

FuturICT



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<http://www.futurict.eu/>

My name is Steven Bishop and I am presenting this exciting proposal on behalf of Dirk Helbing and the many experts who have been involved our discussions so far.

Aims of FuturICT

Bring together the fields of ICT and social science

- to model our social system using
planetary scale simulations
- powered by a new
planetary scale data science
- to enable a paradigm shift to
data intensive policy making

so we can manage our new global society in a sustainable manner.

The aim of the proposal is to bring together the fields of **ICT** and **social science** producing advances in both - Hence it represents **Future ICT**

As Dirk has highlighted in previous presentations - it is clear that many of our problems stem from the global interaction of a wide range of systems.

To understand these complex interactions, we aim to build **planetary scale models** of our social system, and fully integrate interactions with economic, technological and environmental systems. Hence we shall involve leading experts from all of these areas bringing them together to develop models that will advance our knowledge of **complex systems**. These models will be powered by a new **planetary scale data science** which will allow us to acquire, manipulate and make sense of massive volumes of real-time data, where the volume of data in question will be orders of magnitude larger than anything previously encountered.

Importantly, we aim to use this to enable a paradigm shift to **data intensive policy -making**, which we believe is urgently required for us to manage our complex global society in a sustainable manner – and therefore this is a also **Futurist** proposal – so both pronunciations work.

Springing from these main aims we will see a significant value-added component with **demonstrators** in various areas creating an **innovation economy**.

Interactions with social science will run through all aspects of the project raising awareness of this important area.

Scientific advance:
Planetary scale simulation

Build planetary scale models of our social systems



including their interaction with economic,
technological and environmental systems

Picture credit: Martin Austwick (central graphic)

To understand these complex interactions, we need to build planetary scale models of our social system, and fully integrate interactions with economic, technological and environmental systems. Hence we shall involve leading experts from all of these areas.

These models will be of much greater scale and scope than anything that has gone before.

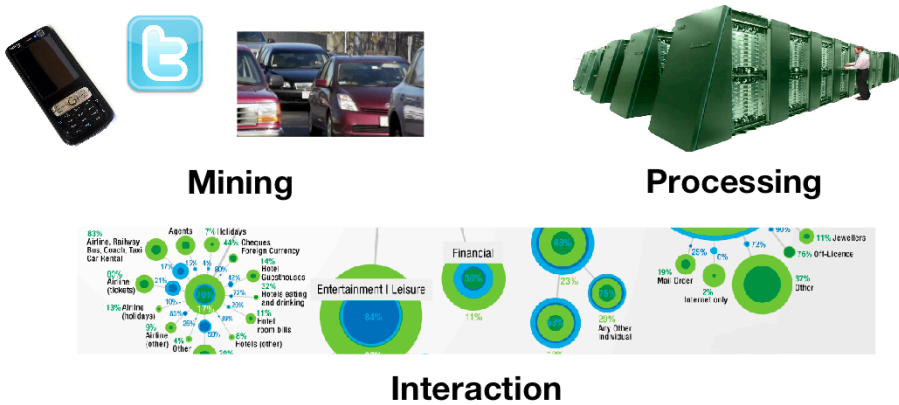
To enable real-time decision making, they will need to incorporate and react to, real-time data.

They will also need to fully embrace the concepts and techniques of recent advances in complexity science.

Technological advance:

We need real-time data of massive size and scope.

