, in “Secure Societies” there are sub-chapters on the "Ethical/Societal Dimension" under the calls on "Disaster-resilience", "Fight against crime and terrorism" and "Border Security and External Security"). Challenge 5 “Climate Action…” is an example where many of the SSH flagged topics refer explicitly to the inclusion of Social Sciences or Humanities as a requirement. In general, only a smaller share of topics flagged as SSH-relevant includes explicit references to SSH or to multi- and interdisciplinary research.

Recommendations

- All Horizon 2020 Advisory Groups should include a significant share of experts with SSH backgrounds to ensure that SSH is adequately taken into account in the agenda setting.
- SSH aspects in the calls should go beyond an ancillary role (e.g. improving the public acceptance of technologies). The increased inclusion of humanities also outside of Challenge 6 could lead to a greater in-depth understanding of the respective challenge.
- Similar approaches in all programme parts should be taken with regard to flagging topics as SSH relevant (e.g. flagging only topics with major SSH aspects).
- Explicit references to the inclusion of SSH or to interdisciplinary consortia in the topic texts could contribute to the integration of SSH researchers in proposals.
- The important contribution of SSH to the tackling of societal challenges should be also adequately reflected in the budget share for SSH research dimensions.
- The inclusion of SSH experts in evaluation panels must be complemented with evaluation criteria that reflect the interdisciplinary character of proposals.
- The forming of interdisciplinary consortia of SSH researchers and researchers from natural and technical sciences should receive support e.g. through the funding of specific networking platforms or synthesis centres.
- For larger interdisciplinary projects, the funding of preparatory phases should be considered.
- The display of SSH-flagged topics on the Participant Portal could be improved, e.g. by the possibility to sort the list by keywords, calls or programmes.
- The mechanisms for monitoring the embedding of SSH in Horizon 2020 should assess the degree of interdisciplinarity and integration of SSH into funded projects as well as the outcome of these projects and the importance of the embedded SSH research on the project impact.

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List of Abbreviations

Abbreviation	Explanation
DG CNECT	Directorate-General for Communications Networks, Content and Technology, European Commission
DG RTD	Directorate-General for Research and Innovation, European Commission
EC	European Commission
ERC	European Research Council
EU	European Union
FP	European Framework Programme for Research and Technological Development.
Horizon 2020	The EU Framework Programme for Research and Innovation 2014-2020
ICT	Information and Communication Technologies
NCP	National Contact Point: National official representative to the Framework Programme in Member, Associated Countries and Third Countries.
NET4SOCIETY	International Network of the National Contact Points for Socio-economic Sciences and Humanities
R&I	Research and Innovation
SSH	Socio-economic sciences and the Humanities

1. Introduction

Horizon 2020, the EU's framework programme for research and innovation for the time period of 2014 to 2020, shall play a central role in the accomplishment of the Europe 2020 strategy for smart, sustainable and inclusive growth. The Regulation for Horizon 2020 foresees that socio-economic sciences and humanities (SSH) will be an integral part of Horizon 2020 and a cross-cutting issue throughout the whole programme. SSH are to be embedded in all pillars of Horizon 2020. They are an essential element of the activities needed to tackle each of the societal challenges and will contribute to enhancing the impact of research results. Specific support to SSH will be provided by the Societal Challenge 6 "Europe in a changing world: Inclusive, innovative and reflective societies".

In order to monitor the integration of SSH in Horizon 2020, to identify those parts of Horizon 2020 that explicitly include SSH research dimensions and to guide National Contact Points (NCPs), researchers and other stakeholders towards funding opportunities for SSH in Horizon 2020, NET4SOCIETY has compiled this report on SSH integration in Horizon 2020. The report therefore provides an indication on what kind of SSH-relevant topics are likely to be taken up in the different programme parts of Horizon 2020 in the coming seven years.

This publication is based on a preliminary report on "SSH integration in Horizon 2020" that NET4SOCIETY published in July 2013 and on the NET4SOCIETY publication "Opportunities for Researchers from the Socio-economic Sciences and Humanities (SSH)" (December 2013). For this report a qualitative textual analysis of the Horizon 2020 Specific Programme was carried out. This is complemented by an analysis of SSH relevant topics in the first Horizon 2020 Work Programmes.[1]

This report begins with a description of the approach of embedding SSH in Horizon 2020. The structure of the main part of the document is then determined by the degree of SSH integration in the different Horizon 2020 programme parts. Instead of following the numerical order of the different parts in Horizon 2020 (*I. Excellent science, II. Industrial leadership, III. Societal challenges, IV. Non-nuclear direct actions of the Joint Research Centre*), this report starts with the part that includes "top down" topics and the highest amount of SSH research dimensions, the *societal challenges*. It continues with the "Key enabling technologies" of the *Industrial leadership* part. In the following chapter, SSH aspects in *Excellent science* are presented (mostly "bottom up" opportunities). Last but not least, the programmes "Science with and for society" and "Spreading excellence and widening participation" are analysed.

Some parts of Horizon 2020 are not covered in this analysis. The programme parts "Access to risk finance" and "Innovation in SMEs" (both part of *Industrial leadership*) are omitted, as they neither define top-down research areas that could be analysed with regard to SSH aspects nor do they present programmes of particular attractiveness for SSH researchers, such as the ERC or the Marie Skłodowska-Curie Actions. Part IV *Non-Nuclear Actions of the Joint Research Centre (JRC)* is not included, as the activities in this part do not present funding opportunities for SSH researchers in general but rather describe how the JRC will contribute to the other parts of Horizon 2020.

The report finishes with conclusions of the analysis and a number of recommendations.

[1] The analysis of the Work Programmes 2014/15 is partly based on information of the European Commission, DG Research, Unit B.6.

2. "Embedding SSH" – Implementation aspects

To a certain amount, socio-economic aspects were already a cross-cutting theme in the 7th Framework Programme. However, the approach in Horizon 2020 to pursue the embedding of SSH in all specific objectives (read: programme parts) of the Framework Programme is a novelty. This new approach requires specific activities. In fact, the implementation of interdisciplinary research programmes is a challenge in itself. Traditionally, career patterns and academic institutions are structured along disciplinary lines. Interdisciplinary projects are usually more time-consuming as they need additional efforts to establish an integrated team and concept. Interdisciplinary funding programmes need to invest extra efforts to the programme design and to organising the evaluation of interdisciplinary proposals.[2]

To meet this challenge of embedding SSH in interdisciplinary projects, the EU Commission foresees several measures for supporting the embedding of SSH in Horizon 2020.

One measure concerns the cooperation within the European Commission. The different units within the Directorate-General for Research and Innovation (DG RTD), but also within other Directorates-General like the DG for Communications Networks, Content and Technology (DG CNECT), shall work closely together in designing interdisciplinary topics including SSH research aspects. In particular, an important role falls to DG RTD unit B.6 "Reflective Societies" as the unit responsible for embedding SSH research.

Those topics that are relevant for SSH researchers have been **"flagged" as SSH relevant on the participant portal.** The degree of SSH integration in these topics varies. Some topics are clearly dominated by (or even restricted to) SSH research aspects and aim at the SSH research community. Other "flagged" topics include – among other research aspects - a significant part of SSH research dimensions. Some of the topics that are "flagged" only include minor SSH research dimensions. The flagging is supposed to support SSH researchers in identifying funding opportunities throughout Horizon 2020. It is based on a Commission internal analysis of the Work Programme topics. This analysis serves also as essential basis for the selection of evaluators and for the monitoring of SSH embedding.

One central measure is **the inclusion of SSH experts** in the design of the research topics and in the evaluation of projects. The Horizon 2020 Advisory Groups play an important role when it comes to selecting the topics of the Work Programmes. The EC aims at including SSH experts in all Advisory Groups. Currently 14% of all members of Horizon 2020 expert groups have a background in SSH.[3] While the first Work Programmes covering 2014 and 2015 have been elaborated before Horizon 2020 Advisory Groups were formally established, their relevance will increase for the second round of Work Programmes (2016/17). Further to this, the EC intends to involve SSH experts in the evaluation of proposals – in particular for the topics that were identified by the Commission as being SSH-relevant. Efforts were undertaken to specifically motivate SSH experts with the help of National Contact Points for Societal Challenge 6 to register in the EC's database of independent experts for European research and innovation.

The EC has announced to establish a **monitoring system** with regard to embedding SSH in Horizon 2020. This could allow for adopting corrective measures, if problems occur. On various occasions, Commission representatives have stressed that "embedding SSH" is a "learning process"[4] and that it might not work perfectly in the first round of Work Programmes. Further details on the design of the monitoring system have not yet been communicated.

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[2] See also the NET4SOCIETY policy brief „Pulling it together – on Interdisciplinary Research Design" (2013): http://www.net4society.eu/_media/PB_N4S_FINAL.pdf

[3] See Presentation Kurt VandenBerge, EC, DG RTD: http://www.horizont2020.de/media/content/Vandenberghe_Auftakt_WS7.pdf

[4] See speech by Commissioner Geoghegan-Quinn on 24.09.13 in Vilnius: http://europa.eu/rapid/press-release_SPEECH-13-740_en.htm

3. SSH in Horizon 2020 Part III *Societal Challenges*

Part III "Societal Challenges" responds directly to the policy priorities identified in the Europe 2020 strategy. It aims to stimulate the critical mass of research and innovation efforts needed to achieve the Union's policy goals. All the envisaged activities shall take a challenge-based approach, bringing together a critical mass of resources and knowledge across different fields, technologies and scientific disciplines. The activities shall cover the full cycle from research to market.

In order to address these challenges, research of an interdisciplinary character is needed that takes into account various aspects – including the "human factor" and knowledge from social sciences and humanities e.g. on behaviour, lifestyle changes, public awareness and acceptance, values, socio-economic and cultural preconditions for innovation as well as socio-economic and cultural impacts of innovations.

3.1 Challenge 1 "Health, Demographic Change and Well-being"

General description

The broad objectives of the challenge include effective health promotion, supported by a robust evidence base, prevention of diseases, contribution to well-being and to containing costs. Improved understanding of health and disease will demand close linkage between fundamental, clinical, epidemiological and socio-economic research. Effective sharing of data and the linkage of these data with real-world large scale cohort studies is also essential, as is the translation of research findings into the clinic, in particular through the conduct of clinical trials. It is a societal challenge to adjust to the further demands on health and care sectors due to the ageing population. If effective health and care is to be maintained for all ages, efforts are required to improve and speed-up decision making in prevention and treatment provision, to identify and support the dissemination of best practice in the healthcare sector, to raise awareness and to support integrated care.

SSH aspects in Challenge 1 (Specific Programme)

Challenge 1 contains Social Sciences and Humanities aspects in all of its activity lines – a large share of the research aspects listed necessitate the integration of SSH. There is no specific activity line solely dedicated to SSH but there is a frequent reference to the SSH aspects to be integrated in specific sub-areas of the programmes. Three activity lines (1.1.1, 1.4.1 and 1.4.2) put a specific focus on SSH and explicitly state that SSH will be needed to contribute to the research topics listed. However, SSH contributions are easily detectable in other activity lines as well - although not clearly stated.

To summarise, SSH relevant aspects in Challenge 1 focus mainly on issues of developing health and wellbeing indicators, promoting health and disease prevention, support to policy-making, attention to patients, improving healthcare systems, involving all health providers in the research cycle, prevention of health inequalities, demographic change.

The following passages from the various activity lines of Challenge 1 contain SSH aspects:

<u>Activity line 1.1. Understanding health, well-being and disease</u>

1.1.1. Understanding the determinants of health, improving health promotion and disease prevention

SSH aspects:

- Development of comprehensive health and well-being indicators in the Union based on existing data sources and indicator systems. Environmental, behavioural (including life-style), psychological, organisational, cultural, socio-economic, biological and genetic factors, in their broadest senses will be studied.
- Innovative approaches to exposure assessment are needed using new-generation biomarkers based on 'omics' and epigenetics, human biomonitoring, personal exposure assessments and modelling to understand combined, cumulative and emerging exposures, integrating socio-economic, cultural, occupational, psychological and behavioural factors. Improved links with environmental data using advanced information systems will be supported.
- Existing and planned policies and programmes can be assessed and policy support provided.
- Improved behavioural interventions, prevention and education programmes can be developed.

1.1.2. Improving surveillance and preparedness

SSH aspects:

- New or improved methods for surveillance, diagnosis, early warning networks, health service organisation and preparedness campaigns are needed for the modelling of epidemics, for effective pandemic response as are efforts to maintain and enhance capabilities to combat drug resistant infectious disease.

