

# Can Europe Innovate its Way Out of the Recession?

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# Outline

- Key questions
  - Have we moved from a period of consumer-driven innovation to an era of socially-driven innovation?
  - How do we implement an innovation-driven strategy for economic recovery?
- Some old ideas
  - Economic crisis and long waves
- Some new (or renewed) ideas
  - Demand-side and creating a market friendly to innovation
  - Supply side, Grand Challenges and a research-friendly ecology

# The crisis debate

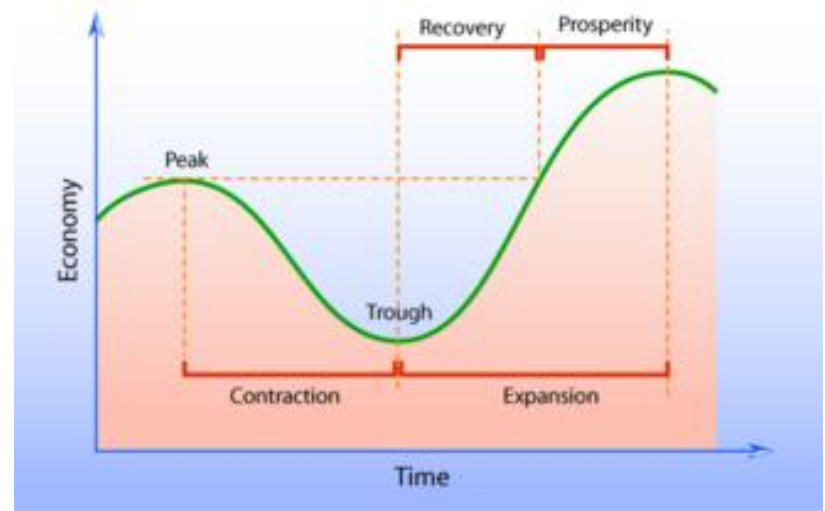
- Policy responses
  - Bank rescues, Neutralisation of toxic assets, Quantitative easing
  - Stimulation of demand through tax cuts and increased public spending
- Creating long-term debt that can only be offset by productivity growth
- Is there a choice between short-term bail-outs of poor or out-dated performers and stimulation of innovation and entrepreneurship targeted to sustainable growth?



# Business cycles and long waves

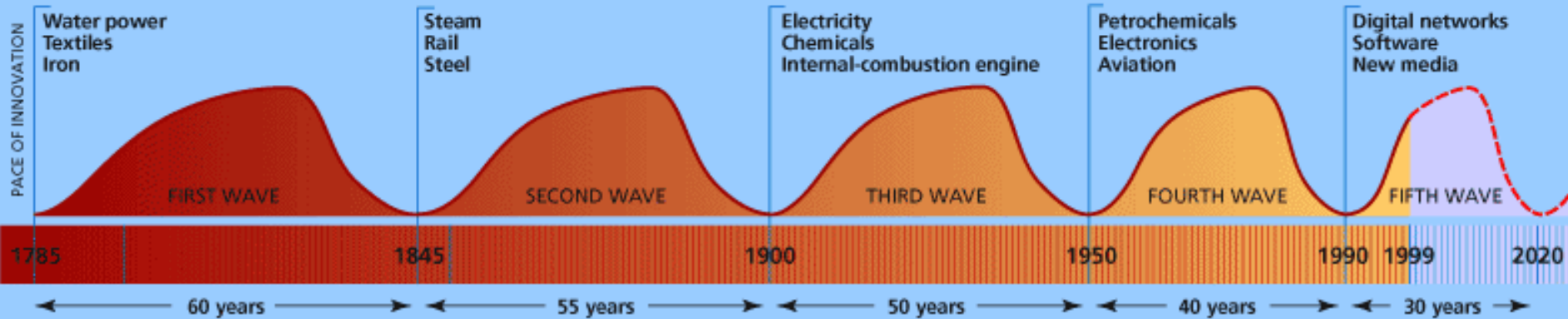
- During times of economic depression economists become interested in the phenomenon of long waves or business cycles
  - Concentrations of literature in the 1930s and 1970s
  - 19<sup>th</sup> century origins of concept but named after Russian economist Kondratiev who in 1925 proposed 50-year cycles across a range of economic indicators
  - Renewed impetus from Schumpeter's association of the cycles with clusters of innovations that drive growth until their innovative potential and entrepreneurial drive is exhausted
  - No satisfactory theoretical base or clear line of causality established in the literature

