Universities of Finland:
Position paper on the mission-oriented approach of FP9

UNIFI

Universities Finland (UNIFI), representing all Finnish universities, would like to take this opportunity to contribute ideas to the **mission-oriented approach** proposed for the next European Framework Programme for Research and Innovation (FP9). Furthermore, the Finnish universities give their full support for **doubling the budget** of the FP9 to €160 billion.

Universities Finland proposes:

1) Key principles of a successful mission-oriented approach, and
2) Missions and research priorities contributing to the achievement of the overall goal – the mission.

Background:

This position paper builds on 57 proposals received from universities and researchers in Finland. The selected missions have been formulated in collaboration with all Finnish universities, which act as leading hubs of basic science, research and innovation ecosystems. In addition, these missions were established in line with national political priorities and with the European Union and United Nations Sustainable Development Goals. Thus, the universities wish to express their support for the views of the Academy of Finland* and the relevant Finnish ministries on FP9**.

1. Key Principles of a successful mission-oriented approach

Missions must be based on **excellent, collaborative and transdisciplinary research**. They should rely on a bottom-up approach and be built on openness. Enhancing the impact of research and innovation and connecting people to European R&I are at the core of all missions.

→ Excellence must be the primary selection criterion across the whole FP9, missions included. Based on **excellent science** the missions must be designed to foster collaborative research, thereby creating genuine EU added value and large-scale impact.

→ Collaboration will be based on **cross cutting, cross border and multidisciplinary research** with a mixture of policy elements. This will support the change of the global operating environment and the network of the world's best innovation ecosystems with the world's most excellent research centres.

→ Missions should be **bottom up**; the open nature of bottom-up research allows researchers and innovators the freedom of thought that leads to solutions to global challenges and identifies new emerging topics. Open calls create the right conditions for **serendipity**.

→ To be successful, any R&I missions must realize the 'knowledge triangle' by **bringing research, education and innovation together**, and fostering the links among them. The **knowledge triangle** can serve as a catalyst for a successful co-creation of R&I missions. Implementing the missions will not be possible without interaction and the right balance between research, education and innovation together with society and companies.

Missions need to be selected in a way that they will make a true difference in society – only then can we inspire and connect people to EU R&I. The Helsinki Challenge science competition is a model example of how mission-driven and impact-focused research is done at its best. The joint international initiative of Finnish universities could contribute in the implementation of future FP9 missions, acting as a tool to find and implement collaboratively ambitious solutions that will have a grand impact in society and future well-being globally by engaging all the EU member States in the mission-driven approach.

2. Beyond societal challenges –
missions from the Finnish universities

Universities Finland proposes **missions for FP9**. Each mission is supported by a number of research priorities contributing to the achievement of the overall goal – the mission. The list of research priorities contributing to the missions is not meant to be exhaustive, and the universities also acknowledge the need for an additional and appropriate policy mix to achieve measurable progress towards these goals.

