

Improving predictions of the impact of policy measures through societal simulations: ICT powered decision support systems

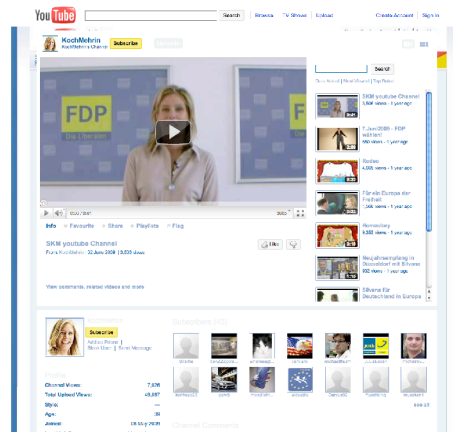
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My talk will consider how we might use simulations in a policy setting to support our decision-makers.

Communication has changed



We must embrace the fact that - the way in which we communicate our policy decisions - has changed ...

We started perhaps with the controlled governance of Luxor through to the more open, knowledge based forum of ancient Greece

but we are now moving away from a soapbox delivery to a more personalised, deskbox system.

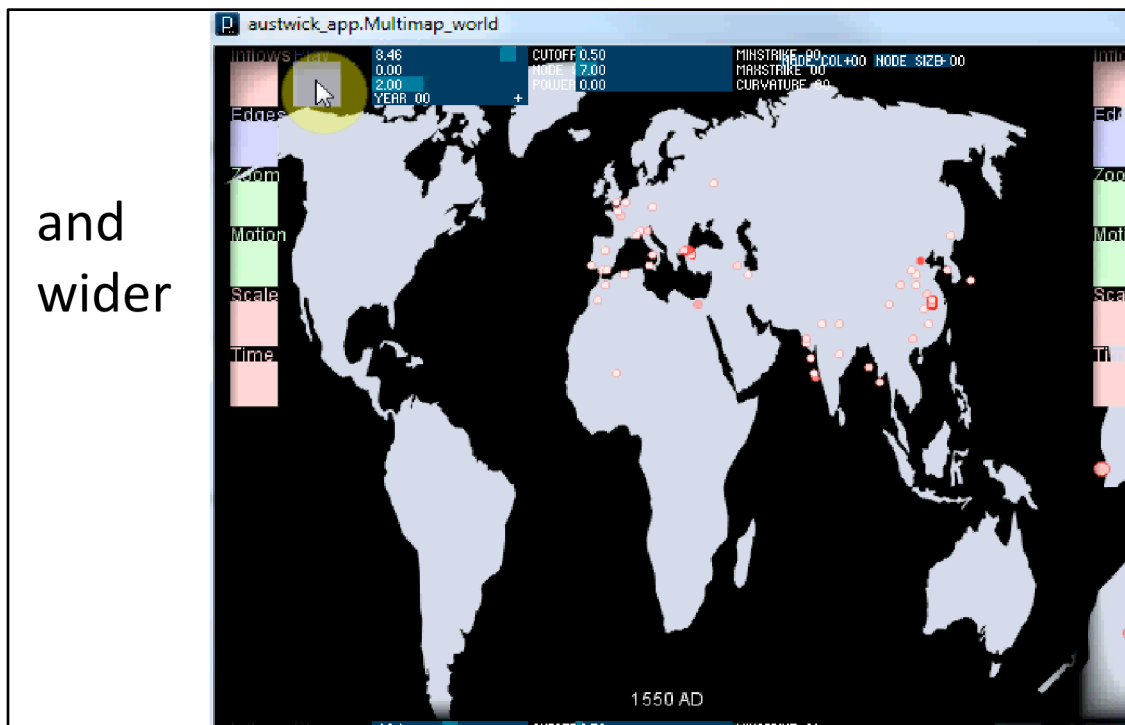
With information transmitted faster



We also see that information travels much faster than before.