Activity line 1.2. Preventing disease

1.2.1. Developing effective prevention and screening programmes and improving the assessment of disease susceptibility

SSH aspects:

- Testing and validation of screening methods and programmes
- Identifying individuals and populations at a clinically relevant increased risk of disease
- Personalised, stratified and collective strategies for efficacious and cost effective disease prevention

Activity line 1.3. Treating and managing disease

1.3.2. Transferring knowledge to clinical practice and scalable innovation actions

SSH aspects:

- Clinical trials for transferring biomedical knowledge to application in patients and support for these will be provided, as well as for the improvement of their practice.
- Enhancing the use of databases and electronic health records as data sources for trials and knowledge transfer

Activity line 1.4. Active ageing and self-management of health

1.4.1. Active ageing and independent and assisted living

SSH aspects:

- Multidisciplinary advanced and applied research and innovation with socioeconomic, behavioural, gerontological, digital and other sciences is needed for cost effective

user-friendly solutions for active, independent and assisted daily living (in the home, the workplace, public spaces, etc.) for the ageing population and people with disabilities taking into account gender differences.

- Development of technologies and systems and services enhancing quality of life and human functionality including mobility, smart personalised assistive technologies, service and social robotics, and ambient assistive environments.
- Research and innovation pilots to assess implementation and wide uptake of solutions will be supported.
- Involvement of end-users, user communities and formal/informal carers will be emphasised.

1.4.2. Individual awareness and empowerment for self-management of health

SSH aspects:

- Research into socio-economic factors and cultural values, behavioural and social models, attitudes and aspirations in relation to personalised health technologies, mobile and/or portable tools, new diagnostics, sensors and devices for monitoring and personalised services
- Solutions will be developed and tested with the use of open innovation platforms such as large scale demonstrators for social and service innovation.

Activity line 1.5. Methods and data

1.5.1. Improving health information and better use of health data

SSH aspects:

- Development of data processing, knowledge management, modelling, visualisation, ICT-security and privacy related issues

1.5.2. Improving scientific tools and methods to support policy making and regulatory needs

SSH aspects:

- Support research and development, integration and use of scientific tools, methods and statistics for rapid, accurate and predictive assessment of the safety, efficacy and quality of health interventions and technologies including new drugs, biologics, advanced therapies and medical devices
- Support for improved risk assessment methodologies, compliance frameworks, testing approaches and strategies relating to environment and health
- Development of relevant methods for assisting the assessment of ethical aspects

Activity line 1.6. Health care provision and integrated care

1.6.1. Promoting integrated care

SSH aspects:

- Cooperation between the providers of health and social/ informal care to support the management of chronic disease, incl. patients with disabilities, outside institutions
- In the context of demographic change, R&I to improve the organisation of long-term care delivery as well as policy and management innovation will also be supported.
- Implementing new and integrated care solutions

1.6.2. Optimising the efficiency and effectiveness of healthcare provision and reducing inequalities by evidence-based decision making and dissemination of best practice, and innovative technologies and approaches

SSH aspects:

- Comparative analyses of the reform of public health systems in Europe and in third countries and assessments of their mid to long-term economic and social impacts
- Analyses of future health workforce needs both in terms of numbers and required skills in relation to new patterns of care
- Research on the evolution of health inequalities, of their interplay with other economic and social inequalities and on the effectiveness of policies aiming to reduce them in Europe and beyond
- Assessment of patient safety solutions and quality assurance systems, including the role of patients on safety and quality of care

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 1

The Work Programme 2014/15 in Challenge 1 "Health, Demographic Change and Well-being" contains 51 Topics in total. Of these, 18 Topics were flagged as SSH relevant, which adds up to a share of 35%. All of these 18 Topics include major SSH aspects. The budget share for SSH in this challenge can be estimated to add up to 37 million € (3% of the total budget)[5]. Two of these topics explicitly call for the inclusion of socio-economic disciplines, while three topics call for inter- or multidisciplinary consortia. The addressed SSH research dimensions regard mainly aspects of behaviour and lifestyles, ethical and legal aspects, socio-economic aspects and impacts of health systems/ promotion strategies, and health policies.

In more detail, the SSH aspects in these first calls in Challenge 1 regard the following research dimensions:

Call – "Personalising health and care"

SSH aspects:

- Trends and determinants of health (behavioural, environmental, occupational, nutritional and other modifiable lifestyle factors, gender), determinants and pathways characteristic of healthy ageing (PHC-1-2014)
- Development of personalised health promotion/ disease prevention, behavioural, ethical, legal and social implications (PHC-5-2014)
- Evaluation of prevention programmes: outcomes, quality-of-life, equity and cost-effectiveness and ethical considerations; taking into account different political, economic and societal contexts (PHC-6-2014)
- Socio-economic outcomes of healthcare intervention in the elderly (PHC-17-2014)
- Service robotics for assisted living: needs, societal expectations, acceptability (PHC-19-2014)
- Developing new models for health care systems, measurement of quality-of-life, cultural background and different socio-demographic groups as factors (PHC-23-2014)
- Self-management on health: research into socio-economic factors, cultural values, behavioural/ social models, attitudes, economic aspects of prevention (PHC-26-2014)

[5] The budget share of SSH is estimated in the following way: The budget of SSH-dedicated topics is counted fully. In addition, for topics with major SSH aspects, 10% of the budget was counted. The same method was also applied for the following chapters.

- Health policy development and regulation, driving factors for health/ well-being and their economic and social impact (PHC-31-2014)
- Inter-sector cooperation (environment/ health): interplay between politics & economics; economic and social benefits, impact on reducing inequalities (PHC-4-2015)
- Link between behaviour changes and consequences of ageing (PHC-21-2015)
- Psychological and social determinants of healthy ageing/ mental well-being, socio-economic stressors (e.g. loneliness, poverty) (PHC-22-2015)
- New care models based on personalised medicine: behavioural, ethical, legal, social, economic implications, gender dimension (PHC-24-2015)
- ICT systems for care: organisational and social barriers; ethical and gender issues (PHC-25-2015)
- ICT supported health self-management: socio-economic factors, behavioural and social models, attitudes, economic aspects (PHC-27-2015)

Call – "Co-ordination activities"

SSH aspects:

- Diabetes treatment/ prevention: lifestyle & behaviour changes, policies (HCO-5-2014)
- Research into health research activities and innovation (HCO-14-2014)
- Cooperation between science and society in health research (HCO-15-2014)

3.2 Challenge 2 "Food Security, Sustainable Agriculture, Marine and Maritime Research and the Bioeconomy"

General description

The specific objective of the challenge is to secure sufficient supplies of safe and high quality food and other bio-based products, by developing productive and resource-efficient primary production systems, fostering related ecosystem services, alongside competitive and low carbon supply chains. This will accelerate the transition to a sustainable European bio-economy.

The need to provide a sustainable, safe and secure food supply for the European and an increasing global population is the challenge that Europe will be facing. Furthermore, Europe will need to ensure sufficient supplies of raw materials, energy and industrial products, under conditions of decreasing fossil carbon resources, while maintaining its competitiveness. Bio-waste represents a huge problem and cost, despite its high potential added value.

SSH aspects in Challenge 2 (Specific Programme)

All in all, SSH aspects are present in the majority of Challenge 2 activity lines. They include the following issues:

- Fostering ecosystem services by integrating agronomic, environmental and social goals into sustainable production and consumption
- Socio-economic research and forward looking activities in relation to the bio-economy strategy, including development of indicators, data bases, models, foresight and forecast, impact assessment of initiatives on the economy, society and the environment
- Social, economic and environmental benefits and the modernisation of the bio-economy associated sectors and markets supported through multi-disciplinary research, driving innovation

- Broad approach to innovation ranging from technological, non-technological, organisational, economic and social innovation

The following passages from the various activity lines of Challenge 2 contain SSH aspects:

Activity line 2.1. Sustainable agriculture and forestry

Support for more productive, environmentally-friendly resource-efficient and resilient agriculture and forestry systems is achieved by appropriate knowledge, tools, services and innovations. These systems should supply sufficient food, feed, biomass and other raw-materials and deliver ecosystems services while at the same time supporting the development of thriving rural livelihoods.

2.1.2. Providing ecosystem services and public goods

SSH aspects:

- Research activities will contribute to a better understanding of the complex interactions between primary production systems and ecosystems services and will support the provisions of public goods (including cultural and recreational value) and services, through the delivery of management solutions, decision-support tools and the assessment of their market and non-market value.

2.1.3. Empowerment of rural areas, support to policies and rural innovation

SSH aspects:

- New concepts & institutional innovations to ensure cohesion of rural areas and prevent economic and social marginalisation, foster diversification of economic activities
- Ensure appropriate relations between rural and urban areas, as well as facilitate knowledge exchange, demonstration, innovation and dissemination and foster participatory resource management
- Explore ways in which public goods in rural areas can be converted into local/ regional socio-economic benefit

  Socio-economic and comparative assessment of farming/ forestry systems and their sustainability performance

2.1.4. Sustainable forestry

SSH aspects:

- Produce bio-based products, ecosystems, services and sufficient biomass, with due consideration to economical, ecological and social aspects of forestry as well as to regional differences
- Activities will focus on the further development of sustainable forestry systems which can address societal challenges and demands.

Activity line 2.2. Sustainable and competitive agri-food sector for a safe and healthy diet

Addressing consumer needs for safe, healthy, high quality and affordable food, while considering the impacts of food consumption behaviour and food and feed production on human health, the environment and the global ecosystem.

2.2.1. Informed consumer choices

SSH aspects:

- Consumer preferences, attitudes, needs, behaviour, lifestyle, education and the cultural component of food quality
- Communication between consumers and the food chain research community and its stakeholders
- Social innovation will respond to societal challenges, and innovative predictive models and methodologies in consumer science will deliver comparable data and lay the ground for responses to Union policy needs.

2.2.2. Healthy and safe foods and diets for all

SSH aspects:

- Nutritional needs, a balanced diet and the impact of food on physiological functions, physical and mental performance
- Food safety innovations, improved tools for risk and risk-benefit assessment and for risk communication and improved food safety standards

2.2.3. A sustainable and competitive agri-food industry

SSH aspects:

- Research on the needs for the food and feed industry to cope with social, environmental, climate and economic change from local to global
- Innovative and sustainable resource efficient technologies and processes that will strengthen the innovation potential of the European food supply chain, enhance its competitiveness, create economic growth and employment and allow the European food industry to adapt to changes

  Traceability, logistics and services, socio-economic and cultural factors, animal welfare and other ethical issues

Activity line 2.3. Unlocking the potential of aquatic living resources

The overall objective is to manage aquatic living resources to maximise social and economic benefits/ returns from Europe's oceans, seas and inland waters.

2.3.1. Developing sustainable and environmentally-friendly fisheries

SSH aspects:

- Measuring the socio-economic effects of management options
- Shared use of maritime space with other activities, particularly in the coastal zone, and its socio-economic impact

2.3.2. Developing competitive and environmentally friendly European aquaculture

SSH aspects:

- Understanding the socio-economic dimensions of the aquaculture sector to underpin cost and energy efficient production matching with the market and consumer demands, while ensuring competitiveness and attractive prospects for investors and producers.

Activity line 3.5. Cross-cutting marine and maritime research

2.5.2. Developing the potential of marine resources through an integrated approach

SSH aspects:

- Advances in the field of eco-innovation, such as new products, processes and the application of management concepts, tools and measure to assess and mitigate the impact of human pressures on marine environment

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 2

The Work Programme 2014/15 in Challenge 2 "Food Security, Sustainable Agriculture, Marine and Maritime Research and the Bioeconomy" contains 50 topics in total. Of these, 19 topics were flagged as SSH relevant, which adds up to a share of 38%. Four of these 19 topics are dedicated to SSH research, eight topics include major SSH aspects, and 7 topics are only of minor relevance for SSH. The budget share for SSH in this challenge can be estimated to add up to 40 million € (7% of the total budget). One topic explicitly calls for socio-economic disciplines, while two topics demand for inter- or multidisciplinary consortia. The addressed SSH research dimensions regard mainly economic aspects of agriculture/ fisheries, management tools, consumption, socio-economic dimensions of food security, and agriculture.

In more detail, the SSH aspects in these first calls in Challenge 2 regard the following research dimensions:

Call – "Sustainable Food Security"

SSH aspects:

- Livestock production: Business models and management systems, economic aspects (Competitiveness, international trade, supply chains), socio-geographic and demographic changes (SFS-1-2014/15)
- Aquaculture: tools for spatial planning, management tools, forecasting and modelling tools (SFS-11-2014/15)
- Protein-rich food: market potential, consumer & regulatory issues (SFS-15-2014)
- Food security: impact of policies, consumption trends incl. long-term socio-economic drivers, socio-economic modelling, economic issues (financial markets, credits, competitiveness) (SFS-19-2014)
- African agro-food systems: development of strategic action plan, including economic factors, anthropological and cultural aspects (SFS-06-2014)
- Economic and social dimensions of discards in fisheries (SFS-09-2014)
- Malnutrition of elderly: ethical, socio-economic and cultural aspects (SFS-16-2015)
- Small farming: supply chains, governance needs, foresight (SFS-18-2015)
- Policy impact of food quality and food procurement policies (SFS-20-2015)

Call - "Blue Growth: Unlocking the potential of Seas and Oceans"

SSH aspects:

- Socio-economic developments in the offshore economy, business models (BG-5-2014)
- Economic sustainability of fisheries/ aquaculture, markets, supply chains, social awareness (BG-10-2014)
- Ocean health: communication with society (BG-13-2014)
- Preservation and sustainable exploitation of Atlantic marine ecosystems: socio-economic dimension (BG-1-2015)
- Climate change impacts on fisheries: assess economic risks, cost-efficient adaptation and mitigation options (BG-2-2015)

Call – "Innovative, Sustainable and Inclusive Bioeconomy"

SSH aspects:

- Operational framework for public goods provided by agriculture: links with economic activities, policy support (ISIB-1-2014)
- Bioeconomy: engaging society in a platform for informed debates (ISIB-8-2014)
- social innovation in agriculture/ rural development, methods for evaluation of social innovation, role of policy instruments and incentives (ISIB-3-2015)

3.3 Challenge 3 "Secure, Clean and Efficient energy"

General description

The specific objective of the challenge is to make the transition to a reliable, affordable, publicly accepted, sustainable and competitive energy system, aiming at reducing fossil fuel dependency in the face of increasingly scarce resources, increasing energy needs and climate change.