HEALTH

Increasing healthy life years of Europeans by year 2050

How? Reducing diseases that are made worse by unhealthy lifestyle or lack of patient compliance (e.g Cardiovascular and metabolic diseases, neurosciences and addiction diseases) by 50 %; Reducing human error as a cause of adverse events in medical care by 80 %; Reducing cancer by 50 % by giving more efficient cancer therapy through personalized medicine; Fighting antibiotic resistance by designing innovative antimicrobial health materials; Improving significantly the quality of life of individuals suffering from mental disorders; Combining scholarships from social policy, sociology and gerontology, analysing older people's care needs, agency and equality as well as the changing character of care work in the context of transnationalisation and digitalisation of the ageing society.
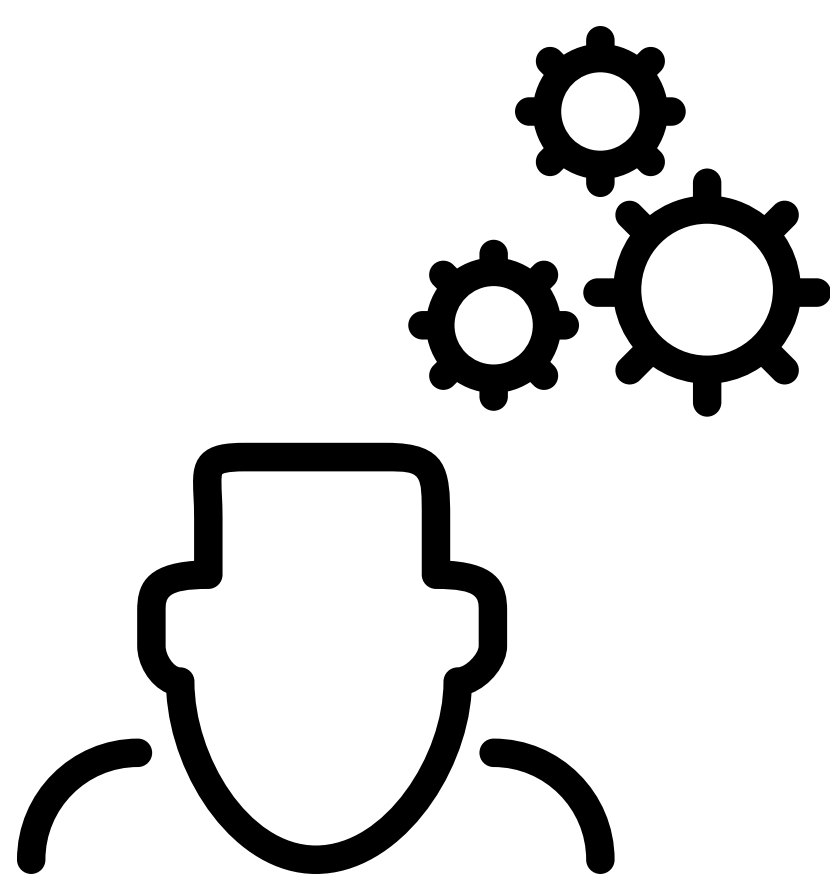
Understanding and enhancing the brain by 2030

How? Multidisciplinary study of the human mind which brings together psychologists, philosophers, linguists, speech researchers, neuroscientists, artificial intelligence researchers, anthropologists, arts scholars and the like; Understand brain changes across the life-span; Developing novel technology of brain imaging and data analysis; Exploit emerging data on brain structure and function.