Technological challenges lie in three key areas:



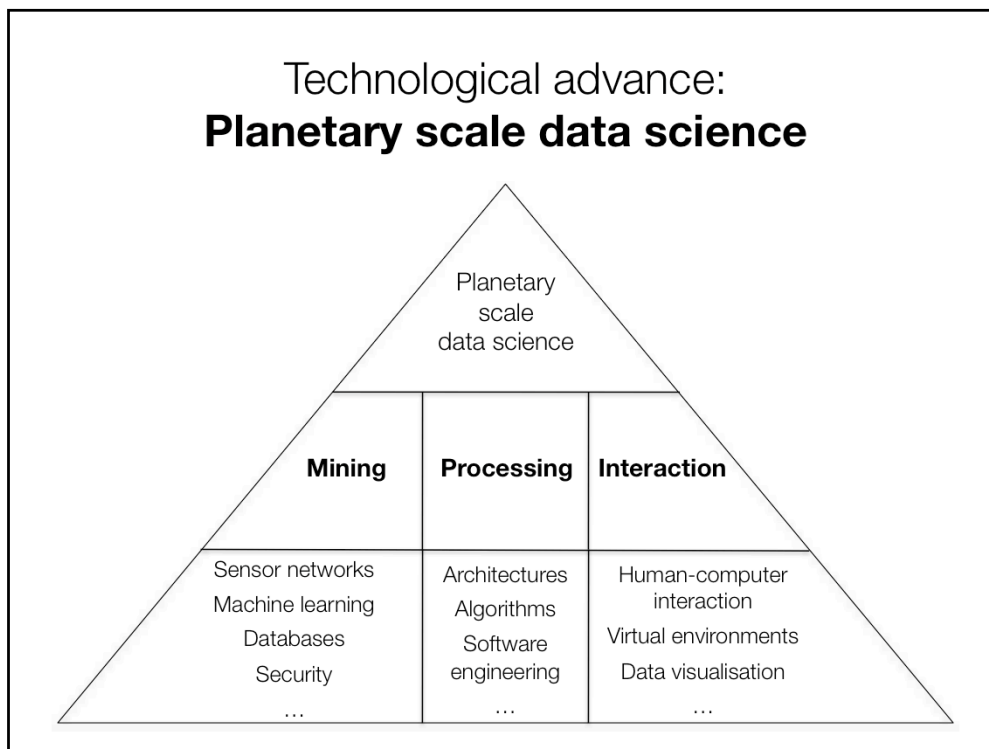
Picture credits: Argonne National Laboratory, Gareth Holmes, GDS Infographics, unnaturalcauses.org

The creation of such massive models, with real-time data from different sources, requires advances in three key areas.

Firstly, we must vastly improve our ability to mine this data. A core challenge lies in federating data from a wide range of sources, such as infrastructure sensors, sensors in mobile devices, web pages, search engines, online social networks and so on. Furthermore, it is also crucial that we make this data available in real-time.

Secondly, we must develop architectures which allow us to process this data.

Thirdly, we must develop technology - transforming this data into **information** which humans can act upon and use as the basis for decisions.



Research in these three areas will drive further advances in a wide range of sub areas within computer science.

For example, advances in data mining will require advances in sensor networks and machine learning,

advances in data processing will require advances in architectures, algorithms and software engineering,

and technological advances will be required in data visualisation - Plus graphical techniques for developing serious games and virtual environments.

To help – we shall be collaborating with at least 4 supercomputing centres.

Perhaps we should note that for this forum we focus here on gains in the core ICT areas but we shall also be advancing our knowledge of social systems.

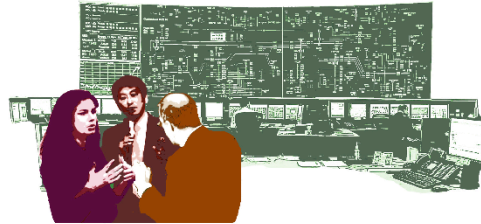
Paradigm shift for society:
Data intensive policy making

**Tools for detecting
upcoming crises**



Mining data and model output
for early warning signs

**Tools for data-based
policy exploration**



Multi-scenario policy exploration
for policy makers
and for citizens

Through these advances in science and technology, we will be in a position to achieve the core goal of the project - a paradigm shift in policy-making to a new data intensive, knowledge aware approach.