SSH aspects in Challenge 3 (Specific Programme)

Challenge 3 contains Social Sciences and Humanities aspects in several of its activity lines. There is no specific activity line solely dedicated to SSH. SSH aspects are especially represented in the content of activity 3.6. There are three activity lines (3.2, 3.3, 3.5) where SSH are not featured. However, SSH (mainly economic sciences) are very important to provide arguments to define which energy conversion is more efficient, which are the more cost-competitive and sustainable technologies, etc.

To summarise, SSH relevant aspects in Challenge 3 focus mainly on issues of understanding interactions between social, economic and environmental systems, providing knowledge and tools for effective decision making and public engagement. SSH activities shall focus on the development of tools, methods, and models and forward-looking and perspective scenarios for a robust and transparent policy support, including activities on public acceptance and engagement, user involvement, environmental impact, and sustainability assessment improving the understanding of energy related socio-economic trends and prospects.

The following passages from the various activity lines of Challenge 3 contain SSH aspects:

Activity line 3.1. Reducing energy consumption and carbon footprint by smart and sustainable use

SSH aspects:

- Development of new advisory, financing and demand management services and input from the behavioural and social sciences while at the same time taking into account questions of public acceptance.

This SSH-relevant activity includes:

3.1.1. Bringing to mass market technologies and services for a smart and efficient energy use

3.1.2. Unlocking the potential of efficient and renewable heating-cooling systems

3.1.3. Fostering European Smart cities and Communities

Activity line 3.4 A single, smart European electricity grid

SSH aspects:

- Managing the interactions between suppliers & customers as well as trade energy flow
- Deployment of future infrastructure indicators and cost benefit analysis
- New planning, market and regulatory designs for smart energy grid technologies, products and services
- Testing and validation of solutions and assessment of the benefits for the system and for individual stakeholders, before deploying them across Europe
- Research to understand how consumers and businesses react to economic incentives, behavioural changes, information services and other innovative opportunities provided by smart grids.

Activity line 3. 6. Robust decision making and public engagement

SSH aspects:

- Development of robust and transparent theories, tools, methods and models to assess the main economic and social issues related to energy
- Building of databases and scenarios for an enlarged Union and the assessment of the impact of energy and energy-related policies on security of supply, consumption, the environment, natural resources, and climate change, society and competitiveness of the energy industry
- Socio-economic research for creating favourable market conditions at the regulatory, administrative and financing level for low-carbon, renewable and energy efficiencies technologies and solutions
- Measures facilitating the energy policy implementation, preparing the ground for rollout of the investments, supporting the capacity building and acting on public acceptance
- Innovation for the smart and sustainable use of existing technologies.
- Innovative organisational structures, dissemination and exchange of good practices and specific training and capacity building actions
- Consumer behaviour including that of vulnerable consumers like persons with disabilities and behavioural changes will be studied in open innovation platforms such as the Living Labs and large scale demonstrators for service innovation as well as through panel surveys, while ensuring privacy.

Activity line 3.7. Market uptake of energy innovation – building on Intelligent Energy Europe (IEE)

SSH aspects:

- Innovative market uptake and replication solutions to rollout new energy technologies in time and through a cost-effective implementation.
- Actions with clear Union added value aiming to develop, apply, share and replicate non-technological innovations with a high leverage factor in Union's sustainable energy markets across disciplines and levels of governance

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 3

The Work Programme 2014/15 in Challenge 3 “Secure, Clean and Efficient Energy” contains 50 topics in total. Of these, 16 topics were flagged as SSH relevant, but there are seven additional non-flagged topics that also include major SSH aspects. Together, the 23 SSH relevant topics add up to a share of 46%. Three out of these 23 topics are dedicated to SSH research, 13 topics include major SSH aspects, and 7 topics are only of minor relevance for SSH. The budget share for SSH in this challenge can be estimated to add up to 45 million € (4% of the total budget). Only one topic explicitly calls for socio-economic disciplines. The addressed SSH research dimensions regard mainly economic aspects of the energy system (market uptake, market development, and business models), energy policies and regulatory frameworks, and user behaviour/ perception/ acceptance.

In more detail, the SSH aspects in these first calls in Challenge 3 regard the following research dimensions:

Call – “Energy Efficiency”

SSH aspects:

- Support for sustainable energy policies (EE-7-2014/15)
- Support to public procurement of sustainable energy products, cost-benefit analysis (EE-8-2014)
- Support to stakeholders in the area of sustainable energy policies, capacity building (EE-9-2014/15)
- Use of social innovations, better understanding consumers/stakeholders perception/ behaviour (EE-10-2014/15)
- Foresight socio-economic activities on energy efficiency. Major trends in society, consumer behaviour, institutional factors (EE-12-2014)
- Foster dialogue between different stakeholders in the area of sustainable energy, frameworks for investments (EE-19-2014/15)
- Tools for planning the renovation of historic buildings (EE-3-2014)
- Establishing large-scale qualification schemes for construction workers (EE-4-2014)
- ICT solutions for energy efficiency: Validation should provide socio-economic evidence for ICT investment (EE-11-2014/2015)
- Developing new markets for industrial heating/cooling systems, organisational, managerial and business innovative models, new regulatory frameworks (EE-14-2014/2015)
- Monitoring of the EU's energy-related products policy (EE-15-2014/2015)
- Demonstrate the financial viability and sustainability of large-scale sustainable energy investments (EE-20-2014/2015)
- Developing new investment mechanisms (EE-21-2014/2015)

Call - “Competitive low-carbon energy”

SSH aspects:

- Market uptake of renewable electricity technologies, connected policies (LCE-4-2014/15)
- Distribution grid: Market models, business cases, public engagement, regulatory and social aspects, economic assessment (LCE-7-2014)
- Economic and public acceptance of technologies for energy storage (LCE-10-2014)
- Bioenergy: market uptake, regulation, policies, socio-economic aspects (LCE-14-2014/15)

- The human factor in the energy system: behaviour, attitudes, perception of risks and benefits, gender aspects, public engagement (LCE-20-2014)
- Transmission grid: market models, business cases, public acceptance, regulatory issues, social aspects, concerns about data security (LCE-6-2015)
- Energy storage systems: market and regulatory issues, socio-economic aspects (LCE-9-2015)
- Impacts of energy technologies, assessment of transformation paths and the related impacts on society and economy, of technology policy measures (LCE-21-2015)

Call – "Smart cities and communities"

SSH aspects:

- Smart Cities: Framework for quantification of economic, and possibly even social, performance (SCC-2-2014)

3.4 Challenge 4 "Smart, Green and Integrated Transport"

General description

The specific objective of Challenge 4 is to achieve a European transport system that is resource-efficient, climate- and environmentally-friendly, safe and seamless for the benefit of citizens, the economy and society.

Activities are aimed at contributing to achieving a 60% reduction of CO2 by 2050, halving the use of 'conventionally-fuelled' cars in cities and achieving virtually CO2-free city logistics in major urban centres by 2030. Activities are also aimed at drastically reducing congestion and accident costs, and virtually eradicating road deaths by 2050.

SSH aspects in Challenge 4 (Specific Programme)

The objective of achieving sustainable mobility requires the development of the knowledge on consumers' behaviour and of the understanding of transports organization. In this perspective, Challenge 4 offers many aspects of research on transport where SSH can contribute, even if the opportunities of involvement are not very well defined, particularly for Humanities. Still, we find SSH research planned within a comparatively small special activity line focussing on social sciences, highlighting socio-economic aspects, foresight and spatial and urban planning (4.4). This activity line 4.4 has no sub-items and by far the least text. The experience with the first Work Programme of this Challenge indicates that there will be a dedicated section in the Work Programme with dedicated SSH topics (relating to activity line 4.4) but that additionally there will be further SSH aspects in other areas of the Challenge as well.

The following passages from the various activity lines of Challenge 4 contain SSH aspects:

Activity line 4.1. Resource-efficient transport that respects the environment

4.1.2. Developing smart equipment, infrastructures and services

SSH aspects:

- Development of new policies, business models, concepts, technologies and IT solutions to increase capacity
- Analysis of accessibility, user friendliness and social inclusiveness

4.1.3. Improving transport and mobility in urban areas

SSH aspects:

- Development of public and non-motorised transport as well as other resource-efficient transport options for passengers and freight as a real alternative to the use of private motor vehicles, supported by greater use of intelligent transport systems as well as by innovative supply and demand management.
- Assessment of interaction between the transport system and other urban systems

Activity line 4.2. Better mobility, less congestion, more safety and security

4.2.1. A substantial reduction of traffic congestion

SSH aspects:

- Innovative solutions to facilitate accessibility/ passenger choices, incl. for the ageing population and vulnerable users and provide opportunities to reduce congestion by improving incident management and the development of traffic optimisation schemes

4.2.2. Substantial improvements in the mobility of people and freight

SSH aspects:

- Ensure flexibility and rapid responses to crisis events and extreme weather conditions by reconfiguring travel and haulage across modes

4.2.4. Reducing accident rates, fatalities and casualties and improving security

SSH aspects:

- Integration of security aspects in the planning and management of passenger and freight flows, on the conception of aircraft, vehicles and vessels, on traffic and system management and on the design of transport infrastructures and of freight and passenger terminals.
- Improve the safety of all road users esp. those at greatest risk, particularly in urban areas
- Provide useful tools for enhanced security thanks to intelligent transport and connectivity applications

Activity line 4.3. Global leadership for the European transport industry

4.3.2. On board, smart control systems

SSH aspects:

- Delivering traffic management and user information directly to in-vehicle devices, supported by reliable real-time traffic data on road conditions and congestion

4.3.4. Exploring entirely new transport concepts

SSH aspects:

- Strategic multidisciplinary research and proof of concept activities shall address innovative transport systems solutions. This will include also new services.

Activity line 4.4. Socio-economic and behavioural research and forward looking activities for policy making

SSH aspects:

- Actions to support policy analysis and development including gathering evidence to understand behaviour on spatial, socio-economic and wider societal aspects of transport
- Understanding local and regional specificities, user behaviour and perceptions, social acceptance, impact of policy measures, mobility, changing needs and patterns, evolution of future demand, business models and their implications, including scenario development and technology foresight
- Better understanding of the links between territorial development, social cohesion and the European transport system
- Reduction of social and territorial inequalities in access to mobility, addressing economic issues, focusing on ways to internalise the externalities from transport across modes, assess future requirements for skills and jobs, research and innovation development

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 4

The Work Programme 2014/15 in Challenge 4 "Smart, Green and Integrated Transport" contains 52 topics in total. Of these, 20 topics were flagged as SSH relevant, but there is one additional non-flagged topic that also includes major SSH aspects. Together, the 21 SSH relevant topics add up to a share of 40%. Four out of these 21 topics are dedicated to SSH research, eight topics include major SSH aspects, and a further eight topics are only of minor relevance for SSH. The budget share for SSH in this challenge can be estimated to add up to 34 million € (4% of the total budget). Within the call "Mobility for Growth" there is a dedicated sub-section on "Socio-economic and behavioural research and forward looking activities for policy making" that contains all the SSH dedicated topics. Outside of this section, the topic texts do not explicitly call for the inclusion of SSH disciplines or for interdisciplinarity. The addressed SSH research dimensions regard mainly user behaviour, regulatory issues, economic aspects of the transport system (markets, supply chains, business models, funding of transport systems), mobility management and new concepts, and regulatory frameworks.