Providing more novel health information by 2030

How? Combining existing genetic, health record and lifestyle data to produce breakthrough health innovations for the entire population; Providing novel digital health care records and registries, big data (including electronic health registries and clinical databases) and computational method development; To increase digital systems for improving the way of life of people; Enabling an active, full life at all ages by focusing on physical activity, sport, health and wellbeing in changing society and environments.
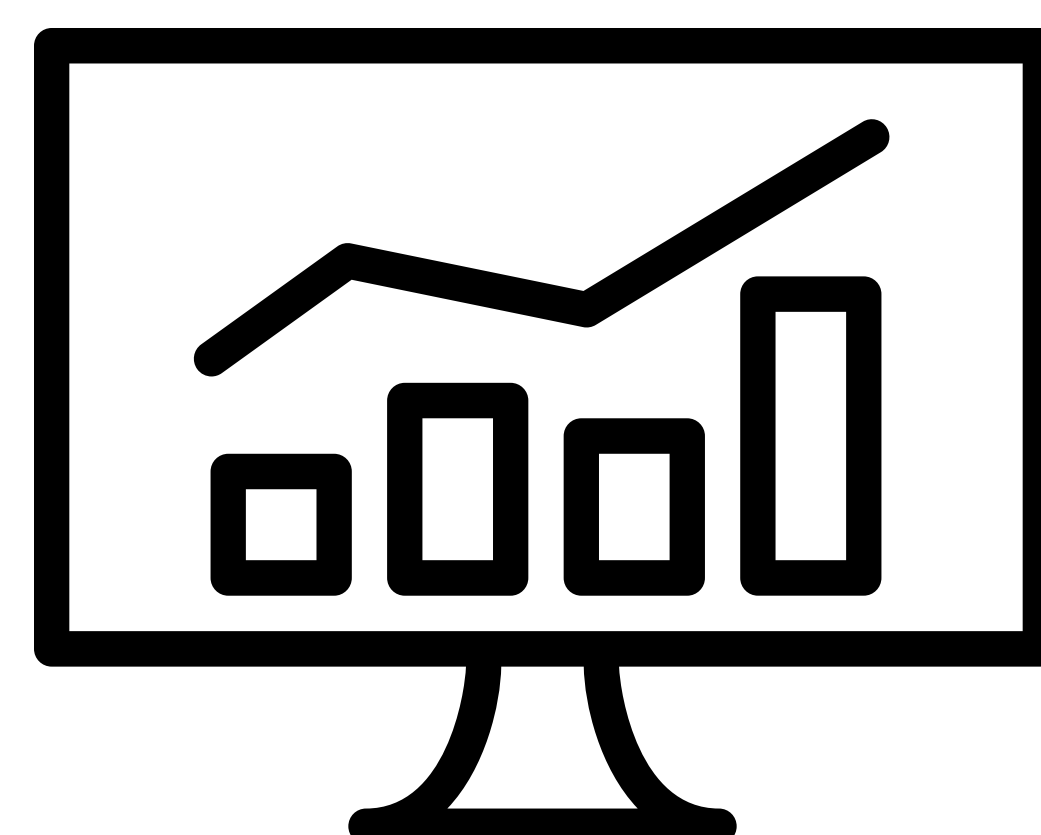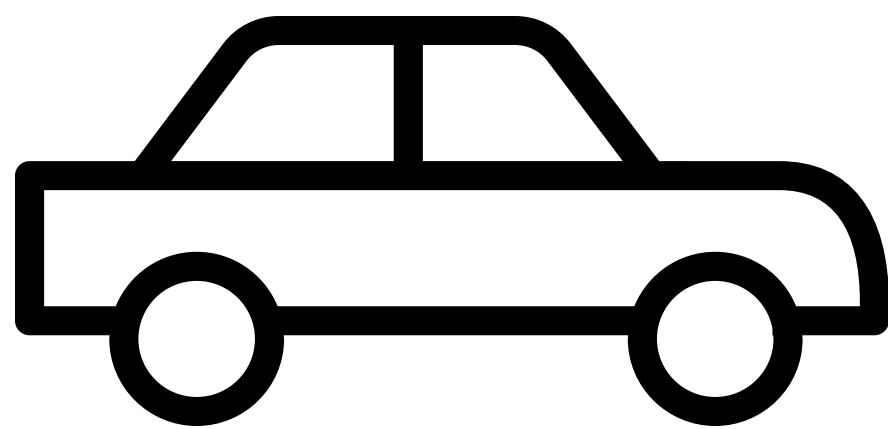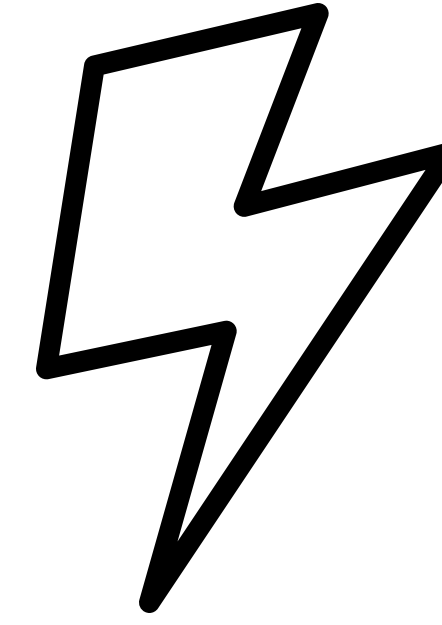
CLIMATE CHANGE, ENERGY AND MOBILITY

Zero-emission power generation by 2050

How? Carbon-free cities by 2030; Achieving a two-degree target by optimizing processes; Policy making and incentives; Zero-emission power generation by 2050; Global zero-emission energy models on an hourly basis.

Creating a zero-emission transport industry by 2035

How? Efficient and functional zero-emission transport sector (incl. cargo); Integrating transport to the circular economy; Greening transport requires behavioural shift in the industry.