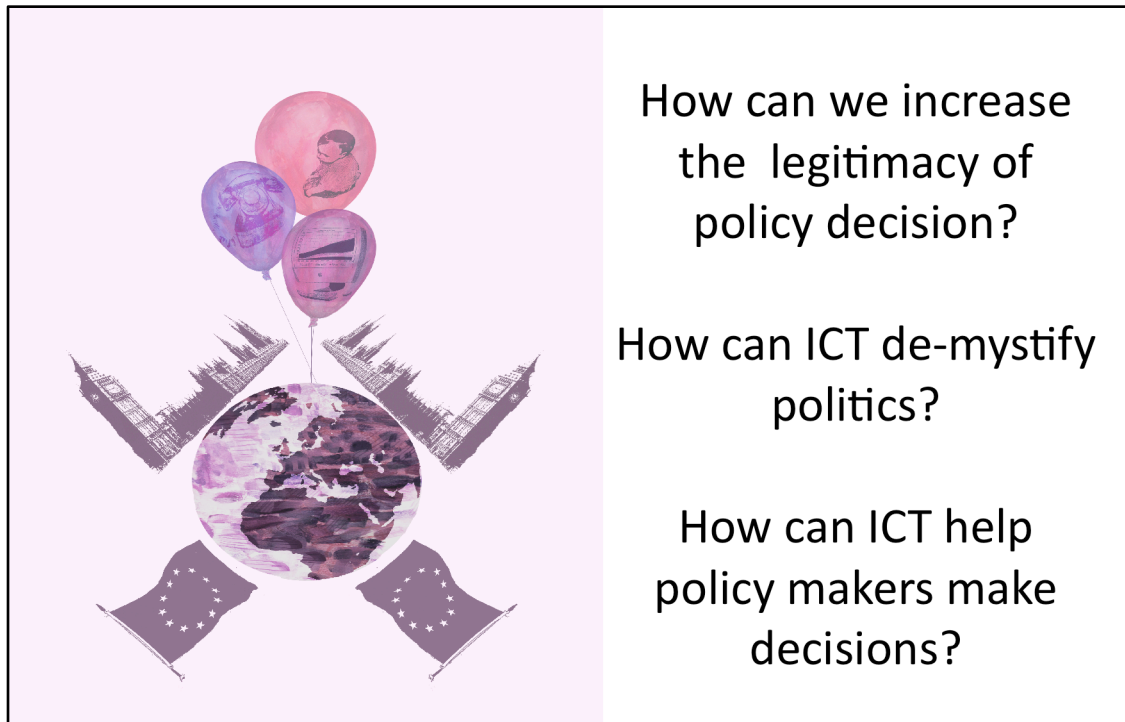
If you put 'sustainability' in the Google Search Engine then in 0.1 of a second you get access to over 30 million articles!

And much wider too with greater connectivity than before - illustrated here by the next graphic that shows connections between 50 of the Worlds largest cities in steps from 1550 to 2000. HIT NEXT SLIDE



And much wider than before with greater connectivity illustrated here by a graphic that shows connections between 50 of the Worlds largest cities in steps from 1550 to 2000.

It uses a 'gravity model' so that when the population passes a certain level connections can be made with other cities shown by red lines



How can we increase
the legitimacy of
policy decision?

How can ICT de-mystify
politics?

How can ICT help
policy makers make
decisions?

Turning to Governance in 2020:

- Policy-makers are under ever increasing scrutiny and pressure to make the right decision - even if it is not clear what we mean by 'right'. This warns us that we must also try to understand the social perception of the problem.

Faced with this, in complex situations we might ask how can we demonstrate the legitimacy of policy decisions?

Scientists can advise but this often leads to bias and controversy – for example recall the discussions from the IPCC recommendations or in the UK you might remember that we had our own spot of bother with our the Government drugs advisor.

Science can certainly aid decision-making but we need to find a way to deliver advice through the ICT.

Data

- Gathering
- Storage
- Open access
- Information exchange
- Analysis



One thing that we do have is data. Perhaps too much data in some cases – we might say that there is a data deluge – certainly we are undergoing a ‘data revolution’. We have advances in **data Gathering** from Mobile enabled devices, Social networks, Google etc all of which can be accessed in real-time.