In more detail, the SSH aspects in these first calls in Challenge 4 regard the following research dimensions:

<u>Call – "Mobility for Growth"</u>

SSH aspects:

- Skill needs and education of aviator engineers (MG.1.6-2014)
- User needs and behaviour in the area of air transport (MG.1.7-2014)
- Societal benefits of transport safety measures, behavioural knowledge in this area, socio-economic costs of road accidents, the driver as a factor in road accidents (MG.3.4-2014)
- New concepts for Inland Waterways Transport and their cost-effectiveness and connected tools for education/ training (MG.4.4-2014)
- Policies, measures and tools to change use of conventionally fuelled vehicles (regulatory measures, demand side measures, promotion), research into mobility behaviour, social norms, business models (MG.5.1-2014)
- Knowledge on freight / service trips: economic and behavioural modelling, impacts of policies / Urban planning (MG.5.2-2014)
- Urban road congestions: link to mobility management, travel awareness; development of new concepts, regulations, awareness raising (MG.5.3-2014)
- Transport user behaviour and mobility patterns (MG.9.2-2014)
- Analysis of funding schemes for transport infrastructure (MG.9.3-2014)

- Market prospects for European transport industries (MG.9.4-2014)
- Innovative transport concept (MG.9.7-2014)
- Cost-efficiency of new technologies/ methods in the area of aviation (MG.1.1-2014)
- Supply Chain improvements: social implications (effect on employment and economy), ethical aspects referring to the transport of livestock (MG.6.1-2014)
- Economic, political, social (including the effect on employment and safety) and organisational aspects of the whole transport and logistics supply chain, business models, governance structures (MG.6.2-2014)
- Communication for mobility: comprehensive understanding of the relevant market structures and business segmentation, regulatory/legal framework (MG.7.1-2014)

Call - "Green Vehicles"

SSH aspects:

- Electric two-wheelers: cost-efficiency and regulatory issues (GV.5-2014)

3.5 Challenge 5 "Climate Action, Environment, Resource Efficiency and Raw Materials"

General description

The specific objective of the challenge is to achieve a resource-efficient and climate change-resilient economy and society, to protect the environment and ensure a sustainable supply of raw materials. Activities are aimed at contributing to increasing European competitiveness, raw materials security and improving well-being, whilst assuring environmental sustainability. The challenge supports the aim of keeping average global warming below 2 degree Celsius and enabling ecosystems and society to adapt to climate change and other environmental changes.

SSH aspects in Challenge 5 in the Specific Programme (Specific Programme)

Challenge 5 contains Social Sciences and Humanities aspects in almost all of its activity lines – a large share of the research aspects listed necessitate the integration of SSH. There is no specific activity line solely dedicated to SSH. Two activity lines (5.4.2 and 5.4.3) put their main focus on SSH and explicitly state that SSH will contribute to the research topics listed. However, SSH is very present in other activity lines as well.

To summarise, SSH relevant aspects in Challenge 5 focus mainly on issues of understanding interactions between social, economic and environmental systems, vulnerabilities and resilience of societies, providing knowledge and tools for effective decision making and public engagement, fostering eco-innovation (including social innovation), and enabling the transition to a green economy and society (such as fostering sustainable consumption).

The following passages from the various activity lines of Challenge 5 contain SSH aspects:

Activity line 5.1. Fighting and adapting to climate change

5.1.2 Assessing impacts, vulnerabilities and developing innovative cost-effective adaptation and risk prevention and management measures

SSH aspects:

- Analysis of vulnerabilities, second order effects such as migration and conflicts, costs and opportunities with regard to climate change
- Impacts of climate change on economic assets
- Evaluation of innovative, equitably distributed and cost-effective adaptation responses to climate change
- Evaluation of potential costs of geo-engineering options
- Investigation of inter-linkages, conflicts and synergies of adaptation and risk-prevention policy choices with other climate and sectorial policies
- Investigation of impacts on employment and the living standards of vulnerable groups

5.1.3 Supporting mitigation policies, including studies that focus on impact from other sectoral policies

SSH aspects:

- Assessment of socio-economic risk, opportunities and impacts of climate change mitigation options
- Assessment from impact from other sectorial policies
- Development and validation of new climate-energy-economy models, taking into account economic instruments and relevant externalities, with the aim of testing mitigation policy options and low carbon technology pathways
- Facilitation of (socio-economic) innovation by improving links between research and application and between entrepreneurs, end users, researchers, policy makers, knowledge institutions

Activity line 5.2. Protecting the environment, sustainably managing natural resources, water, biodiversity and ecosystems

5.2.1 Furthering our understanding of biodiversity and the functioning of ecosystems, their interactions with social systems and their role in sustaining the economy and human well-being.

SSH aspects:

- Monitoring/ forecasting impact of human activities (including land use change) on the environment and of environmental changes on human well-being / economies
- Improvement of understanding of complex interactions between natural resources and social, economic and ecological systems, and of the resilience/ fragility of human systems

5.2.2 Developing integrated approaches to address water-related challenges and the transition to sustainable management and use of water resources and services

SSH aspects:

- Provision of strategies, tools, technologies and innovative solutions to improve water quality, cope with imbalances between water demand and availability of supply, promote sustainable end-user behaviour
- Development of appropriate water management strategies

5.2.3 Providing knowledge and tools for effective decision making and public engagement

SSH aspects:

- Research to underpin policy decisions needed to manage natural resource, and to promote institutional, economic, behavioural and technological change
- Research to underpin development of systems to value biodiversity and ecosystem services
- Assessment of vulnerabilities and impacts
- Development of innovative ways to increase policy coherence, resolve trade-offs and manage conflicting interest
- Development of innovative ways to improve public awareness of research results and the participation of citizens in decision-making

Activity line 5.3. Ensuring the sustainable supply of non-energy and non-agricultural raw materials

5.3.1 Improving the knowledge base on the availability of raw materials

SSH aspects:

- Improve knowledge to develop governance (global rules, practices and standards) of resource exploration, extraction and processing, including economic viability and social acceptance

5.3.2 Promoting the sustainable supply and use of raw materials, including mineral resources, from land and sea, covering exploration, extraction, processing, re-use, recycling and recovery

SSH aspects:

- Investigation of economic viability of recycling and materials recovery technologies

5.3.4 Improving societal awareness and skills on raw materials

SSH aspects:

- Support development of innovative green skills
- Improve public awareness of raw materials; facilitate cultural, behavioural, socio-economic, systemic and institutional changes

Activity line 5.4 Enabling the transition towards a green economy and society through eco-innovation

5.4.1 Strengthening eco-innovative technologies, processes, services and products, including exploring ways to reduce the quantities of raw materials in production and consumption, overcoming barriers in this context and boosting their market uptake

SSH aspects:

- Support of organisational, societal, behavioural, business and policy innovation
- Strengthening participation of civil society
- Taking account of rebound effects
- Addressing the potential to move to more sustainable patterns of consumption
- Removing barriers to development / wide application of eco-innovation, creating or enlarging markets for the solutions concerned, improving competitiveness of Union enterprises

5.4.2 Supporting innovative policies and societal changes

SSH aspects:

- Research on the main barriers to market and societal change
- Contributions from the social sciences and humanities
- Development of tools, methods and models to assess and enable the main economic, societal, cultural and institutional changes needed to achieve a paradigm shift towards a green economy and society
- Research will explore how to promote sustainable lifestyles and consumption patterns, encompassing socio-economic research, behavioural science, user engagement, and public acceptance of innovation, as well as activities to improve communication and public awareness

5.4.3. Measuring and assessing progress towards a green economy

SSH aspects:

- Improvement of measurement methods and systems relevant to resource efficiency and eco-innovation
- Socio-economic research will provide a better understanding of the root causes of producer and consumer behaviour

Activity line 5.6 Cultural heritage

5.6.1 Identifying resilience levels via observations, monitoring and modelling

SSH aspects:

- Analysis of the perception of value of cultural heritage

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 5

The Work Programme 2014/15 in Challenge 5 "Climate action…" contains 31 topics in total. Of these, 15 topics were flagged as SSH relevant, which adds up to a share of 48%. Of these 15 topics, 11 included major SSH aspects and four included minor SSH aspects. The budget share for SSH in this challenge can be estimated to add up to 26 million € (4% of the total budget). Two of the topics explicitly call for the inclusion of Social Sciences and Humanities, further six topics call for the integration of socio-economic sciences and two more demand an inter- or multidisciplinary approach – without explicitly mentioning SSH disciplines. The addressed SSH research dimensions regard mainly management and governance issues, non-technological innovations, consumption, lifestyles and awareness raising, gender issues, economic assessments, support to the development of strategies and policies, and – to a lesser extent – cultural aspects.

In more detail, the SSH aspects in these first calls in Challenge 5 regard the following research dimensions:

Call – "Waste: A resource to recycle, reuse and recover raw materials"

SSH aspects:

- analysis of innovative industrial processes and services, organisational and management systems and business models, opportunities for social innovation, encouragement of sustainable consumption behaviour and lifestyle change, attention to the gender dimension, raising awareness of eco-innovative solutions and their market (WASTE-1-2014)

- Socio-economic and cultural dimension with regard to food waste, safety, legislation and costs with regard to food waste, risk and benefits analysis (WASTE-2-2014)
- Social engagement of citizens and education, waste management and its social, political, cultural and institutional aspects (WASTE-4-2014/15)
- Economic instruments, such as incentives for more sustainable production and consumption patterns, and awareness raising initiatives; development of innovative and sustainable strategies for waste prevention and management; how urban patterns, drivers, consumer behaviour, lifestyles, culture, architecture and socio-economic issues can influence the metabolism of cities; benefits to be derived from ecosystems services and green infrastructure, and their gender sensitive application (WASTE-6-2015)

Call - "Water Innovation: Boosting its value for Europe"

SSH aspects:

- Innovative Water solutions (application/market uptake); social, institutional, economic and governance aspects ensuring a more rapid uptake of solutions as well as aspects affecting market deployment and uptake (standardisation & regulatory issues), market assessment and business plan (Water-1-2014/2015)
- Tools and methodologies for integrating agriculture, forestry, climate change impacts and adaptation with climate-energy-economic models and land-use models, develop integrated strategies, integrating resource efficient land use, agricultural productivity improvements, sustainable water management and low carbon energy transition and analysing interactions with the existing regulatory frameworks in these areas and the potential barriers to implementation (Water-2b-2015)
- water resources management / connection to local knowledge, socio-economic development, cultures, policy institutions and implementing bodies, gender dimension (Water-5c-2015)

Call – "Growing a Low Carbon, Resource Efficient Economy with a Sustainable Supply of Raw Materials"

SSH aspects:

- Economic assessment of climate change impacts and mitigation and adaptation strategies (costs, benefits, risks, impacts on green growth, innovation dynamics, job creation, social cohesion); Development of socio-economic mitigation strategies, examination of policies (SC5-3-2014/15)
- Climate change research: Risks, benefits, socio-economic aspects of negative emission technologies (SC5-5-2014/15)
- Research on biodiversity and ecosystem services in an integrated socio-economic-ecological framework, development of management concepts (SC5-6-2014/15)
- Tools to assess and predict the (cost-)effectiveness of environmental restoration measures (SC5-7-2015)
- Natural resource management: forward looking analysis, science-policy interface, impact on human well-being, land-use, spatial planning (SC5-10-2014/15)
- Green economy and sustainable consumption/ production, value chains, green growth and jobs, green behaviour, economic and environmental policies (SC5-14-2014)
- Citizen Observatories: effective transfer of environmental knowledge for policy, industrial, research and societal use, with a focus land (SC5-17-2015)
- Synergies between European and nationally/regionally funded research in climate change, environment, resource efficiency and raw materials, including socio-economic sciences (SC5-19b-2015)

3.6 Challenge 6 "Europe in a Changing World: Inclusive, Innovative and Reflective Societies"

The specific objective of Societal Challenge 6 is to foster a greater understanding of Europe and its societies. Research shall help to provide solutions and support inclusive, innovative and reflective European societies in a context of unprecedented transformations and growing global interdependencies.

Research under this challenge shall address the significant inequalities that persist in the Union both across countries and within them. A central challenge in addressing these inequalities will be the fostering of settings in which European, national and ethnic identities can coexist and be mutually enriching.

Demographic change represents another major challenge for the economy, society and the sustainability of public finances.

A further aspect under this challenge is to make better use of research and innovation to foster Europe's productivity and economic growth rates that have been relatively decreasing in comparison to other world regions.

The in-built complexity of these challenges and the evolution of demands thus make it essential to develop innovative research and new smart technologies, processes and methods, social innovation mechanisms, coordinated actions and policies that will anticipate or influence major evolutions for Europe. It calls for a renewed understanding of determinants of innovation. In addition, it calls for understanding the underlying trends and impacts within these challenges and rediscovering or reinventing successful forms of solidarity, behaviour, coordination and creativity that make Europe distinctive in terms of inclusive, innovative and reflective societies compared to other regions of the world.

It also requires a more strategic approach to cooperation with third countries, based on a deeper understanding of the Union's past and its current and future role as a global player.