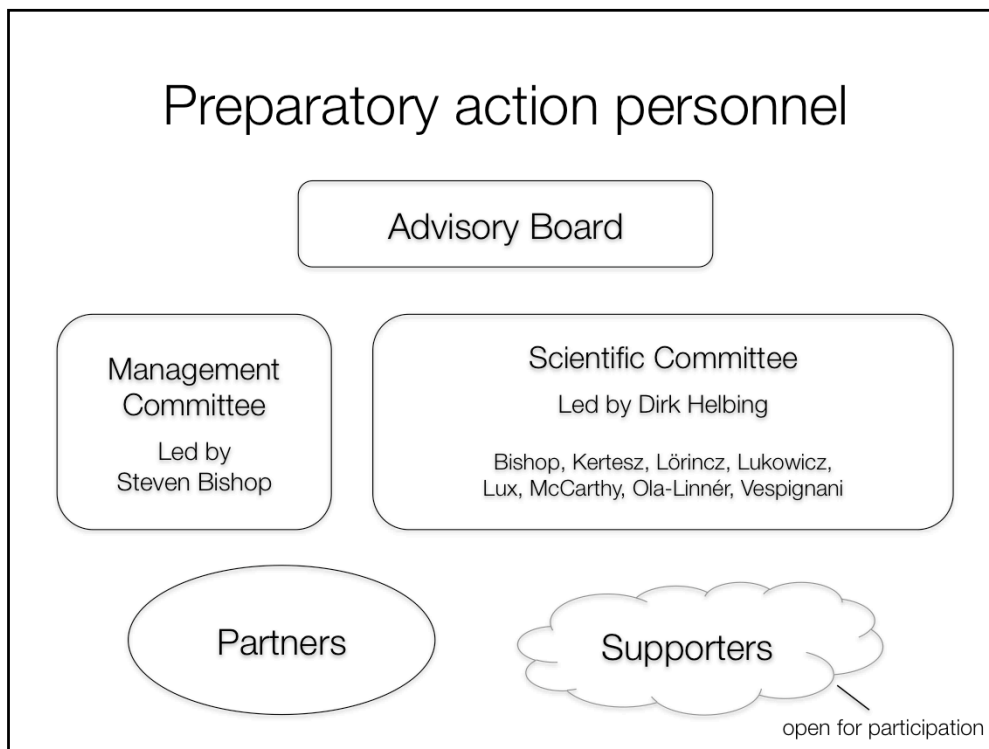
We envisage two core strands within this approach.

Firstly, we seek to create tools which allow us to mine the data collected and search the output of our models for early warning signs of crises, whether these be financial, environmental, health related, or otherwise. Through early detection we will be in a better position to avert or at least mitigate such crisis events. So the proposal will lead to a crisis relief project.

Secondly, we aim to build a series of linked centres that will be multimedia arenas to support the policy-making process. People will be able to explore the implications of different scenarios allowing us to assess levels of uncertainty. These centres can also be used for crisis management and public engagement.

We will consider a range of areas – our demonstrator areas - including the economy, the environment, city design, transport, security, health and education, with a particular focus on innovation.

However, the project will also focus on making these models and this data available to citizens via online interfaces – so we will need to create technology that reduces the size and complexity of our arenas without loss of functionality.



The CSA will develop a strong and focused network of scientists to address these challenges. Meaning computer scientists and social scientists but plus experts from economics and all the connecting topic areas.

This slide shows the organisation of the people involved.

The action will be overseen by an Advisory Board. There will be several meetings held within the year to capitalise on their knowledge.

Underneath the Advisory Board will be two key committees. One of these will be focussed on management of the project, and the other will be focused on scientific issues. The scientific committee will be composed of the work package leaders.

There will also be further committees focusing on ethical issues, conflict resolution, training and mobility.

We will remain open to views from outside.

