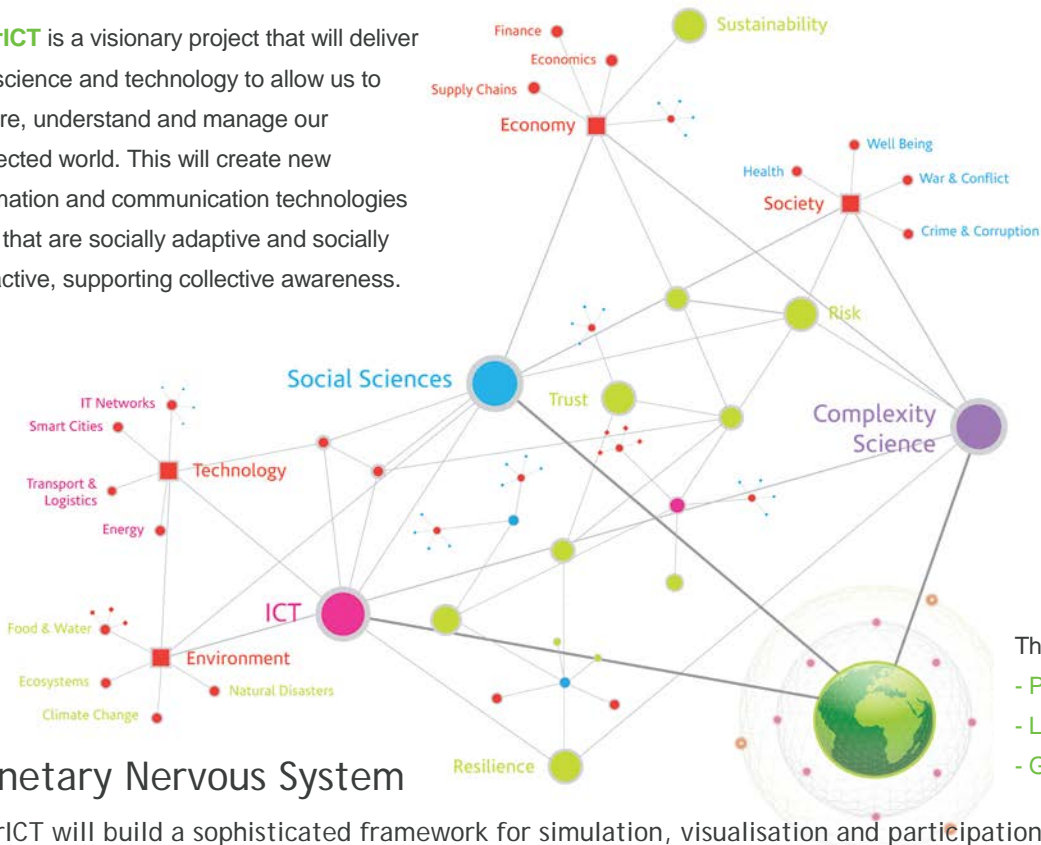




FuturICT is a visionary project that will deliver new science and technology to allow us to explore, understand and manage our connected world. This will create new information and communication technologies (ICT) that are socially adaptive and socially interactive, supporting collective awareness.



- The FuturICT Platform:
- Planetary Nervous System
  - Living Earth Simulator
  - Global Participatory Platform