We have advances In Storage – where data and models are now kept in the ‘cloud’.

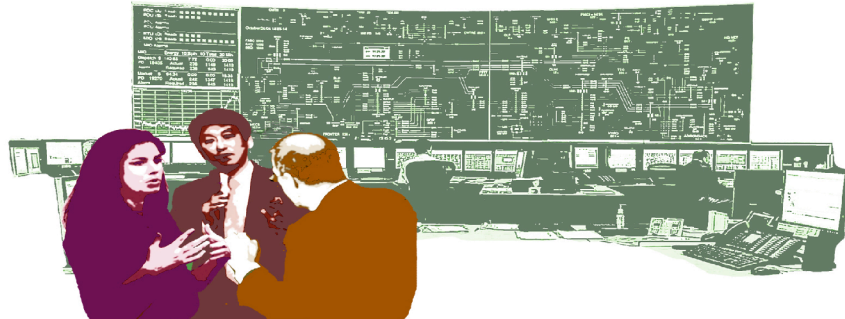
Data is becoming more accessible with Governments putting vast amounts of data online - for free!.

Meanwhile, organisations are beginning to share data and information – although this does raise privacy issues.

While for individuals Peer-to-peer systems and recommender systems are now being developed.

To help, great strides are being made in using super and grid computing for New mining techniques - Leading to a new concept of REALITY MINING

A Decision Space for Policy Makers



Place decision-makers in a strategy room equipped with real-time, integrated visualisations of social, economic and environmental changes in response to decisions.

Used for running scenarios of various events including shortages of natural resources (e.g. water) and crises (e.g. floods). Training of Advisors to government

The question is can we build planetary scale comprehensive models of our social system, powered by a new planetary scale data science which allows us to acquire, manipulate and make sense of such vast volumes of data integrating economics, social behaviour and our environment?

This is a big ask – but if we can then this would allow us to achieve truly data intensive policy-making, which I believe is urgently required for us to be able to manage our global society in a sustainable manner.

Also we could provide decision-makers with an ICT powered space to explore the parallel worlds from which they must select a specific path.

These spaces – decision theatres if you like – would have the added bonus of being able to be used for crisis management-centres for floods, earthquakes etc.

Some examples:

- CRITECH: Crisis Monitoring and Response Technologies (lunar.jrc.it/critech/)
- Decision Theater, ASU (decisiontheater.org)
- War strategy
- BBC crisis response

Of course examples of such systems do already exist but we now have the ability to this on a massive scale with centres in each major city linked to each other, the data and the models.

What is needed for Decision Theatres?