SSH aspect in Challenge 6 (Specific Programme)

Challenge 6 is driven by research topics on European societies and includes mainly, but not exclusively SSH research; therefore SSH research dimensions are included in all parts of Challenge 6. The Specific Programme states that specific support to SSH will be provided by this Challenge.[6] As all parts of Challenge 6 contain SSH aspects, not every aspect will be listed in detail here. Instead, a few keywords will be given for all the different activity lines to give an idea on the issues they address:

Activity line 6.1. Inclusive societies

6.1.1. The mechanisms to promote smart, sustainable and inclusive growth

SSH aspects:

- Research on citizen participation, sustainable growth and development, cultural and behavioural aspects, values, institutions, markets, tools for impact analysis, public

[6] Official Journal of the European Union (20.12.2013): Council Decision of 3 December 2013 establishing the specific programme implementing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020) and repealing Decisions 2006/971/EC, 2006/972/EC, 2006/973/EC, 2006/974/EC and 2006/975/EC, L 347/965-1041, here: p. 976 (From hereon referred to as "Specific Programme").

policies, employment, taxes, inequalities, poverty, social integration, education and skills, competitiveness, stable economic and financial systems

6.1.2. Trusted organisations, practices, services and policies that are necessary to build resilient, inclusive, participatory, open and creative societies in Europe in particular taking into account migration, integration and demographic change

SSH aspects:

- European integration, welfare state, identities & Europeanization, diversity, participation, family, work, education, employment, mobility and migration, digital inclusion

6.1.3. Europe's role as a global actor, notably regarding human rights and global justice

SSH aspects:

- Research on Europe and other regions, globalisation, transnational actors, global governance, trade development, human rights, security, diplomacy

6.1.4. The promotion of sustainable and inclusive environments through innovative spatial and urban planning and design

SSH aspects:

- Research on the dynamics of urban societies, design and use of public spaces, cities as centres of innovation and employment, socio-ecological transition, reduction of risks and crime, social cohesion

Activity line 6.2. Innovative societies

6.2.1. Strengthening the evidence base and support for the Innovation Union and ERA

SSH aspects:

- Analysis of research, innovation and education policies, systems, and actors, development of indicators, research on incentives for the European Research Area (ERA) promoting measures, improvement of framework conditions or innovation

6.2.2. Exploring new forms of innovation, with special emphasis on social innovation and creativity, and understanding how all forms of innovation are developed, succeed or fail

SSH aspects:

- Research on innovation processes, different forms of innovation, social innovation, creativity and change, social networks, Research on public sector / services innovation

6.2.3. Making use of the innovative, creative and productive potential of all generations

SSH aspects:

- Research on innovation and demographic change, active ageing, improved services and new business and social models, policies, integration of young generation

6.2.4. Promoting coherent and effective cooperation with third countries

SSH aspects:

- International cooperation on research, coordination of policies

Activity line 6.3. Reflective societies - Cultural heritage and European identity

6.3.1. Studying European heritage, memory, identity, integration and cultural inter-action and translation, including its representations in cultural and scientific collections, archives and museums, to better inform and understand the present by richer interpretations of the past

SSH aspects:

- Research on cultural heritage (language, memory, practices, institutions, identities), analysis of interpretation / practices of cultural inter-action, integration and exclusion, identity spheres in collections, archives, museums, libraries, cultural heritage sites, culture as access to social, cultural, economic developments, understanding European identity

6.3.2. Researching into European countries' and regions history, literature, art, philosophy, and religions and how these have informed contemporary European diversity

SSH aspects:

- Research on cultural diversity and its implications for creativity, historical and future development, art, media, language, philosophy, religion, as means to interpret the social, political and cultural reality, influence on individuals and social actors

6.3.3. Researching Europe's role in the world, the mutual influence and ties between the world regions, and a view from outside on European culture

SSH aspects:

- Research on the complexity of the socio-economic and cultural links between Europe and other world regions, on the potential for improved intercultural exchanges, views in Europe on other world regions and vice versa

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 6

The Work Programme 2014/15 in Challenge 6 "Inclusive, Innovative and Reflective Societies" contains 44 topics in total. Of these, 34 topics were flagged as SSH relevant, which adds up to a share of 80%.[7] Of these 34 topics, 31 are dedicated to SSH research and three include major SSH aspects. The budget share for SSH in this challenge can be estimated to add up to 137 million € (50% of the total budget).[8] The addressed SSH research dimensions regard mainly aspects of growth and the economic crisis, including societal and political impacts, the situation of the young generation in Europe (economic, social, political), education, European identities, cultural aspects of opposition / war, cultural heritage, European foreign policies, public service innovation, social innovation.

In more detail, the SSH aspects in these first calls in Challenge 6 regard the following research dimensions:

[7] The 35 topics also includes a support action for National Contact Points of Societal Challenge 6 that is not listed here.

[8] This calculation also includes 10% of the budget for COST actions (even though COST is not a traditional "topic" and not flagged on the participant portal), since COST also involves SSH activities. The 137 million € add up to 50% of the 275.7 million € that are allocated to all calls under the challenge and the COST programme under the challenge. Budget for "horizontal activities" and "Other actions" – other than COST – are excluded from this calculation.

Call – "Overcoming the Crisis: New Ideas, Strategies and Governance Structures for Europe"

SSH aspects:

- Resilient, sustainable economic and monetary union in Europe (EURO.1-2014)
- Economic growth in Europe (EURO.2-2014)
- Impact of economic crisis on European societies (EURO.3-2014)
- Economic crisis and its political challenges, European integration (EURO.4-2014)
- urban development and work, education, housing, mobility, access to public spaces, culture and leisure (ERA-Net EURO.5-2015)
- Improving public administrations and services (EURO.6-2014)

Call – "The Young Generation in an Innovative, Inclusive and Sustainable Europe"

SSH aspects:

- Job insecurity and labour market exclusion of young people (YOUNG.1-2014)
- Impacts of youth mobility, analysis of connected policies (YOUNG.2-2014)
- Lifelong learning of young adults and connected policies (YOUNG.3-2015)
- Young people as drivers of social change (YOUNG.4-2015)
- Societal and political engagement of young people (YOUNG.5-2014)

Call – "Reflective Societies: Cultural Heritage and European Identities"

SSH aspects:

- Uses of the past, historical perspectives, cultural heritage, traditions and languages (ERA-Net - REFLECTIVE.1-2014)
- European identities, emergence of a European cultural heritage in a historical perspective (REFLECTIVE.2-2015)
- European cohesion, regional/ urban policies, perceptions of Europe (REFLECTIVE.3-2015)
- Cultural opposition in former socialist countries (REFLECTIVE.4-2015)
- Cultural heritage of war in contemporary Europe (REFLECTIVE.5-2015)
- Digital cultural assets: new models of the analysis, interpretation and understanding of Europe's cultural and intellectual history, application of humanities research perspectives (identity, culture, questions of place, historical and cultural knowledge) (REFLECTIVE.6-2015)
- Dissemination of research results in the area of inclusive, innovative and reflective societies (REFLECTIVE.8-2015)
- Mapping of existing research, developing a future European research agenda in the field of Reflective societies (Social Platform REFLECTIVE.9-2014)

Call – "Europe as a Global Actor"

SSH aspects:

- Europe and a value-based global order (INT.3-2015)
- EU's policy on global development (INT.4-2015)
- EU's crisis response mechanisms, recent conflicts (INT.5-2015)
- EU's partnership with Mediterranean countries (INT.6-2015)

- Geo-politics in the southern and eastern Mediterranean region (INT.7-2015)
- EU's relation with Eastern partnership countries (INT.8-2015)
- EU's relation with Turkey and neighbouring countries (INT.9-2015)
- EU's relation with Balkan countries (INT.10-2015)
- European cultural and science diplomacy (INT.11-2015)
- Cultural, scientific and social dimension of EU relation with Latin America / Caribbean Countries (INT.12-2015)

Call – "New Forms of Innovation"

SSH aspects:

- ICT-enabled open government: user behaviour (INSO.1-2014/15)
- Economic impact of the Innovation union policy (INSO.3-2014)
- Social innovation (INSO.5-2015)
- ICT-supported learning: educational aspects/ policies, digital exclusion (INSO.6-2014)

3.7 **Challenge 7 "Secure Societies"**

General description

The specific objective of this challenge is to protect freedom and foster security in Europe in a context of global interdependencies and sophistication of threats while strengthening the European culture of freedom and justice and its compliance.

SSH aspects in Challenge 7 (Specific Programme)

SSH issues that are relevant in this context include research on conflicts & conflict resolution, foreign & security policy, policy development, legal & illegal activities, justice, human/ fundamental rights, the rule of law, communication, media and perception, prevention, preparation, anticipation, foresight, risk analysis, risk and crisis management, societal resilience, values, privacy, radicalisation, extremism, socioeconomic, cultural, and anthropological dimensions of security , ethical & legal issues, trade issues

Activity line 7.1. Fighting crime, illegal trafficking and terrorism, including understanding and tackling terrorist ideas and beliefs

SSH aspects:

- Understanding causes and impacts of radicalisation and violent extremism and tackling terrorist ideas and beliefs

Activity line 7.5 Increasing Europe's resilience to crises and disasters

SSH aspects:

- Research will cover the whole crisis management chain and societal resilience

Activity line 7.6 Ensuring privacy and freedom, including in the Internet and enhancing the societal legal and ethical understanding of all areas of security, risk and management

SSH aspects:

- Better understanding of the socioeconomic, cultural, and anthropological dimensions of security, causes of insecurity, role of media and communication and the citizen's perceptions
- Ethical and legal issues and protection of human values and fundamental rights
- Risk and management issues

Activity line 7.7 Enhancing standardisation and interoperability of systems, including for emergency purposes

SSH aspects:

- Activities will also address aspects such as communication and human factors

Activity line 7.8 Supporting the Union's external security policies including through conflict prevention and peace-building

SSH aspects:

- Development of organisational, legal, ethical aspects, trade issues, protection of confidentiality and integrity of information
- New capabilities and solutions to support the EU's external security policies in civilian tasks
- Research on conflict resolution and restoration of peace and justice, early identification of factors leading to conflict
- Research on impact of restorative justice processes

SSH aspects in the first Work Programme 2014/15 in Societal Challenge 7

The Work Programme 2014/15 in Challenge 7 "Secure Societies" contains 59 topics in total. Of these, 20 topics were flagged as SSH relevant, which adds up to a share of 34%. Of these 20 topics, 7 are dedicated to SSH research, 10 include major SSH aspects and three include minor SSH aspects. The budget share for SSH in this challenge can be estimated to add up to 20 million € (7% of the total budget). Two of the topics explicitly call for the inclusion of socio-economic disciplines. The SSH research dimensions addressed regard mainly aspects of radicalisation, management issues, risk and security perceptions e.g. in different cultures, support to the development of strategies and policies, conflict prevention and data protection.

In more detail, the SSH aspects in these first calls in Challenge 7 regard the following research dimensions:

Call – "Disaster-resilience: safeguarding and securing society, including adapting to climate change"

SSH aspects:

- Factors (socio-economic, psychological, political, cultural) for radicalisation and violent action (DRS-20-2014)
- Understanding the links between culture, risk perception and disaster management (DRS-21-2014)
- Development of a testing regime for emergency calls (DRS-19-2014)
- Effective adaptation strategies and systems for better risk management of vulnerable heritage materials and for mitigating damage to cultural heritage assets (DRS-11-2015)

- Resilience of critical infrastructure: human factors (i.e. radicalization), security, geo-politics, sociology, economy, etc. and increased vulnerability due to changing threats, economic indicators (DRS-14-2015)
- Critical infrastructures: analysis of risks and strength/vulnerabilities, identification of alternatives resources, socio-economic impacts of accidents (DRS-15-2015)
- Instruments, tools, and actions to address climate change security risks, contingency plans, impact of climate-driven crises on European security (DRS-22-2015)

Call – "Fight against crime and Terrorism"

SSH aspects:

- Solutions for urban security and resilience, perception of security and crime (incl. architecture, anthropology, arts, economy, law, linguistics and sociology (FCT-10-2014)
- Perception of personal (in)security of various groups (FCT-13-2014)
- Co-operation between police and citizens, "Community policing" and its social, culture, legal, ethical and gender dimension (FCT-14-2014)
- Societal dimension of crowd management (legal and ethical issues, acceptance) (FCT-12-2014)
- Strategies for profiling crimes or offenders and matching and predicting different type of crimes (FCT-2-2015)
- Management and use of suspect information including data mining, language and semantic analysis, connected ethical issues (FCT-4-2015)
- Organizational, legal and societal means for a European electronic identity ecosystem, taking into account trust and data protection, patterns in identity fraud (FCT-9-2015)
- Better understanding the role of new social media networks and their use for public security purpose (FCT-15-2015)
- Role of social, psychological and economic factors in progression into organised crime and terrorist networks. (FCT-16-2015)

Call – "Border Security and External Security"

SSH aspects:

- Analysing civilian and military efforts on conflict prevention and peace building, potential for pooling and sharing of capabilities for civilian conflict prevention (BES-12-2014)
- Human (psychological) factors in border control (BES-14-2014)
- New training methods in the field of civilian conflict prevention and peace building (BES-13-2015)

Call – "Digital Security: Cybersecurity, Privacy and Trust"

SSH aspects:

- Empowering internet users to set the desired level of privacy, based on a simple to understand visualisation of the privacy level (DS-1-2014)

4. SSH in Horizon 2020 Part II *Industrial Leadership – Leadership in enabling and industrial technologies*

The Horizon 2020 Part "Industrial Leadership – Leadership in enabling and industrial technologies" (KET – Key enabling technologies) aims at strengthening the competitiveness of Europe's businesses and will provide dedicated support for research, development and demonstration on ICT, nanotechnology, advanced materials, biotechnology, advanced manufacturing and processing and space. Interactions and convergence across and between the different technologies will be emphasised. This part will follow a technology-driven approach to develop enabling technologies that can be used in multiple areas, industries and services. Applications of these technologies to meet societal challenges shall be supported together with the societal challenges.