Preparatory action work packages

Scientific program

- Models and data
- Tools
 - Crisis detection
- Policy areas
 - Economy, environment, civil design, security, health, education, innovation
- Ethics

Management

- Project coordination
 - Coherence and collaboration
 - Funding
- Stakeholder liaison
 - Policy makers, business, NGOs, other EU projects, beyond Europe
- Dissemination and inclusion
 - Internet and media
 - Exhibitions

This slide shows the organisation of the work packages -

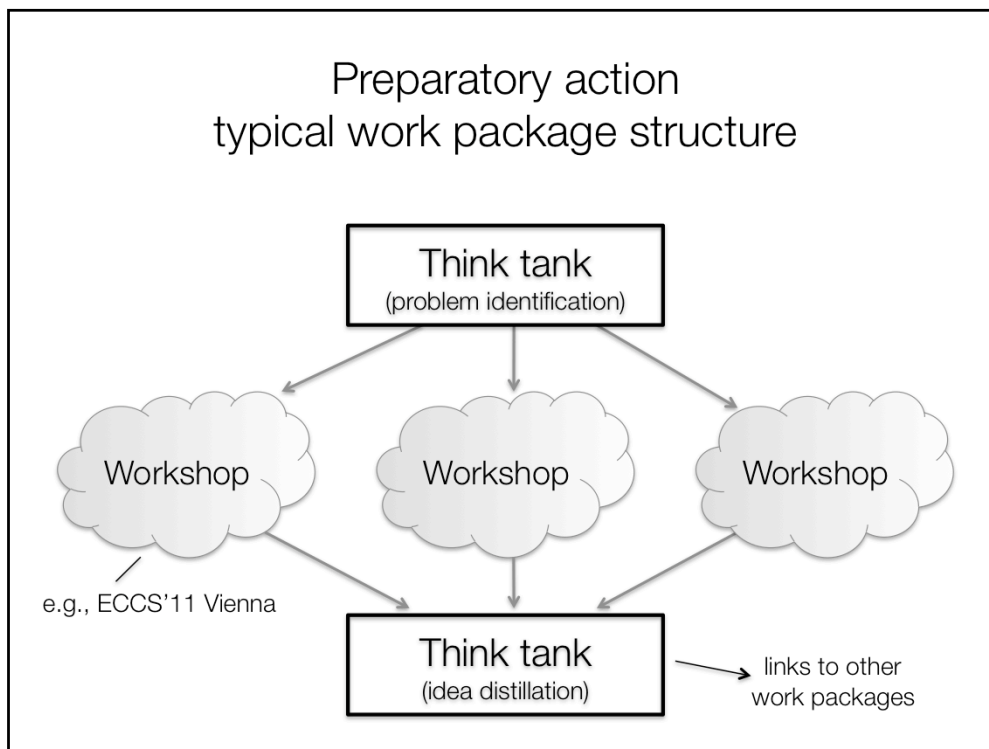
There are four main scientific work packages. This will allow us to focus on

- 1) the development of the planetary scale comprehensive models and the planetary scale data science required to support it;
- 2) on development on crisis detection and exploration of policy tools to mitigate again such events;
- 3) on the application of these tools in a variety of policy areas.
- 4) and on understanding and addressing issues of ethics and privacy.

Within the three management work packages, we will focus on

- 1) internal project coordination,
- 2) liaison with stakeholders from business, government and beyond,
- 3) and finally, dissemination of the outputs of the project to the scientific community and wider public through a well established web presence and exhibitions involving the help of artists to explain and explore this work.

Views from supporters and others will be both welcomed and sought.



The organisation of a typical work package will proceed roughly along these lines.

Each work package will begin with a think tank of experts from our list of partners to distill or amplify the core challenges for that work package and identify additional key people that we need to contact.

