



## Executive Summary

### Unifying Goal

The unifying goal of the FuturICT FET flagship is to integrate the fields of information and communication technologies (ICT), social sciences and complexity science, to develop a new kind of participatory science and technology that will help us to understand, explore and manage the complex, global, socially interactive systems that make up our world today, while at the same time paving the way for a new paradigm of ICT systems that will leverage socio-inspired self-organisation, self-regulation, and collective awareness.

FuturICT will bring together, on a global level, Big Data, new modelling techniques and new forms of interaction, leading to a new understanding of society and its co-evolution with technology. It will place Europe at the forefront of a major scientific drive to understand, explore and manage our complex, connected world in a sustainable and resilient manner.

FuturICT is motivated by the fact that ubiquitous communication and sensing blur the boundaries between the physical and digital worlds, creating unparalleled opportunities for understanding the socio-economic fabric of our world, and for empowering humanity to make informed, responsible decisions for its future. The intimate, complex and dynamic relationship between global, networked ICT systems and human society directly influences the complexity and manageability of both. This also opens up the possibility to fundamentally change the way ICT will be designed, built and operated, to reflect the need for socially interactive, ethically sensitive, trustworthy, self-organised and reliable systems.

FuturICT will create a new public resource - value-oriented tools and models to aggregate, access, query and understand vast amounts of data. Information from open sources, real-time devices and mobile sensors will be integrated with multi-scale models of the behaviour of social, technological, environmental and economic systems, which can be interrogated by policy-makers, business people and citizens alike. Together, these will build an information eco-system that will lead to new business models, scientific paradigm shifts and more rapid and effective ways to create and disseminate new knowledge and social benefits – thereby forming an innovation accelerator.

To realise this vision, FuturICT is organised into a number of closely interacting Focus Areas which will be introduced in Section 1.1.2. Given below are a high level overview of the research areas, the motivation behind the research and a plan of action to accomplish the FuturICT goal.

FuturICT will create a **“Planetary Nervous System” (PNS)** to orchestrate a high-level, goal driven self-organised, collection and evaluation of Big Data generated from sources such as social media, public infrastructures, smart phones or sensor networks. The aim is to create an increasingly detailed “measurement” and a better understanding of the state of the world. For this, the sensing concept used in the physical and environmental sciences will be combined with machine learning and semantic technologies and extended to social and economic contexts. The information provided by the Planetary Nervous System will fuel the development of more realistic, and eventually, global scale models that bring data and theories together, to form a **“Living Earth Simulator” (LES)** enabling the simulation of “what if ...” scenarios. The LES will reveal causal interdependencies and visualise possible short-term scenarios, highlight possible side effects and test

critical model assumptions. The “**Global Participatory Platform**” (GPP) will open up FuturICT’s data, models, and methods for everyone. It will also support interactivity, participation, and collaboration, and furthermore provide experimental and educational platforms. The activities to develop a “**Global System Science**” (GSS) will lay the theoretical foundations for these platforms, while the focus on socio-inspired ICT will use the insights gained to identify suitable designs for socially interactive systems and the use of mechanism that have proven effective in society as operational principles for ICT systems. FuturICT’s “**Exploratories**” will integrate the functionalities of the PNS, LES, and GPP, and produce real-life impacts in areas such as Health, Finance, Future Cities, Smart Energy Systems, and Environment. Furthermore, the “**Innovation Accelerator**” (IA) will develop new approaches to accelerate inventions and innovations. A strong focus on ethics will cut across all activities and develop value-sensitive ICT. Targeted integration efforts will push towards the creation of a powerful and integrated ICT platform that puts humans in the centre of attention.



*FuturICT will integrate different scientific areas and activities into a FuturICT platform that will enable participatory science and technology to manage our complex world in a sustainable and resilient manner.*

### Fitting the Flagship Call

FuturICT is a visionary and **ambitious** Big Science project requiring a **large-scale** and collective, **federated** effort of the European academic powerhouses, brought together to provide the necessary expertise and resources to achieve its unifying goal. FuturICT has a work plan of science-driven research ultimately to tackle global **societal challenges**. FuturICT is **interdisciplinary**, bringing together not only the core groups of ICT, social science and complexity science, but also a range of other fields such as economics, engineering and more, leading to innovations of significant **societal** and **economic benefit**.

To achieve European leadership, FuturICT will link Europe’s leading academic institutions and businesses to instigate the scientific and technological paradigm shifts needed to achieve FuturICT’s goal.

FuturICT capitalizes on three developments: the collection of Big Data of techno-socio-economic activities, the availability of previously unseen supercomputing power, and opportunities created by social media and socially interactive technologies. These developments will eventually enable the creation of a “Planetary Nervous System” to measure the state of the world in real-time, a “Living Earth Simulator” to study possible scenarios resulting from causal interdependencies between different processes and systems, and a “Global Participatory Platform” to allow people to solve problems collaboratively that are more complex than any one individual or team can handle. FuturICT will hence develop new science and technology to better manage the opportunities and challenges of our complex, connected world. FuturICT will also create new business opportunities through its new ICT paradigm, characterized by socio-inspired ICT, a co-evolution of ICT with society, platforms for collective awareness, ethical and value-sensitive design, and a whole new information ecosystem fuelled by FuturICT’s Innovation Accelerator, Global Systems Science, and Exploratories.

FuturICT is in perfect alignment with Europe’s Vision 2020 with its strong focus on innovation and socio-economic-environmental as well as health challenges, and also by supporting European Leadership. Big Data is the “oil of the 21<sup>st</sup> century”. As Europe is scarce of natural resources, it must build on ideas. Big Data and the ability to refine them can become Europe’s resource. Big Data is the perfect area of innovation for Europe offering new opportunities for small and medium-sized businesses, for self-employment, for an age of creativity leading to economic, social and cultural prosperity. FuturICT is committed to create an innovation ecosystem jointly with other initiatives such as the Climate KIC project, the Future Internet and the Open Data movement.