In the Specific Programme it is stated: "Where appropriate, social sciences and humanities will contribute to taking into account user needs preferences and acceptance as well as ensuring societal engagement and informed consumer choice."[9] Obvious applications of SSH in KETs might also be associated with ethical concerns with regard to technology advances.

4.1 Information and Communication Technologies (ICT)

General description

The specific objective of this area is to maintain and reinforce European leadership in technologies related to advanced, embedded and energy and resource efficient and robust components and systems, leverage European assets in processor and system architecture, and data localisation technologies, to reinforce the competitiveness of European industry in developing, mastering and shaping the next generation Internet, to strengthen Europe's position as provider of products and services based on individual and business creativity and to reinforce European scientific and industrial leadership in industrial and service robotics, cognitive and communicative systems and to take advantage of the excellence of Europe in these key enabling technologies and support and further enhance the competitiveness and market leadership of its industry.

SSH aspects in ICT (Specific Programme)

There is no specific activity line solely dedicated to SSH. All in all, not many SSH aspects are mentioned in this section. Below are some activity lines listed that contain SSH aspects.

Cross-cutting dimension:

- the interaction between humans and technology

1.1.3 Future Internet: Software, hardware, infrastructures, technologies and services

SSH aspects:

- To develop the next generation internet, research and innovation will be needed on issues such as services, cyber security, privacy, reliability and trust.

[9] Specific Programme, p. 988.

1.1.4 Content technologies and information management: ICT for digital content and for cultural and creative industries

SSH aspects:

- New tools to create, access, exploit, preserve and re-use all forms of digital content in any language and to model, analyse, and visualise vast amounts of data (big data), including linked data (intelligent and adaptive information management systems) will be developed. This includes new technologies for arts, language, learning, interaction, web design, and media.

SSH aspects in the first Work Programme 2014/15 in ICT

The Work Programme 2014/15 in ICT contains 47 topics in total. Of these, 10 topics were flagged as SSH relevant, which adds up to a share of 21%. Of these 10 topics, one is dedicated to SSH research, six include major SSH aspects and three include minor SSH aspects. The budget share for SSH in this programme part can be estimated to add up to 13.5 million € (1% of the total budget). Two of the topics explicitly call for the inclusion of SSH disciplines. Further four topics explicitly require multi- or interdisciplinary consortia. The addressed SSH research dimensions regard mainly aspects of human-machine interaction, user perspective and scenarios, interaction between internet and society, education, and business models.

In more detail, the SSH aspects in these first calls in ICT regard the following research dimensions:

Call – “Information and Communication Technologies Calls” (ICT)

SSH aspects:

- Multilingual online communication: development of a new paradigm, realistic use situations (ICT.17-2014)
- Digital Gaming: narratives, virtual character, interaction systems, human-machine interfaces, emotional models, education (ICT.21-2014)
- Human-computer interaction, user needs and behaviour (ICT.22-2014)
- Influence of hyper connectivity on human lives (on notions such as identity, privacy), norms and behaviours (ICT.31-2014)
- Social, economic and legal issues that arise from the interplay between the Internet and society (ICT.5-2014)
- Collective awareness platforms: obstacles and opportunities, incentives and motivations, governance, ethical issues (ICT.10-2015)
- Potential of new emerging technologies (e.g. 3D) to enhance human creative process, new demands for search engines (ICT.19-2015)
- Learning technologies: application scenarios, gender differences in use (ICT.20-2015)
- Internet of Things: development of business models, societal acceptance, education (ICT.30-2015)

4.2 Nanotechnologies

General description

The specific aim for the section “Nanotechnologies” is to raise the awareness of benefits and risks. Safety assessment and the management of overall risks in the deployment of these technologies will be systematically addressed. Where appropriate, social sciences and

humanities will contribute to taking into account user needs preferences and acceptance as well as ensuring societal engagement and informed consumers' choices.

SSH aspects in Nanotechnologies (Specific Programme)

There is no specific activity line solely dedicated to SSH. The SSH aspects are more present in the content of activities 1.2.2. and 1.2.3. The activity line 1.2.1. does not feature SSH. To summarise: Social sciences and humanities will contribute to defining proactive, science-based governance of nanotechnologies as well as to providing validated scientific tools, methods and platforms for hazard, exposure and risk assessment and management along the entire life cycle of nanomaterials and nanosystems, identifying the human and physical needs of nanotechnology deployment.

The explicit share of SSH is very limited in comparison to other research aspects. Behind the defined actions it is clear that some preliminary and accompanied SSH work is expected to be done. For example, the 1.2.3. activity "Addressing the human and physical needs of nanotechnology deployment" suggests identification of such needs, and the activity "Focussing on governance of nanotechnology for societal and environmental benefit, including communication strategies to ensure social engagement" suggests the identification, characterisation and evaluation of such benefit (or loss).

The following list provides an overview on SSH-relevant activity lines and the SSH aspects mentioned within them:

Activity line 1.2.2. Ensuring the safe and sustainable development and application of nanotechnologies

SSH aspects:

- Defining proactive, science-based governance of nanotechnologies
- Providing validated scientific tools, methods and platforms for hazard, exposure and risk assessment and management along the entire life cycle of nanomaterials and nanosystems, including standardisation issues

Activity line 1.2.3. Developing the societal dimension of nanotechnology

SSH aspects:

- Addressing the human and physical needs of nanotechnology deployment
- Focussing on governance of nanotechnology for societal and environmental benefit, including communication strategies to ensure social engagement.

Activity line 1.2.4. Efficient and sustainable synthesis and manufacturing of nanomaterials, components and systems

SSH aspects:

- Identification of new characteristics of management concerning new flexible, scalable and repeatable unit operations, smart integration of new and existing processes, including technology convergence such as nanobiotechnology, as well as upscaling to enable sustainable high precision large scale production of products and multi-purpose plants that ensures the efficient transfer of knowledge into industrial innovation

Activity line 1.2.5. Developing and standardisation of capacity-enhancing techniques, measuring methods and equipment

SSH aspects:

- Characterisation of specifics of market introduction of safe complex nanomaterials and nanosystems, including nanometrology

SSH aspects in the first Work Programme 2014/15 in Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing:

The first Work Programme 2014/15 for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing brings together several programme parts that are otherwise handled separately in this document. For this reason, the SSH aspects in all of these programme parts will be listed here and will not be repeated in the following chapters.

The first Work Programme 2014/15 for these areas contains 77 topics in total. Of these, six topics were flagged as SSH relevant, which adds up to a share of 8%. Of these six topics, four include major SSH aspects and two include minor SSH aspects. The budget share for SSH in this programme part can be estimated to add up to 4 million € (0.4% of the total budget). Two of the topics explicitly call for the inclusion of SSH disciplines. Further two topics explicitly require multi- or interdisciplinary consortia. The addressed SSH research dimensions regard mainly aspects of communication and interaction with society, education and economic issues (business models).

In more detail, the SSH aspects in these first calls regard the following SSH research dimensions:

Call - "Nanotechnologies, Advanced Materials and KET support actions" (NMP)

SSH aspects:

- Preservation/ restoration of cultural heritage: historical value, business models, human risk factors (NMP.21-2014)
- Eco-innovation business models, management and (re)use of new materials, models to decouple economic growth from resource constraints, cost effectiveness (NMP.34-2014)
- Communication and awareness on nanotechnologies (NMP.31-2014)
- Key enabling technologies: networking on communication and societal dialogue; synergies with Social Sciences and Humanities actors, gender issues, foresight activities; education and training needs (NMP.36-2014)
- Nanotechnology: best practices in societal, future economic and social benefits and risks of nanotechnology (NMP.32-2015)

Call for "FoF – Factories of the Future" (NMP)

SSH aspects:

- Wellbeing and autonomy of workers, education, attractiveness of factories for workers (FOF.4-2014)

4.3 Advanced materials

General description

The specific objective is boosting Europe's industrial leadership through research, technological development, demonstration and innovation in advanced materials.

SSH aspects in "Advanced materials" (Specific Programme)

There is no specific activity line solely dedicated to SSH. The SSH aspect is more present in the content of activities 1.3.4. and 1.3.5. The activity line 1.3.1. does not feature SSH.

Social sciences and humanities are expected to contribute to developing new approach based and 'no-waste' management; to developing new business models and responsible consumer behaviour; to creating new business opportunities, and including the preservation of Europe's materials with historical or cultural value.

The explicit share of SSH is very limited in comparison to other research aspects. Behind the defined actions it is clear that some preliminary and accompanied SSH work is expected to be done.

The following list provides an overview on SSH-relevant activity lines and the SSH aspects mentioned within them:

Activity line 1.3.2. Materials development and transformation

SSH aspects:

- Research to define efficient, safe and sustainable development and scale up to enable industrial manufacturing of future design based products towards a "no-waste" management of materials in Europe e.g. in the metal, chemical or biotechnological industries

Activity line 1.3.3. Management of materials components

SSH aspects:

- Research and development for new and innovative management of life cycle costs and environmental impacts through novel use of advanced materials technology

Activity line 1.3.4. Materials for a sustainable, resource-efficient and low-emission industry

SSH aspects:

- Developing new business models and responsible consumer behaviour that increase the use of the renewable resources for sustainable applications, reduce energy demand in the product's entire life cycle and facilitate low emission production, as well as process intensification, recycling, depollution, materials for energy storage and materials with potential for high-added value from waste and remanufacture

Activity line 1.3.5. Materials for creative industries, including heritage

SSH aspects:

- Applying design and the development of converging technologies to create new business opportunities, including the preservation and restoration of Europe's heritage and materials with historical or cultural value, as well as novel materials

Activity line 1.3.6. Metrology, characterisation, standardisation and quality control

SSH aspects:

- Promoting technologies such as characterisation, non-destructive evaluation and predictive modelling of performance for progress and impact in materials science and engineering

Activity line 1.3.7. Optimisation of the use of materials

SSH aspects:

- Research and development to investigate innovative business model approaches

SSH aspects in the first Work Programme 2014/15 in Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing:

The first Work Programme 2014/15 for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing brings together several programme parts that are otherwise handled separately in this document. For this reason, the SSH aspects in Advanced Material is already listed under "Nanotechnologies" and will not be repeated here.

4.4 Biotechnology

General description

The specific objective of the Biotechnology theme is to lay the foundations for the European industry to stay at the front line of innovation, also in the medium and long term, enabling the European industry to develop new products and processes meeting industrial and societal demands using preferably environmentally-friendly and sustainable production methods; and competitive and enhanced biotechnology-based alternatives to replace established ones; on the other hand, harnessing the potential of biotechnology for detecting, monitoring, preventing and removing pollution. In addition to that, developing platform technologies (e.g. genomics, meta-genomics, proteomics, metabolomics, molecular tools, expression systems, phenol typing platforms) and triggering leadership and competitive advantage on a wide number of economic sectors are indicated as other important aims related to this area.

SSH aspects in "Biotechnology" (Specific Programme)

There is no specific activity line solely dedicated to SSH. Major SSH aspects are determined as below:

1.4.2 Biotechnology-based industrial products and processes

SSH aspects:

- Assessment of the techno-economic feasibility as well as the sustainability of the developed products and processes

Cross-cutting

- User needs preferences and acceptance as well as ensuring societal engagement and informed consumers' choice on products
- Safety assessment and the management of overall risks in the deployment of bio-technologies
- Raising awareness of benefits and risks for bio-technology on general public
- Developing appropriate technical standards and technical activities in support of standardisation and regulation on bio-technology

SSH aspects in the first Work Programme 2014/15 in Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing:

The first Work Programme 2014/15 for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing brings together several programme parts that are otherwise handled separately in this document. For this reason, the SSH aspects in "Biotechnology" are already listed under "Nanotechnologies" and will not be repeated here.

4.5 Advanced Manufacturing and Processing

General description

The objective is to boost Europe's industrial leadership through research, technological development, demonstration and innovation in advanced manufacturing and processing.

SSH aspects in "Advanced Manufacturing and Processing" (Specific Programme):

There is one specific activity line solely dedicated to SSH: *1.5.4. New Sustainable Business Models.* The activity lines 1.5.2. and 1.5.3. do not feature SSH.

Social sciences and humanities will contribute to this part through promoting sustainable, industrial growth by facilitating a strategic shift in Europe from cost-based manufacturing to an approach based on the creation of high added value products and ICT-enabled intelligent and high performance manufacturing in an integrated system and through the development of new business models.