Systemic sustainable wellbeing of people and societies by 2030

How? Exploring people's and societies' wellbeing from a truly systemic perspective that covers sustainable energy use, sustainable living environments and arrangements, sustainable services (including, where appropriate, co-evolution of technology and services), sustainable businesses, sustainable working life, sustainable ageing, etc. User involvement and co-creation with them and other stakeholders are keys to this multidisciplinary mission that is aimed at achieving a systemic understanding of how the different elements of sustainability co-evolve and co-impact wellbeing of people and societies.
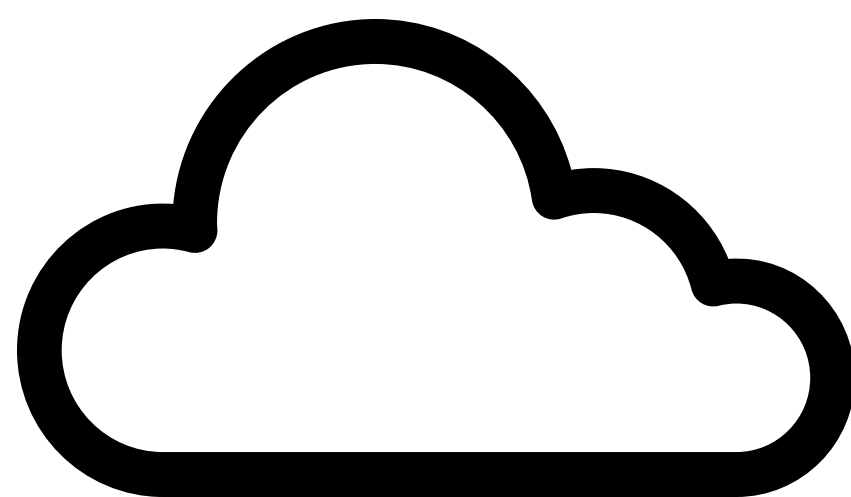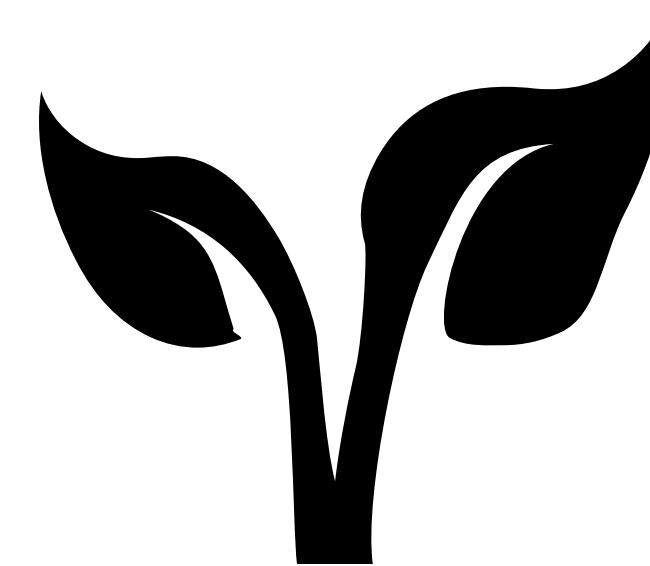
CO2 as a raw material – negative greenhouse gas emissions

How? CCU – collection of CO_2 from air, industrial processes and sea water; Clean hydrogen by clean electricity; Hydrogen and CO_2 based distributed production of fuels, plastics, materials, feed and food.

Global energy system, industrial process and emission modeling

How? Global 100 % renewable based energy model based on high resolution map of renewable resources (hydro, bio, wind, PV, nuclear); Producing steel in a sustainable way by 2030; Roadmap to 100 % renewable energy, transportation, industrial and agriculture systems; Economic and emission analyses to political decisions makers.
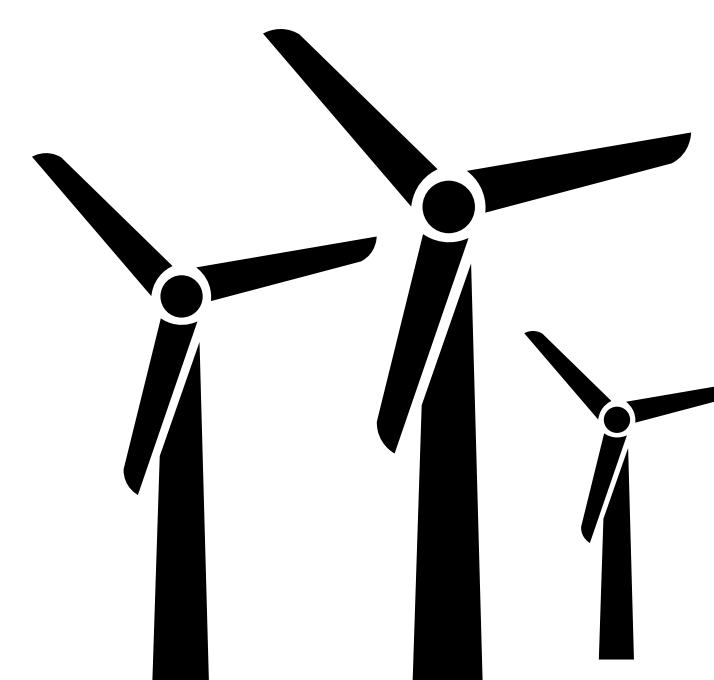
FOOD AND NATURAL RESOURCES