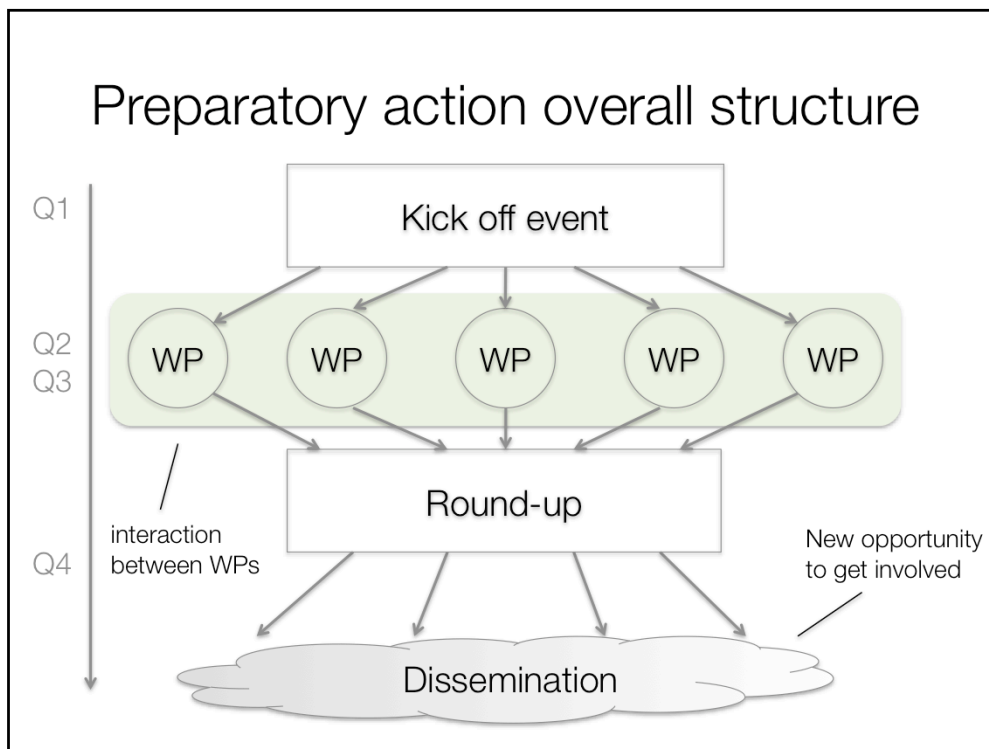
A range of workshops aiming to develop thinking around the core areas will be arranged which will allow other interested academics and representatives from business, government and indeed the general public to have their say and mould the final proposal.

We are planning that some of these workshops may take place at the European Conference on Complex Systems in Vienna next September.

A final think tank will bring together ideas developed in the various workshops.

These ideas will be integrated into the final proposal, the writing of which will be completed during this final think tank.

Output from all events will be shared with other work packages at an early stage to ensure full integration.



We can now consider how this fits in with the overall structure of the project.

The CSA itself will begin with a large kick off event in Q1, to which all partners and supporters will be invited.

Here, coordination between work packages will be arranged. Integration between work packages will be facilitated by nominated representatives of work packages attending think tanks and workshops of **other** work packages, and passing information in both directions.

The work package process itself will take up much of Q2 and Q3.

In Q4, a round up meeting will be staged to integrate the conclusions of the various work packages and coordinate the final compilation of the proposal.

Final dissemination will include distribution of this work to the wider public, which will identify further opportunities for researchers to become involved in the project.

and finally ...

Thanks to Peter, Paul and Suzy for help with the slides

The Motion Box for the movie

Further technical details will be posted on the website.

My thanks to Peter Baudains, Paul Lukowicz and Suzy Moat for their help with this presentation – and thank for your time. If you have any questions or are interested in becoming further involved with this project, please speak to Dirk Helbing or myself. We are also collecting a list of supporters on our website, and these people will be the first group to hear about workshops and other progress within the project. If you would be interested in signing up we would be very grateful for your support.

We hope that this flagship will then set sail!

I shall end with a short movie file