# Schumpeterian cycles



## 1 Surf's up

Schumpeter's waves accelerate



Sources of diagrams

[http://content.answers.com/main/content/wp/en/thumb/d/d2/330px-Business\\_cycle\\_01.png](http://content.answers.com/main/content/wp/en/thumb/d/d2/330px-Business_cycle_01.png)

[http://www.mega.nu:8080/ampp/corporate2\\_img/schumpeter.gif](http://www.mega.nu:8080/ampp/corporate2_img/schumpeter.gif)

# Drivers of diffusion

- Timing of innovation is not in itself of great interest
- Requires diffusion and uptake in the market to gain economic significance
- Often significant gap in time
  - Steam engine, electric motor, camera, computer, laser....
- Explanation for gap usually lies in the interaction of supply and demand
  - Post-innovation improvements gradually increase competitive advantage over substitute technologies and allow to overcome “lock-in” effects
  - Adaptations to new niches increase the potential market
  - Widespread use may require development of complementary innovations or infrastructure
  - May also be inertia in training and skills development

# Economic significance

- Rosenberg & Frischtak in 1984 in a generally sceptical review of the evidence for long waves identified conditions for a gaining major economic significance
- Backward linkages to buildings, machinery, raw materials and equipment causing innovations in “production goods”
- Forward linkages to innovations and price reductions in other sectors
  - eg the impact of ICT through productivity improvement in other sectors is much greater than the impact of the sector itself
  - Depends upon pervasiveness of the technology

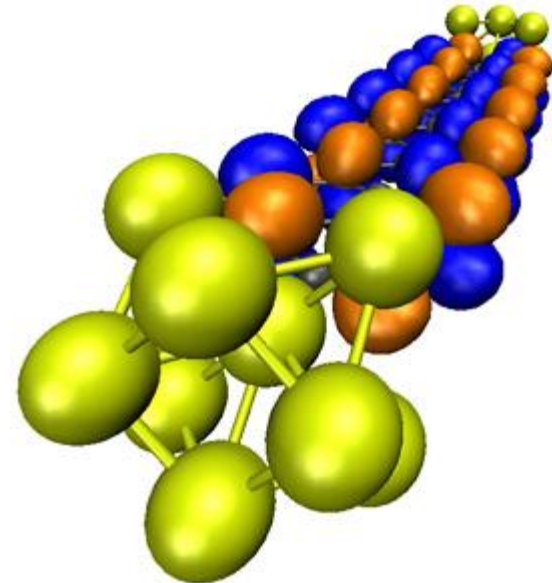
## Conjectures and reputations



- 1990 saw the start of a cycle based on software, digital networks and consumer electronics.
- Rise of Microsoft and Google and in Europe the strong performance of firms such as Nokia and Philips epitomise what was once called the “New Economy
- ICTs combined with deregulation enabled transformation of the service sector.
- Could the slowdown of this wave be an underlying feature of our crisis?
  - Certainly these technologies continue to have much to offer but perhaps at least with their present technological base they will drop off the leading edge as economic drivers. What then may replace them?

## Supply-driven view: Pervasive technologies

- One perspective is to look for the underpinning generic technologies which have the same quality of pervasiveness as silicon-based microelectronics and software engineering
  - Biotech in 4 colours
  - Nanotechnology



# Does nanotechnology meet the criteria of pervasiveness and economic, social and scientific challenge?

- UK Government Horizon Scanning Centre has just released its new *Sigma Scan*
- “*Evidence of the future*” gathered from 2000 documents and 300 interviews designed to challenge assumptions and spark ideas and presented in 250 structured documents
- Used as input to specific government foresight exercises across range of policy areas
- Also available to public in searchable format
- Categorised under Economics, Environment, Politics, Science and Technology and Society
- <http://www.sigmascan.org/>
- Search on nanotechnology brings up 38/250 topics