Establishing the Global Earth Observatory by 2030

How? Climate-change mitigation by resilient forest ecosystems, including in the Arctic area; Understanding and reducing natural hazards, quantify biosphere-atmosphere interactions and feedbacks in the earth system; Technological development for monitoring the status of the forest ecosystems and their carbon sink strength; Extensive platform for field surveys; Arctic ecosystem services, sustainable resource use, impact mitigation, viable communities, natural and societal responses, global change.
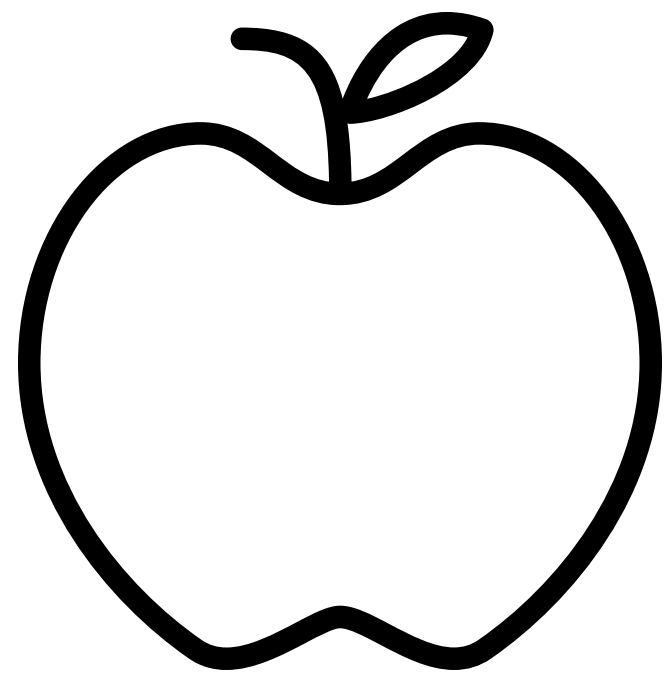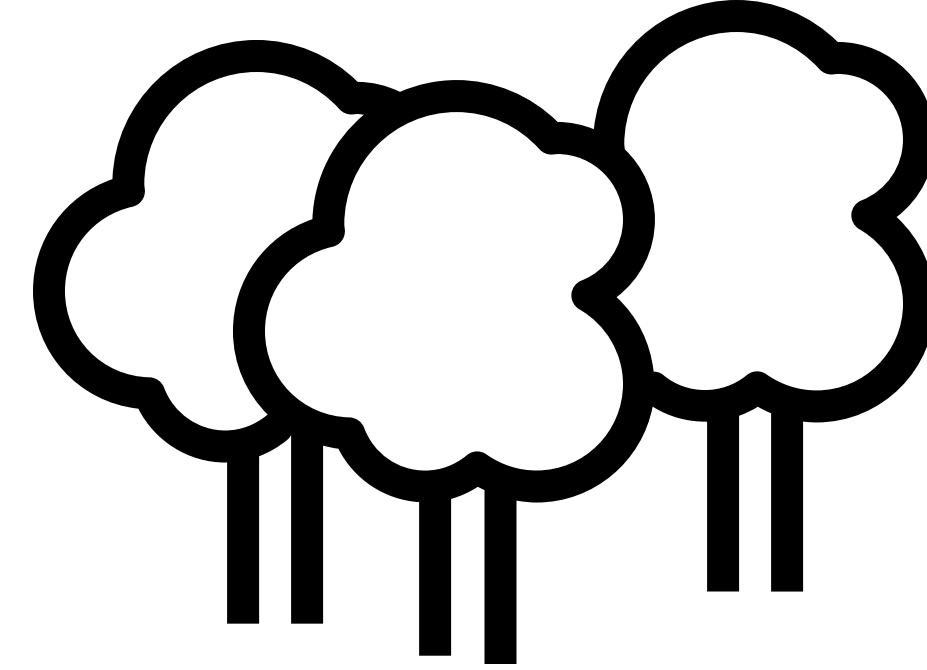
Creating sustainable Future Food Systems by 2035

How? Exploring completely new food sources, new growing/production methods, resource- and energy efficiency, spread of know-how; Urban farming and urban food production; Smart plants for cultivation.