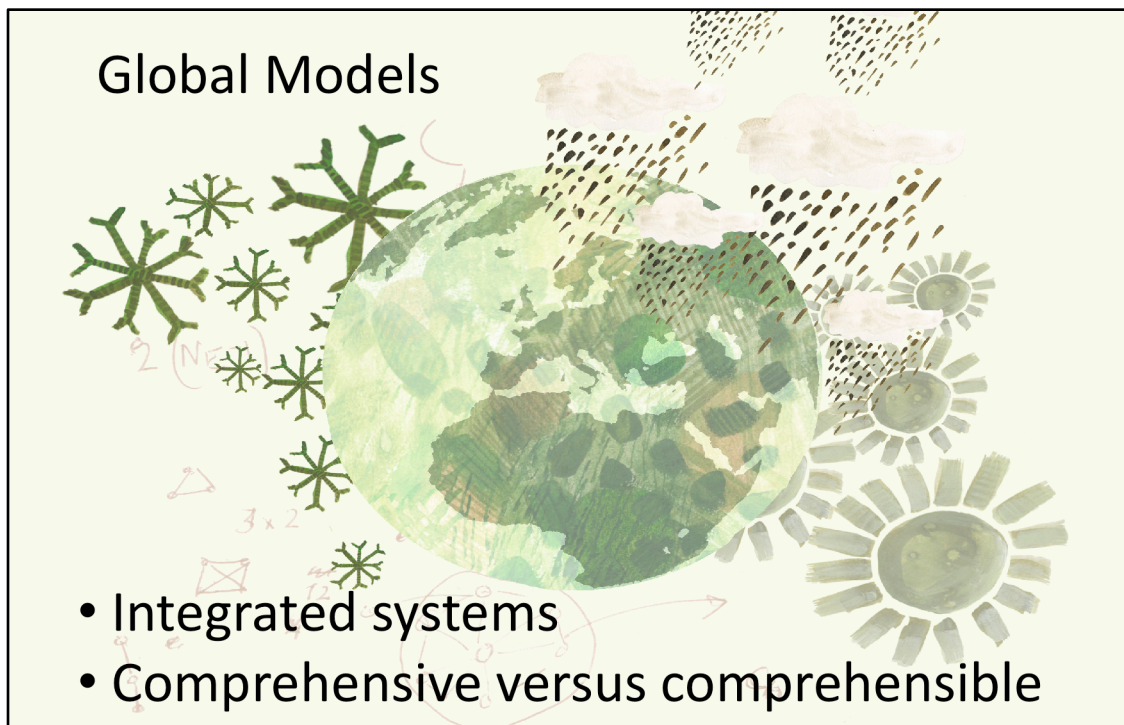
- Laboratories devoted to real-time gathering and processing enormous volumes of data on techno-socio-economic systems from sensors and CCTV as well as from natural systems, such as the Earth and its ecosystem, to detect early warnings of impending events.
- To combine synthesised data with complementary scientific models and simulations to provide policy makers with a visualisation of the global implications of their potential actions.
- Training guidelines for policy makers and their advisors

To create these decision spaces we need Laboratories devoted to real-time gathering and processing from different sources.

Armed with this we will be able to detect early warnings of impending events.

We need to combine synthesised data with complementary scientific models and simulations to provide policy makers with a visualisation of the global implications of their potential actions.

Another key point is that we need training guidelines for policy-makers and their advisors to provide them with the global systems viewpoint in order that they can make sense of these outputs and visualisations – in other words we need to adapt the policy process.



Picking up on two issues It is clear that a lot of our problems - such as the current economic crisis - stem from the global interaction of a wide range of systems. Models are needed of much greater scale and scope than before. The good news is that Global models can uncover previously unseen connections. These global models do not yet exist but in some areas, such as climate and energy for instance, scientists have certainly made a start.

What we need are integrated systems but we have to beware since the dynamics of so-called complex systems means that outcomes of the full system cannot simply be determined by the outcome of the sub-parts.

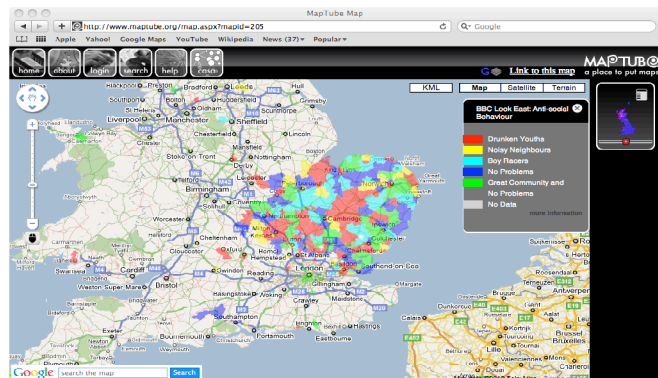
Models must be comprehensive to include all the elements that we need, for instance economics, health implications and so on, while being comprehensible, that is understandable at different levels. We will probably need a narrative description to go alongside the scientific, equation-based, explanations

Computational models of complex networks can be developed that are linked to data. It should also be possible to quantify the political dimensions to a problem and insert these within a model – but this is very much untried and needs considerable further work.

Visualisation



- GETOnline (www.chalmers.se/ee/getonline)
- VISmaster (www.vismaster.eu)
- Map Tube (<http://www.maptube.org/>)




Novel and innovative methods for visualisation of data and models are required. There are some good examples

For instance in the EC funded GSD project an interactive web model was developed which allows the user to select different conditions for the development of the energy system, such as CO2 storage, demand for energy and taxation levels.