## Planetary Nervous System

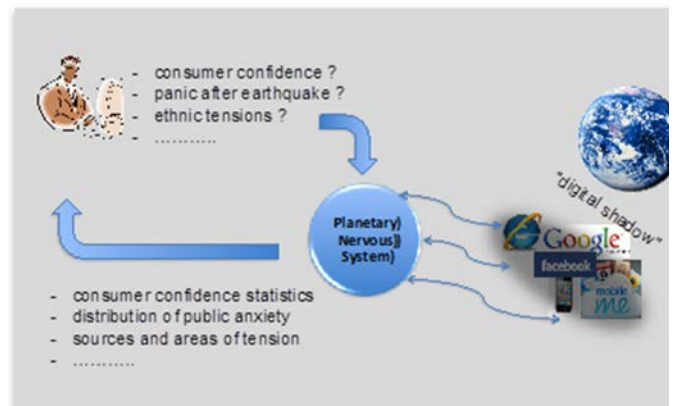
FuturICT will build a sophisticated framework for simulation, visualisation and participation, called the FuturICT Platform. A suite of models forming the Living Earth Simulator will power Observatories, to detect and mitigate crises plus identify opportunities in specific areas. These models will be driven, and calibrated, by data aggregated in real-time, which are gathered by a digital Planetary Nervous System. Both models and data will support the decision-making of policy-makers, business people and citizens, through a Global Participatory Platform which is intended to facilitate better social, economic and political participation. Exploring interactions among society, technology, environment and the economy will promote innovation.

## The Digital Shadow

One of the most profound impacts of the Internet has been in the instant, global availability of digital, archival information. Following that development is the trend towards real world events becoming instantly visible in the digital domain. Through digital news sources, social media (Twitter, Facebook, FourSquare etc.), online sensors and networked public infrastructure things that happen in the real world increasingly acquire a "digital shadow" in the global ICT system. This "shadow" is clearly neither an accurate nor a coherent or complete description of specific events. Instead it is a loose, often random collection of data items each somehow related to one or more events in the real world.

# Planetary Nervous System (PNS)

How to extract useful information from the digital shadow is a fundamental ICT challenge that will be addressed within the FuturICT project by the PNS. In short the challenge is to bridge the gap between high level queries like “what is the current level of consumer confidence” or “are there ethnic tensions within a certain area” and the **billions** of Tweets, news feeds, photos, mobile phone data streams, and infrastructure sensors within the global ICT system. To this end the PNS will build on recent work in areas such as Participatory Sensing, Reality Mining, and Extreme Citizens Science extending it towards global scale, interactive, self-organized data analysis driven by abstract high level goals and built around a privacy respecting, distributed bottom up reasoning:



1. **Dynamic self-organization driven by human understandable high-level goals.** To be truly useful the system must allow the user to enter queries that are meaningful to him and automatically organize the information search, collection, and evaluation. Thus, in essence, it must provide a functionality similar today’s internet search engines. However, where search engines deal with string matching on largely static, indexed, and organized (within HTML pages) information, the PNS must (1) interpret semantically complex queries, (2) automatically identify (and acquire) suitable sources of information within the billions of dynamically changing data streams in the digital shadow, and (3) autonomously select appropriate complex pattern recognition and reasoning algorithms to be applied to those streams.
2. **Global scale integration of heterogeneous data sources.** Much previous research in Reality Mining and Participatory Sensing concentrates on few, mostly statically selected information sources (e.g. mobile phones mobility data) and spatially and temporally constrained questions (e.g. daily traffic patterns within a city). The PNS will facilitate the analysis of data over different temporal and spatial scales including truly global questions and leverage any data source available: from YouTube videos through Tweets to mobile phone sensor data from volunteers. This poses fundamental challenges with respect to interoperability, data fusion, and reasoning as different levels of abstraction, reliability, and temporal relationships need to be reconciled.
3. **Privacy aware distributed, bottom up reasoning.** For privacy and practicability reasons the PNS will try to refrain from storing raw data. Instead the algorithms will be applied “on the fly” to the data as it will be aggregated and, where possible, only high-level conclusions will be propagated to the user. Significant advances in pattern analysis and reasoning will be facilitated by this vision.
4. **Incremental construction of a “self-awareness” like world representation.** While refraining from storing raw data the system will clearly need to retain some history information to simplify future queries and put results in context. The PNS intends to go beyond mere history towards the construction of adaptive, incremental models of the relevant social processes leading to “social awareness” of the system. How such awareness can be realized is an open, fundamental question involving the adaptation of human like cognitive processes to global scale, networked ICT.

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