Free the environment of nano- and microplastics by 2035

How? Transforming all plastics by 2035, at the same time freeing food from nano- and microplastics; Development of innovative biomass-based products to replace fossil-based products in the circular economy; According to some estimates, 10% of fossil-based plastics could be replaced by bio-based degradable plastics*; Enzymatic processes for utilization of biomass to produce fine chemicals; Microbial genomic research, discovery of new biosynthetic pathways; Biomimicry, Eco-design, waste management and policies regulating corporates and affecting consumer behaviour; Digitalisation of circular economy.
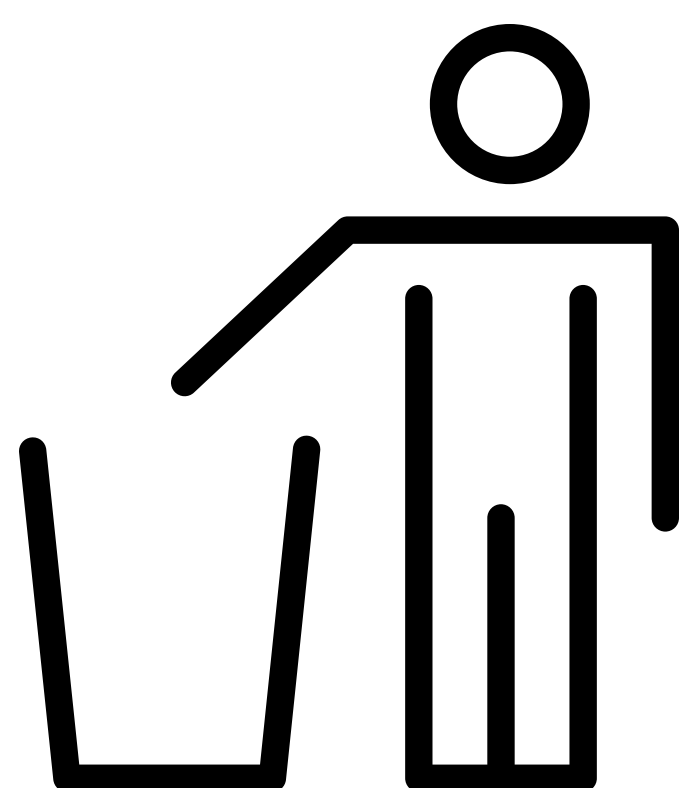
Getting into the loop – 50 % reduction of waste by 2030 – from waste to resources

How? Transmogrification of waste into high value products – research, which aims to acquire a systemic understanding of resource efficiency pertaining to critical metals and renewable biomass from European perspective.

DIGITAL AND INDUSTRY

Inclusive and human-centric artificial intelligence development to increase social trust in the systems and the society

How? Ensuring inclusive and human-centric development of artificial intelligence (AI), taking into account privacy concerns and security, and avoiding risks of manipulation and information stealing. Such trustworthy and dependable AI will increase social trust in the systems and enable wide applicability in the society. Also, making AI better understand the user will facilitate laypeople's abilities to work with robots and AI systems, and increase the ability of AI to augment human capabilities.

Energy internet – online management of system of systems

How? Online management system for billions of energy appliances and 100 % renewable based power production; Integration of energy systems and connectivity (5G & 6G, Internet of Things, AI); Power and cyber security; Power to the people.

Placing Europe at the leading edge of beyond 5G systems by 2030

How? Successful realisation and commercialisation of 5G; Rollout making 5G available in all urban areas by 2025; Enabling 5G and beyond -driven digitalisation throughout society, trials and demonstrations across vertical industries (e.g. health, energy, transport); Development of radio access network technologies, unlimited access capacity, signal processing and optimisation, radio frequency systems and design, ubiquitous wireless sensor systems, intelligent services and architectures; Ensuring data protection.