# Nanotechnology in the Sigma Scan – some key words

**R&D outsourcing**  
**Brazil scientific leader**  
**Chinese S&T**  
**Transdisciplinarity**  
**Nanowires**  
**Nanoshell**  
**Carbon nanotubes**

**Lighter vehicles**  
**Spacecraft**  
**Water purification**  
**Catalogue living species**  
**Synthetic chemical cells**  
**Personal fabrication**  
**Sensing applications**  
**Smart materials**  
**Programmable materials**  
**Room temperature ferromagnets**

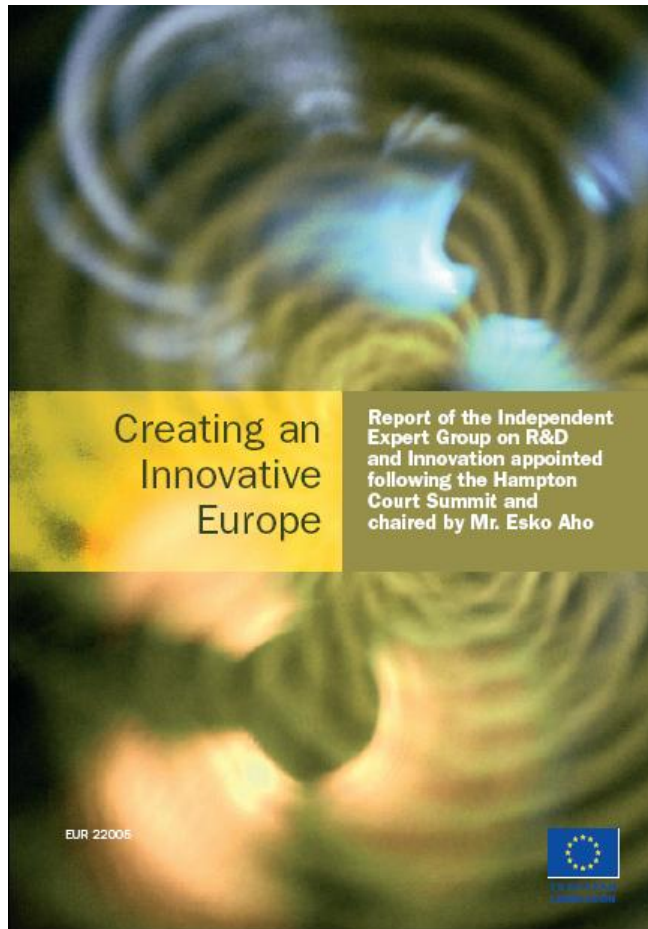
**Choosing, funding science**  
**Quantum materials & devices**  
**Synthetic biology**  
**DNA Microarray**  
**Oncology**  
**Understanding body and mind**  
**Drug delivery**  
**Extended self**  
**Obesity**  
**Complexity**  
**Online relationships and virtual sexuality**  
**Human behaviour**  
**A.I. Law**

**Dataservers**

# Demand-driven view: Societal challenges

- Principal challenges of our age include:
  - Sustainability and climate change
  - Energy security, Food security, Ageing society
  - Health, Migration...etc
- All have innovation as necessary and integral part of response
  - Technological, structural and social innovation
- Public service innovation notoriously difficult
  - Governments at all levels dislike taking risks, particularly when the rewards may come beyond the next phase of the electoral cycle
  - Citizens often fail to perceive the benefits of innovations
  - In search of a culture that celebrates innovation in general and socially-driven innovation in particular.

# Creating an Innovative Europe



***Three years ago a Panel of four mandated by Hampton Court Summit of EU leaders to report on Reinforcing EU Research and Innovation Performance in the Face of Globalisation***

[http://ec.europa.eu/invest-in-research/action/2006\\_ahogroup\\_en.htm](http://ec.europa.eu/invest-in-research/action/2006_ahogroup_en.htm)