The explicit share of SSH is very limited in comparison to other research aspects. Behind the defined actions it is clear that some preliminary and accompanied SSH work is expected to be done.

The following list provides an overview on SSH-relevant activity lines and the SSH aspects mentioned within them:

Activity line 1.5.1. Technologies for Factories of the Future

SSH aspects:

- Promoting sustainable, industrial growth by facilitating a strategic shift in Europe from cost-based manufacturing to an approach based on the creation of high added value products and ICT-enabled intelligent and high performance manufacturing in an integrated system

Activity line 1.5.4. New sustainable business models

SSH aspects:

- Development of business models in customised approaches that can adapt to the requirements of globalised value chains and networks, changing markets, and emerging and future industries; addressing sustainable business models by covering the whole lifecycle of the product and process

SSH aspects in the first Work Programme 2014/15 in Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing:

The first Work Programme 2014/15 for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing brings together several programme parts that are otherwise handled separately in this document. For this reason, the SSH aspects in "Advanced Manufacturing and Processing" is already listed under "Nanotechnologies" and will not be repeated here.

4.6 Space

General description

The specific aims of the "Space" part of the key enabling technologies are: to carry out research activities in line with the space research activities of the Member States and European Space Agency (ESA) aiming at building up complementarities among different actors, to maintain a globally leading role in space by safeguarding and further developing a cost-effective and competitive and innovative space industry (including SMEs) and research community, by fostering space-based innovation, to enhance the research-base by providing continuity in space research and innovation programmes, to make standardisation in order to optimise the investments in space sector and to exploit the space infrastructure by promoting the development of innovative products and services, to develop advanced and enabling space technologies and operational concepts from idea to demonstration in space, to ensure more extensive utilisation of space data from existing, archived and future European missions in the scientific, public and commercial domain and to support the European research and innovation contribution to long term international space partnerships.

SSH aspects in "Space" (Specific Programme):

The activity lines listed under "Space" do neither explicitly include SSH aspects, nor do they mention themes that include obvious but implicit SSH research dimensions.

SSH aspects in the first Work Programme 2014/15 in "Space"

Although an analysis of the Specific Programme as the overall framework does not reveal any SSH aspects in this programme part, there are nonetheless very few topics in the first Space Work Programme 2014/15 with SSH relevance. The Work Programme 2014/15 in Space contains 31 topics in total. Of these, 2 topics with minor SSH aspects were flagged as SSH relevant, which adds up to a share of 6%. The budget share for SSH in this programme part can be estimated to add up to ca. 1 million € (0.5% of the total budget). None of the topics explicitly call for the inclusion of SSH disciplines or for multi- or interdisciplinary consortia. The addressed SSH research dimensions regard mainly aspects of communication and data use.

In more detail, the SSH aspects in these first calls in Space regard the following research dimensions:

<u>Call – "Earth Observation"</u>

SSH aspects:

- Use of space data in Earth system science: dissemination mechanisms and reference frames (EO.1-2014)

<u>Call – "Competitiveness of the European Space Sector: Technology and Science"</u>

SSH aspects:

- Attracting interest of students towards space (Compet.10-2014)

5. SSH in Horizon 2020 Part I *Excellent Science*

The Horizon 2020 Part on "Excellent Science" aims at reinforcing and extending the excellence and competitiveness of the EU's science base. It shall contribute to the consolidation of the European Research Area. It will support individual researchers through the ERC and the Marie Skłodowska-Curie actions. The programme part "Future and emerging technologies (FET)" will extend Europe's capacity for advanced and paradigm-changing innovation. It will foster scientific collaboration across disciplines on radically new, high-risk ideas and accelerate development of the most promising emerging areas of science and technology. Research infrastructures will be further developed. These activities are inherently forward-looking and are intended to build skills and capacities in the long term. In this part of Horizon 2020, the activities are mostly of a "bottom-up", science-driven nature.

5.1 European Research Council

General description

The European Research Council (ERC) consists of no predetermined subjects or themes making it a bottom-up approach concept. It funds cutting-edge frontier research. ERC, which over the period of FP7 became an important resource for SSH in Europe, had dedicated approximately 15% of the total budget to proposals in the SSH field of research in FP7.[10]

For Horizon 2020 (2014-2020), the ERC has received a substantial increase in its budget (now €13,268 billion). Currently, 17% of the budget is foreseen for proposals from SSH domains.

SSH aspects in the ERC

SSH researchers can participate and make use of the grants available under ERC as it is specifically designed for projects across science, engineering, humanities and social sciences. The following are the four calls in which SSH researchers can participate in:

- **ERC Starting Grant**: this scheme targets promising researchers who have the proven potential of becoming independent research leaders. These calls, which are published once a year, are for researchers of any nationality with 2-7 years of experience since completion of PhD.
- **ERC Consolidator grants:** these grants are designed to support excellent Principal Investigators at the career stage at which they may still be consolidating their own independent research team or programme. The grants under this scheme are awarded for a period of 5 years where the Principal Investigator shall have been awarded their first PhD over 7 and up to 12 years prior to the publication date of the call for proposals.

[10] At the end of FP7, ERC had committed 17% of its total budget of €7,510 million to the Social Sciences and Humanities.

- **ERC Advanced Grants**: these grants move a step higher, as the researchers that fall under the remit of this scheme need to be already independently established researchers who are aiming to pursue ground breaking and high risk projects in their respective field of research.
- **ERC Proof of Concept**: those that would have already been awarded an ERC grant have a second opportunity to re-apply for additional funding under this scheme. This scheme was devised with a vision of establishing the innovation potential of ideas arising from their ERC –funded frontier research projects.

SSH aspects in the first Work Programme 2014/15 in "ERC"

The first Work Programme 2014/15 for ERC foresees calls for ERC Starting Grants, ERC Advanced Grants, ERC Consolidators Grants and ERC Proof of Concept Grants. All of them are open to SSH researchers.

5.2 Future and Emerging Technologies (FET)

General description

The specific objective of the FET programme is to open up new and promising fields of research and innovation, to foster radically new technologies by exploring novel and high-risk ideas building on scientific foundations and contribute to the European next generation industries.

To achieve this goal, FET shall promote research and technology beyond what is known, accepted or widely adopted, and shall foster novel and visionary thinking to open promising paths towards powerful new technologies, some of which could develop into leading technological and intellectual paradigms for the decades ahead.

SSH aspects in FET

FET activities consist primarily of bottom-up collaborative research in all fields. Thus, there is no specific activity line dedicated to SSH. Nonetheless, while the FET programme aims to be visionary, transformative and unconventional, the new logics for action and new opportunities of research for SSH must be considered:

(a) The support for goal-oriented and interdisciplinary collaborative research might aim to further collaboration with SSH researchers.
The FET programme appeals to radical breakthroughs with a transformative impact increasingly rely on intense collaboration across disciplines in science and technology (for instance, information and communication, biology, bioengineering and robotics, chemistry, physics, mathematics, medicine modeling, earth system sciences, material sciences, neuro- and cognitive sciences, social sciences or economics) and with the arts, behavioral sciences and humanities.

(b) The support for new emerging research themes, with benefits for society.

The activities shall give firmer shape to different logics for action, on the appropriate scale, identifying and seizing opportunities of long-term benefit for citizens, the economy and society.

In particular, both of the following activities report SSH aspects:

FET Proactive

- shall, in close association with the societal challenges and industrial leadership themes, address a number of promising exploratory research themes with the potential to generate a critical mass of inter-related projects that, together, make up a broad and multi-faceted exploration of the themes and build a European pool of knowledge.

FET Flagships

- shall, taking into full account the outcome of FET preparatory projects, support ambitious large-scale, science and technology driven research aiming to achieve a scientific and technological breakthrough in areas identified as relevant in an open and transparent manner involving the Member States and relevant stakeholders. The scientific advance should provide a strong and broad basis for future technological innovation and economic application, plus novel benefits for society.

The activities within the FET programme should be complementary to the activities of the other parts of Horizon 2020, but they could also potentially overlap.

SSH aspects in the first Work Programme 2014/15 in FET:

The first Work Programme 2014/15 for "FET" contains 10 topics in total. Of these, three topics were flagged as SSH relevant, which adds up to a share of 30 %. Of these three topics, two include major SSH aspects and one includes minor SSH aspects. The budget share for SSH in this programme part can be estimated to add up to 2.5 million € (0.4 % of the total budget). One of the topics explicitly calls for the inclusion of SSH disciplines. The two other topics explicitly require interdisciplinary consortia. The addressed SSH research dimensions regard (risk) management, political and economic dimensions, and SSH perspectives on cognition.

In more detail, the SSH aspects in the first calls in FET regard the following SSH research dimensions:

Call – "FET-Proactive – Emerging Themes and Communities"

SSH aspects:

- Global Systems Science: decision making under uncertainty, systemic risk in finance/ economics, managing growth and migration, managing pandemics, policy interactions, new approaches to citizen's participation in policies (FETPROACT.1-2014)
- Cognition: new approaches to/ integrative studies of learning, motivation, autonomy, knowledge, belief, intention, experience, understanding, social belonging, culture; impact on societal changes(FETPROACT.2-2014)

Call – "FET-Open – novel ideas for radically new technologies"

SSH aspects:

- Bottom up topic with interdisciplinary background on high risk visionary science and technology research (FETOPEN.1-2014)

5.3 Marie Skłodowska-Curie Actions

General description

The Marie Skłodowska-Curie Action‘s budget is worth an estimated €5.7billion under Horizon 2020.

Tuition and mobility of professionals in the fields of science and technology is essential for the development of the ERA. It is noteworthy that the Marie Skłodowska-Curie actions that are about exchanging knowledge and gaining new experiences from network cooperation, as well as mobility, through a bottom-up approach with no pre-defined themes, have promoted excellence and contributed to internationalisation efforts in Europe. In strategic terms, the Marie Skłodowska -Curie actions were the most international initiatives in FP7. In Horizon 2020, the identified main objectives for Marie Skłodowska-Curie are to ensure optimum development and dynamic use of Europe’s intellectual capital in order to generate new skills and innovation.

SSH aspects in Marie Skłodowska-Curie actions

As Social Science and Humanities research remains a relatively new domain in European funding schemes, with a proportionally small share of funds, Marie Skłodowska-Curie Actions have been often seen as an alternative funding source to SSH.

Therefore, involvement of “research institutions, businesses, SMEs and other socio-economic actors” in Marie Skłodowska-Curie actions should be used in the widest possible sense, including all fields of future workplaces and public engagement. Apart from that, Marie Skłodowska-Curie actions will be bottom-up. Around 11 % of the budget will be available to SSH researchers.

The following schemes are available for SSH researchers in Horizon 2020:

1. *Fostering new skills by means of excellent initial training of researchers (structured doctoral training)*

This action focuses on structuring the initial training of excellent researchers and doctoral students, providing them with enhanced career perspectives in both public and private sectors. In international, interdisciplinary and inter-sectoral training networks early stage researchers are equipped with a diversity of skills matching the demands of the labour market.

2. *Nurturing excellence by means of cross-border and cross sector mobility (Marie Skłodowska-Curie Fellowships)*

The fellowship programme will fund researchers who want to conduct a research project at an institution in another European or non-European country, thus, creating an attractive career opportunity for experienced researchers. The aim is to enlarge the researchers’ competences at universities, research institutions and businesses and to improve their career development in the public and private sectors.

3. *Stimulating innovation by means of cross-fertilisation of knowledge (Staff exchange)*

The increase of knowledge transfer and innovative ideas to the market is made possible under this action. This will be achieved by exchanging highly qualified research staff between participants in different countries, disciplines and sectors within Europe and worldwide.

4. *Increasing structural impact by co-funding activities*

The promotion of regional, national, and international funding schemes for young researchers is the main aim of this action. This further includes the setting up of new programmes as well as enlarging existing ones in order to harmonise them with European standards for working conditions.

SSH aspects in the first Work Programme 2014/15 in Marie Skłodowska-Curie actions:

In the first Work Programme 2014/15 in the area of Marie Skłodowska-Curie Actions, Calls for all the four schemes mentioned above are included. SSH researchers can participate in all of these calls.

5.4 Research Infrastructures (including e-infrastructures)

General description

The activities aim at developing excellent European research infrastructures for 2020 and beyond, fostering their innovation potential and human resources and reinforcing European policy. Coordination with the cohesion funding sources is pursued to ensure synergies and a coherent approach for the development of the research infrastructures. Synergies with Marie Skłodowska-Curie actions will be encouraged.

In Horizon 2020, Research Infrastructures (RI) will include the following activities:

- Developing the European research infrastructures for 2020 and beyond

EU funding will support the preparation phase of future research infrastructures, the implementation phase, the development of Regional Partner facilities, the operation phase and design studies for new RIs. It will support the networks and clusters that bring together and integrate, on European scale, key national research infrastructures.

Finally, support will be provided to global research and education networks, infrastructures providing virtually unlimited computational and data processing capacity and interoperable, open and trusted scientific data infrastructure.