RESILIENCE AND SECURITY

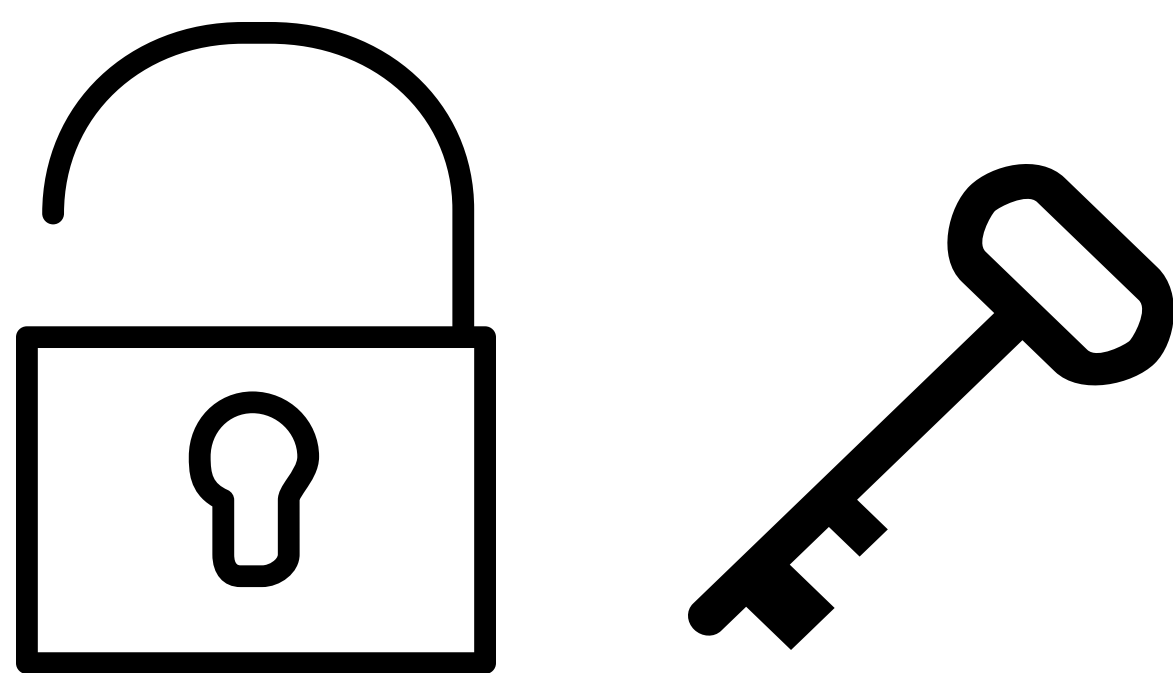## New skills for new era - Europeans as trailblazers by 2030

How? Creating a more resilient and innovative workforce able to tackle and find solutions to global problems and inequalities; Integrating creativity, arts and critical thinking in all education in order to produce effective problem-solving skills; Integrating entrepreneurial skills to all levels of education by 2025; Teaching digital skills and using digital learning methods at all levels of education; Artificial intelligence related skills; Investigating the role of life style factors and physical activity for health and wellbeing of young; Strengthening the quality and quantity of STEAM education; Understanding complex learning processes via multidisciplinary and multi methodological approach; Creating a sustainable and inclusive working life allowing flexible transition between different labour market positions by 2025; Creating new social innovations and service innovations, promoting well-being and social inclusion.
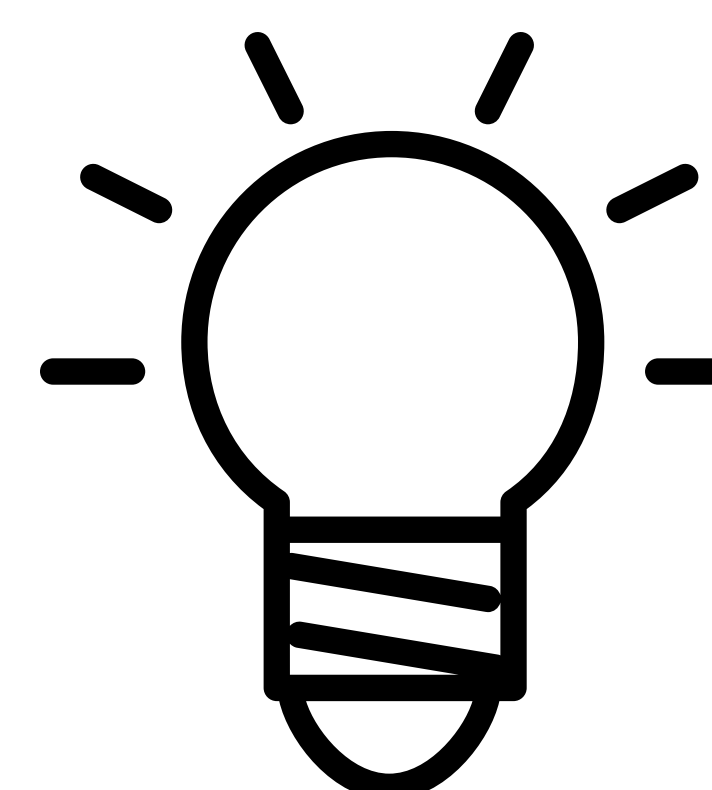
Designing democracy to increase equality and inclusion, wellbeing and business opportunities by 2030