# A need for action – some hard words

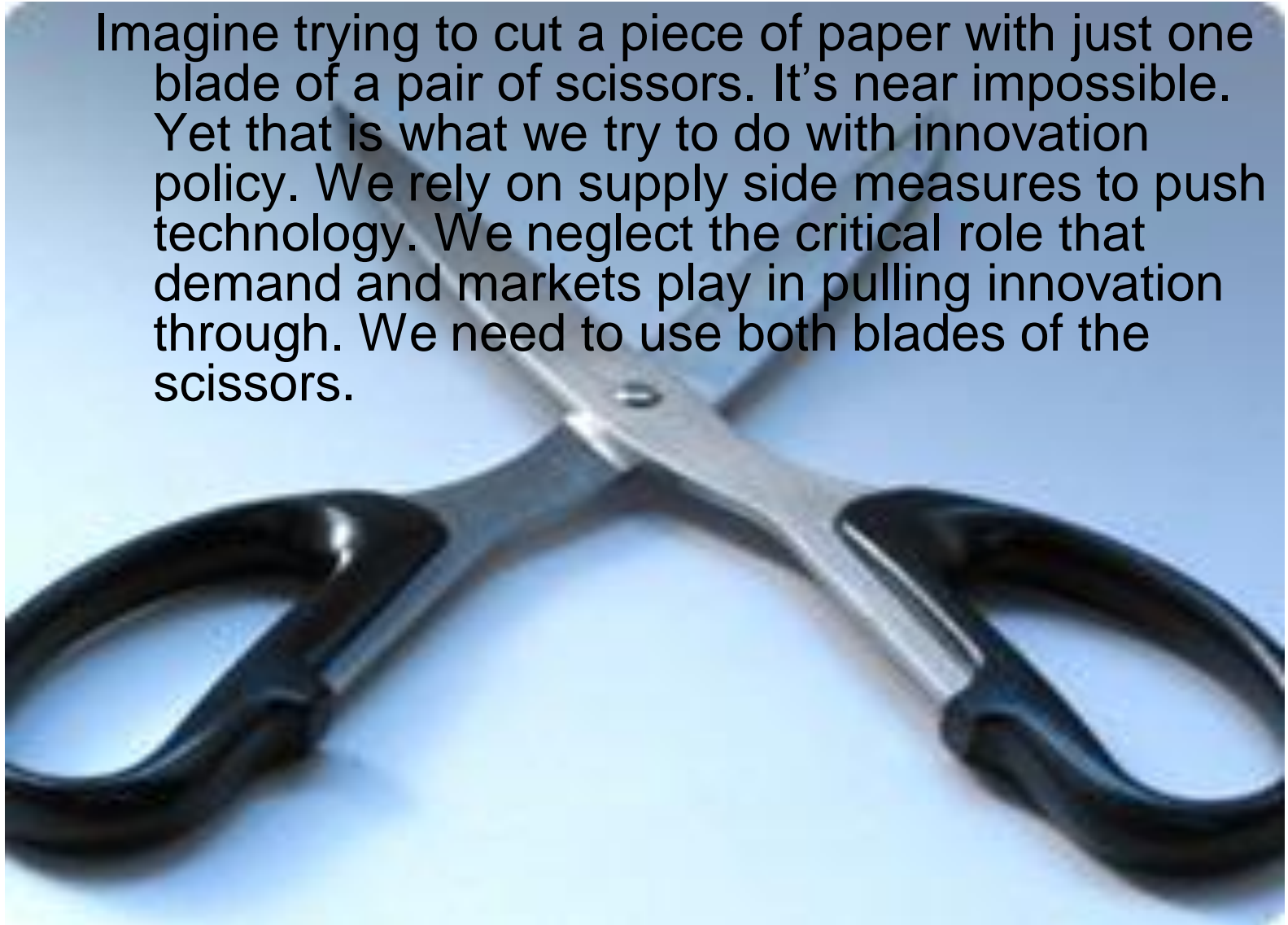
- Europe must break out of structures and expectations established in the post-WW2 era which leave it today living a moderately comfortable life on slowly declining capital
- There is a large gap between:
  - the ***rhetoric*** of a political system that applauds the knowledge society
  - and
  - the ***reality*** of budgetary and other priorities that have shown little shift in preparing to engage with it!
- **A final word.** The opportunity to implement the proposed actions will not be available for much longer. Europe and its citizens should realise that their way of life is under threat but also that the path to prosperity through research and innovation is open if large scale action is taken now by their leaders **before it is too late**