- Fostering the innovation potential of RIs and their human resources

This activity will support R&D partnerships with industry, pre-commercial procurement by research infrastructure actors, stimulate the use of research infrastructures by industry, encourage the integration of research infrastructures into local, regional and global innovation Ecosystems.

Furthermore the training of staff managing and operating research infrastructures of pan-European interest, the exchange of staff and best practices between facilities will be supported.

- Reinforcing European research infrastructure policy and international cooperation

This activity will exploit synergies between national and Union initiatives and will facilitate the development of global research infrastructures.

SSH aspects in Research Infrastructures

The roadmap with ESFRI infrastructures[11] includes five in the area of SSH:

SHARE, European Social Survey, CESSDA, CLARIN and DARIAH

Those that are officially under implementation are SHARE, European Social Survey and CESSDA.

The use of infrastructures in SSH research will lead to new, innovative and often interdisciplinary ways of research. For example making available our cultural heritage in digital form combined with sensitive interlinking of such resources will open a new frontier for Humanities research.

SSH aspects in the first Work Programme 2014/15 in Research Infrastructures:

The first Work Programme 2014/15 for "Research Infrastructures" contains 22 topics in total. Of these, 13 topics were flagged by the EC as SSH relevant, which adds up to a share of 59 %. However, as most of the topics have a very open character when it comes to the area of research addressed, it is very difficult to calculate a budget share for SSH research infrastructures in this area. An example: the call "Developing new world-class research infrastructures" calls for design studies for new infrastructures in all fields of science and technology.

6. Spreading excellence and widening participation

General description

The aim of this programme part is to fully exploit the potential of Europe's talent pool and ensure that the benefits of an innovation-led economy are both maximised and widely distributed across the Union in accordance with the principle of excellence.

There are significant disparities across Europe in research and innovation performance. The measures in this programme part will aim at unlocking excellence and innovation and will be distinct from, and where appropriate complementary and synergistic with, policies and actions of the ESI Funds. The following main activities are included under this programme:

- Teaming of excellent research institutions and low performing RDI regions
- Twinning of research institutions
- ERA Chairs
- Policy Support Facility
- Supporting access to international networks

SSH aspects in "Spreading excellence and widening participation":

The activities in this programme do not address a specific scientific field. They are therefore as well open to SSH institutions.

SSH aspects in the first Work Programme 2014/15 in "Spreading excellence and widening participation":

[11] http://ec.europa.eu/research/infrastructures/pdf/esfri-strategy_report_and_roadmap.pdf

The first Work Programme 2014/15 in this area contains 3 topics. One topic (ERA Chairs) has been flagged as SSH relevant. However, as this topic as well as the other measures under this programme have a very open character when it comes to the area of research addressed, it is very difficult to calculate a budget share for SSH research in this area.

7. Science with and for Society

General description

The aim of "Science with and for Society" is to build effective cooperation between science and society, to recruit new talent for science and to pair scientific excellence with social awareness and responsibility.

A dialogue and active cooperation between science and society shall be developed to ensure a more responsible science and to enable the development of policies more relevant to citizens. The societal and political support to S&T shall be widened. Therefore the activities under this programme aim to make scientific careers more attractive, to promote gender equality in the research sector, to integrate society in science and innovation issue, to encourage citizens to engage in science and to further develop the accessibility and the use of the results of publicly-funded research. The governance of research and innovation shall be developed, potential impacts of research shall be taken into account and knowledge on science communication shall be improved.

SSH aspects in "Science with and for society"

This programme addresses a number of SSH relevant research issues, particularly in the area of Science and Technology Studies. SSH aspects include education, gender issues, the relation between science and society, science policies, governance of science, societal needs with regard to science, ethics framework, and communication.

SSH aspects in the first Work Programme 2014/15 in "Science with and for society"

The first Work Programme 2014/15 for "Science with and for society" contains 21 topics in total. Of these, 13 topics were flagged as SSH relevant, which adds up to a share of 59 %. Of these 13 topics, 10 include major SSH aspects and three includes minor SSH aspects. The budget share for SSH in this programme part can be estimated to add up to 13 million € (14 % of the total budget). One of the topics explicitly calls for the inclusion of SSH disciplines. The addressed SSH research dimensions mainly regard education, R&I systems and policies, legal and ethical issues.

In more detail, the SSH aspects in the first calls in "Science with and for Societies" regard the following SSH research dimensions:

<u>Call for Making Science Education and Careers Attractive For Young People</u>

SSH aspects:

- Science education, gender balance in science, interaction between different levels of the education system (SEAC.1-2014/2015)
- Development of higher education curricula with regard to societal engagement, gender equality, gender in R&I, science education, ethics (SEAC.2-2014)
- Support to researchers' career development (SEAC.3-2014)
- assessing 'good human resources management' in the public research sector (SEAC.4-2015)

Call for Promoting Gender Equality in Research and Innovation

SSH aspects:

- Evaluation of gender equality plans (GERI.4-2014/15)
- Evaluation of initiatives to promote gender equality in research policy and research organisations (GERI.3-2015)

Call for Integrating Society in Science and Innovation

SSH aspects:

- Development of Responsible Research and Innovation plan (ISSI.5-2014/15)

Call for Developing Governance for the Advancement of Responsible Research and Innovation

SSH aspects:

- Barriers for uptake of Responsible Research and Innovation in R&I systems (GARRI.1-2014)
- Text and Data Mining: Policy developments, legal frameworks, awareness raising (GARRI.3-2014)
- Ethics in Research: Cases of misconduct incl. socio-economic / psychological dimension (GARRI.5-2014)
- Export of non ethical practices to third countries: case studies involving local structures, impact on population (GARRI.6-2014)
- Implementation of Responsible Research and Innovation in the industry, optimal cooperation between industry and societal actors (GARRI.2-2015)

8. Conclusions and Recommendations

This report demonstrates that a number of SSH aspects are present in the different programme parts of Horizon 2020.

This is particularly true for **Part III. "*Societal Challenges"***. All Societal Challenges include SSH aspects in the respective text passages of the Specific Programme, to varying degrees. Apart from the SSH-driven Challenge 6 "Europe in a changing world: Inclusive, innovative, and reflective societies", Challenge 1 "Health, Demographic Change and Well-being" and Challenge 5 "Climate Action, environment, Resource Efficiency and Raw Materials" include the largest share of SSH research dimensions. Challenge 2 "Food Security, Sustainable Agriculture, Marine and Maritime Research and the Bioeconomy" and Challenge 4 "Smart, Green and Integrated Transport" and Challenge 7 "Secure Societies" include many SSH aspects as well. Challenge 3 "Secure, Clean and Efficient Energy" contains SSH aspects to a lesser extent. While some activity lines in the different challenges concentrate on SSH-aspects (such as activity line 5.4 "Enabling the transition towards a green economy and society through eco-innovation" in Challenge 5), within the text of the Specific Programme there is only one explicitly SSH-dedicated activity line, in Challenge 4 "Transport": "4.4 Socio-economic research and forward looking activities for policy making".

The SSH aspects that are mentioned most often throughout the challenges in the Specific Programme regard issues of behaviour, consumption and lifestyles, management and governance, public perceptions/awareness and public engagement and acceptance, policy development and decision support, policy impact assessment, social/economic innovation, market assessment & business development, economic systems and instruments. It is noteworthy that the inclusion of humanities is rather limited (with the exception of Challenge 6).

A particular large share of SSH flagged topics can be found in the Work Programme of Challenge 6 (80 %). Within the other Challenges, the share ranges between 48 % in Challenge 5 "Climate Action…" and 34% in Challenge 7 "Secure Societies". The topics of the first Work Programmes of Horizon 2020 reflect the texts of the Specific Programme and SSH aspects outside of Challenge 6 deal mostly with behaviours and lifestyles, cost-efficiency, business models, market potentials, management and governance, policy support, socio-economic contexts, user needs, and legal and ethical aspects.

Within the priority ***"Leadership in enabling and industrial technologies"***, the integration of SSH in the text of the Specific Programme is more limited. There are no dedicated activity lines to socio-economic research, or activity lines that are mainly SSH-driven. In "Nanotechnologies" and "Advanced materials" SSH research aspects seem to be more present than in other parts. In "Space", no SSH aspects are mentioned. All in all, the SSH research dimensions within this part focus on consumer behaviour, user preferences and acceptance, governance and management issues, risk assessment and management, and the creation of business models.

The share of SSH flagged topics in the first Work Programmes 2014/15 in this area adds up to ca. 12 % - with significant difference in the individual programme parts. While in "ICT" 21 % of topics are flagged as SSH relevant, only 8 % and 6 % are flagged in "Nanotechnologies…" and "Space" respectively. The SSH research dimensions of the Work Programme topics refer to user perspectives, human-machine-interaction, societal impacts of the digital age, business models, cost-efficiency, workers' needs, communication with society and education.

Within the programmes of **Part I, *"Excellent Science"***, there are no pre-defined research topics in the area of the ERC and the Marie Skłodowska-Curie Action. Therefore an analysis of SSH research dimensions cannot be undertaken for these programmes. However, it can be stated, that a number of funding opportunities for SSH researchers exist in these areas. In the case of the ERC, proposals crossing disciplinary boundaries are particularly encouraged.

This can be a chance for SSH researchers to engage in interdisciplinary research and therefore can built capacities to foster the embedding of SSH. Within the “Future and emerging technologies (FET)” Programme a similar interdisciplinary approach is applied. The SSH-relevant FET topics in the first Work Programme 2014/15 address (risk) management, political and economic dimensions, and SSH perspectives on cognition.

In part V. **“Science with and for society”** SSH research dimensions both in the Specific Programme and in the first Work Programme relate to education, gender issues, the relation between science and society, science policies, governance of science, societal needs with regard to science, ethics framework, and communication.

According to the European Commission, in total 37% of the topics in the first Work Programmes are flagged as SSH relevant, adding up to a budget share of estimated 5.3% (ca. 450 mio. €). This includes also topics in the parts “Spreading excellence and widening participation” and “Research Infrastructures” that rather fund measures to support the research system (often in an open, non-thematic way) than research itself. In the priorities “Societal Challenges” and “Lead Enabling and Industrial Technologies” the share of SSH flagged topics adds up to 34 % (including Societal Challenge 6) with a budget share of 4.7 %.

With regard to the flagging of SSH-relevant topics, approaches differ from programme to programme. For example, in Challenge 1 “Health…” all topics that are flagged as SSH relevant include major SSH aspects, while in Challenge 4 “Transport” 38 % of the SSH-flagged topics only include minor SSH aspects. There are some topics among those that are flagged as SSH relevant, that reveal only very little SSH aspects in the topic texts, such as a mere reference to cost-effectiveness or business models. In a few cases, topics with major SSH aspects have not been flagged. Therefore a simple comparison of the number of flagged topics in the different programme parts can be misleading.

A difference in the phrasing of topics and in the explicit references to SSH or to multi- and interdisciplinarity can also be observed. In few cases, such as in Challenge 4 “Transport” and Challenge 7 “Secure Societies” there are dedicated sections in calls that are explicitly calling for SSH research and which are reserved for SSH-dedicated topics (in “Transport” the section is called “Socio-economic and behavioural research and forward looking activities for policy making”, in “Secure Societies” there are sub-chapters on the "Ethical/Societal Dimension" under the calls on "Disaster-resilience", "Fight against crime and terrorism" and "Border Security and External Security"). Challenge 5 “Climate Action…” is an example where many of the SSH flagged topics refer explicitly to the inclusion of Social Sciences or Humanities as a requirement. In general, only a smaller share of topics flagged as SSH-relevant includes explicit references to SSH or to multi- and interdisciplinary research.

Recommendations

- All Horizon 2020 Advisory Groups should include a significant share of experts with SSH backgrounds to ensure that SSH is adequately taken into account in the agenda setting.
- SSH aspects in the calls should go beyond an ancillary role (e.g. improving the public acceptance of technologies). The increased inclusion of humanities also outside of Challenge 6 could lead to a greater in-depth understanding of the respective challenge.
- Similar approaches in all programme parts should be taken with regard to flagging topics as SSH relevant (e.g. flagging only topics with major SSH aspects).
- Explicit references to the inclusion of SSH or to interdisciplinary consortia in the topic texts could contribute to the integration of SSH researchers in proposals.
- The important contribution of SSH to the tackling of societal challenges should be also adequately reflected in the budget share for SSH research dimensions.
- The inclusion of SSH experts in evaluation panels must be complemented with evaluation criteria that reflect the interdisciplinary character of proposals.
- The forming of interdisciplinary consortia of SSH researchers and researchers from natural and technical sciences should receive support e.g. through the funding of specific networking platforms or synthesis centres.
- For larger interdisciplinary projects, the funding of preparatory phases should be considered.
- The display of SSH-flagged topics on the Participant Portal could be improved, e.g. by the possibility to sort the list by keywords, calls or programmes.
- The mechanisms for monitoring the embedding of SSH in Horizon 2020 should assess the degree of interdisciplinarity and integration of SSH into funded projects as well as the outcome of these projects and the importance of the embedded SSH research on the project impact.