How? Ensuring inclusion and equality, wellbeing and business opportunities through experience and service design. Design practices will advance from problem-solving to being human-experience-driven, which requires a radical change in society and industry. Art and design knowledge building will allow the development of new experience design approaches to make citizens, businesses and society flourish.

Solving crises, adapting to societal change

How? Bringing together research conducted in various fields of human and social sciences (history, politology, philosophy, social research, linguistics, ethnology) that has focused on studies of crises, continuity and change. Providing societies and communities with an understanding of phenomena that are significant to them. The root causes for crises and changes in society vary from ecological to man-made, (geo)political, and socioeconomic ones, and the consequences mostly appear as unpredictable.

Creating sustainable business and governance models that continue to support welfare states

How? Sustainable organizations, social responsibility and business disciplines; Developing a communication and media environment in ways that contribute to stable, secure and sustainable societal development by using AI, co-creation, technology-based and human interaction; Promoting dialogue, wellbeing and shared values and more interaction and safe & participatory communities – Religious and spiritual Europe in 2025; Active engagement of arts, design and creativity to create new social and service innovations as well as to promote inclusion and equality.
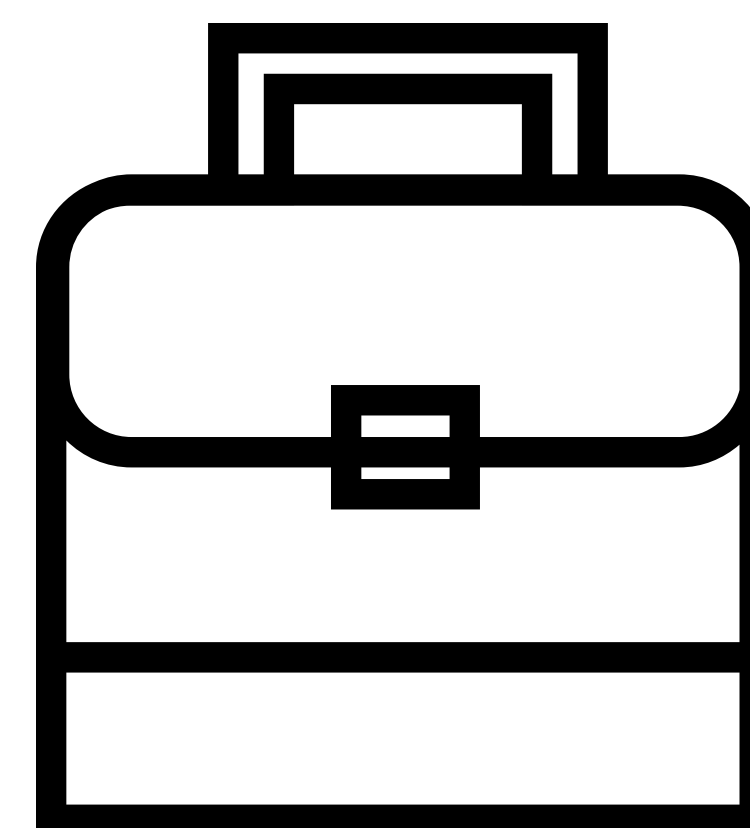
Facing the complexity of borders, mobilities and cultural encounters

How? Understanding European integration and the complex and contradictory process of globalization; Changing and reassessing the significance of political, cultural, and linguistic borders; Addressing the formation and characteristics of novel mobilities and encounters between people, ideas, and things; Studying sociocultural heterogeneity, cross-border interaction, and new forms of mobility; Enhancing understanding concerning alternative perceptions of space, political viewpoints, and social and cultural arenas; Developing novel methodologies and tools to approach and map emergent processes; Encouraging transdisciplinary frameworks capable of tackling with new phenomena; Developing co-research with other actors (third sector, general public).