## 4-pronged strategy

- Simultaneous and synchronous actions are needed at all levels in:
  1. **Creation of a market for innovative products and services**
  2. Providing sufficient resources for R&D and innovation
    - Included specific call for major investment in nanotechnologies and smoothing path to commercialisation
  3. Improving the structural mobility of Europe
    - People, finance and organisational structures
  4. Building positive attitudes and a culture favourable towards entrepreneurship and risk taking

# Demanding innovation

Imagine trying to cut a piece of paper with just one blade of a pair of scissors. It's near impossible. Yet that is what we try to do with innovation policy. We rely on supply side measures to push technology. We neglect the critical role that demand and markets play in pulling innovation through. We need to use both blades of the scissors.



# Aho Group recommendations for innovation friendly market

- Ambitious lead market projects - *strategic areas*
  - eHealth, Pharmaceuticals, Energy, Environment, Security, Electronic Entertainment and Content, Transport and Logistics
- Harmonised regulatory environment - *anticipate needs*
- Ambitious use of standards-setting power - *reorganise processes*
- Intelligent use of public procurement - *more proactive*
- Globally competitive intellectual property rights system - *overcome the impasse*
- Fostering a culture that celebrates innovation

Basic recommendations accepted and one response has been a new Lead Markets Initiative from the European Commission

Remains a gap between acceptance of diagnosis and effective action on a sufficient scale

# Aligning the research system... ERA Rationales



Challenging Europe's Research – Rationales for the European Research Area is at [http://ec.europa.eu/research/era/pdf/eg7-era-rationales-final-report\\_en.pdf](http://ec.europa.eu/research/era/pdf/eg7-era-rationales-final-report_en.pdf)  
 L.Georghiou, Europe's Research System Must Change, Nature Vol 452 24 April 2008

## Key points

- Maximise value contributed by research to Europe's economic, social & environmental goals
- Switch thinking about research system from remedying deficit to seizing opportunity

# Three interlinked core elements

- Engage research system in Europe's response to a series of **Grand Challenges**
- Develop a **research-friendly ecology** to allow actors and institutions to work together in productive networks
- Achieve a step-change in the quality of dialogue and linkages between supply and demand for research to **re-orientate strategic and applied research in close support of policy and regulation** at EU level

# 3 types of Challenge



## 1. Economic challenges

- correspond to the agenda set out by the Aho Group need to engage business through a combination of supply-side measures for promotion of RTD and demand-side measures to create innovation-friendly markets

## 2. Social and environmental challenges

- causes and consequences of issues such as climate change, food and energy security and the ageing society
- initial drive will have to come from governments.

## 3. Science and technology

- collective ability to respond to opportunities in frontier research

Must be relevant, feasible and have research dimension

# Socially driven Challenges require new process of response

- Types 2 and 3 are both socially-driven
  - Will not occur unless impetus comes from governments at the highest level and from a European perspective – acting in a collective and coordinated mode
- To move forward need
  - New kind of political process combining bottom-up and top-down
  - Targeted foresight to bring together socioeconomic demand and innovation potential
  - Both incubator and lobby
  - At top-down level need capacity to mobilise resources very quickly – a dedicated fund
  - Kuhlmann's Policy Platforms
- Basic recommendations accepted by Ministers and now part of ERA Vision

# Transition and linking supply and demand

- How to transfer to more sustainable modes of development
  - overcome lock-in to dominant sociotechnical regimes
  - Put in place infrastructures and policy/regulatory frameworks
- Critical role for users and link to demand-side innovation policies
- Building constituencies including researchers
- Coordination, engagement and building the capacities and incentives for users to play a major role in the process
- Embedding in a Grand Challenge initiative more likely to succeed?

# Conclusions

- Supply-side policies needed to ensure pervasive technologies available with the potential for radical solutions
- Demand-side policies needed
  - to create market friendly to innovation in private and public goods and
  - to foster large scale coordinated efforts in key areas
- Neither set of policies make sense without being coordinated with the other
- This line of investment offers more realistic (but inevitably slower) way out of present economic crisis than the present fiscal and monetary short-term fixes