A second example shown here, is the use of online data gathering and geographical display – in this case people were asked what were the major crime or social unrest problems in their particular neighbourhood. The red for instance corresponds to drunken youths, the yellow is noisy neighbours, and so on.

To get decision-makers used to the system, we also need demonstrators –: virus spreading – both physical diseases and damaging online viruses, Migration, Conflict, crime, terrorism - And my own particular interest in water delivery. Although if we really want to catch their attention a focus on services would be good.



Citizen Jury

- Dissemination
- Public understanding
- Legitimacy of policy
- Social inclusion

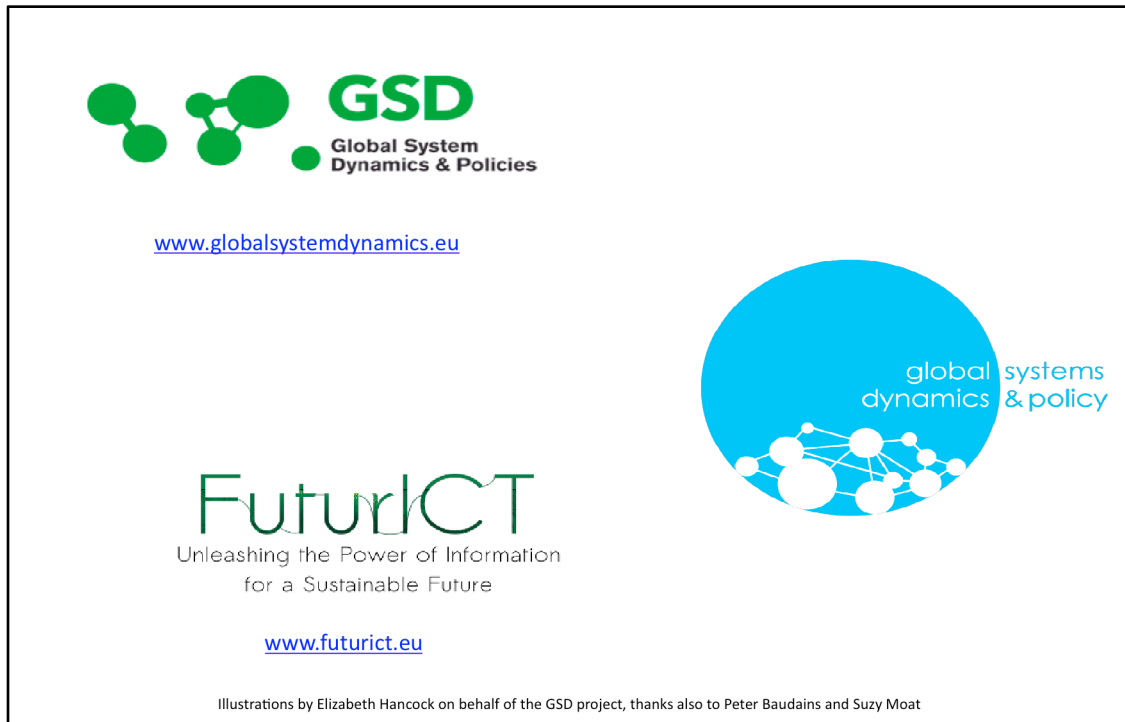
But there is a bonus.

This new kind of science can be opened up to the public via internet enabled tools.

If the public are able to view the same ICT tools as policy-makers - or at least a simplified version of the same tool – then this will increase transparency in the decision making process

This in turn will improve public understanding of key issues and hence provide legitimacy.

For non-connected citizens, this same exercise can be carried out in a series of physical events to improve social inclusion.



I mention here links to

GSD – Recently completed EC funded CA (see booklet)

GSDP – To continue the work of GSD start in October.

FuturICT – EU Flagship proposal

And in their absence offer thanks to my UCL collaborators Peter Baudains and Suzy Moat.