

EUROPEAN  
SCIENCE  
FOUNDATION



# The Science of Innovation

Tuesday 28 February 2012 • European Parliament, Brussels

# About the Conference

The term 'innovation' is a key concept in EU policy. Innovation is often depicted as a panacea, a cure for all problems: it will bring economic development, competitiveness, job creation, and help to achieve the EU2020 goals of smart, sustainable and inclusive growth. Consequently, both the European Commission and the European Parliament aim to substantially increase the funding for research and innovation within the overall EU budget.

However innovation is a complex phenomenon and its effects are not always that straightforward. For example, innovation might lead to jobless growth rather than job creation; and high rates of innovation might increase inequalities between and within European countries – and is thus not necessarily inclusive. Also the net effect of innovation on environmental sustainability is not always positive, as it affects production and consumption processes in complex and often unexpected ways.

There is no doubt that innovation, and the underlying knowledge, creativity and motivation driving it, is the key to human progress. However, it requires in-depth understanding to ensure that the process of 'creative destruction' underlying innovation will translate into a better world. The study of innovation is an important, growing field of research, and this conference will present thought-provoking state-of-the-art insights from the 'science of innovation' on crucial issues for innovation policy makers.

Issues addressed will be:

- Is innovation always good? How can we tell? Can there be 'too much' innovation? When can innovation do more harm than good?
- How do we make sensible, evidence-based choices about innovation policy, in the light of its complex dynamics and its unintended side-effects?
- How is innovation related to the financial crisis; and what will the effect of the financial crisis be on innovation – will it slow down innovation rates, or will the strain on financial resources actually lead to increased innovation?
- Could research and innovation policy, with its emphasis on excellence, lead to increased inequalities in Europe?
- How can innovation be translated into a true competitive advantage in a global world, in which many players aim to be the most innovative?

# Programme

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Tuesday 28 February 2012

**09:30**

**Registration and Coffee**

**10:30**

**Welcome**

Roderick Floud, *Conference Chair*

António Correia de Campos, *MEP, STOA Vice-Chair*

**10:50**

**Introduction: The Science of Innovation  
From creative destruction to destructive creation**

Luc Soete, *University of Maastricht*

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## **Session 1:**

**Understanding Innovation  
and Innovation Policy**

**11:20**

**Introduction**

Vittorio Prodi, *MEP, STOA Panel*

**11:25**

**European Innovation policy as cargo cult: myth  
and reality in knowledge-led productivity growth**

Alan Hughes, *University of Cambridge*

**11:45**

**Trade-offs in European policy on research,  
innovation and higher education**

Merle Jacob, *Lund University*

**12:15**

**Questions from the Audience**

**12:30**

**Lunch**

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## **Session 2:**

**Innovating Science  
and Innovation Policy**

**14:00**

**Introduction**

Paul Rübig, *MEP, STOA Chair*

**14:05**

**Evidence-based innovation policy? Merits,  
limits and challenges of policy analysis**

Jakob Edler, *University of Manchester*

**14:35**

**Financing innovation, financial innovation  
and the implications of the financial crisis**

Mariana Mazzucato, *University of Sussex*

**15:05**

**Questions from the audience**

**15:20**

**Coffee break** served in the conference room

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## **Session 3:**

**The way forward:  
which way, whose way?**

**15:30**

**Introduction**

Salvatore Tatarella, *MEP, STOA Panel*

**15:35**

**Public Value Failure in Science and Innovation  
Policy**

Barry Bozeman, *University of Georgia*

**16:15**

**Panel Discussion**

Clara de la Torre, *European Commission*

Kent Johansson, *MEP, STOA Panel*

Catherine Trautmann, *MEP*

Merle Jacob, *Lund University*

Barry Bozeman, *University of Georgia*

Mariana Mazzucato, *University of Sussex*

Jakob Edler, *University of Manchester*

Martin Hynes, *ESF Chief Executive – Moderator*

**17:15**

**Concluding Remarks**

Roderick Floud, *Conference Chair*

**17:30**

**Reception**

## Conference Chairs



### **Roderick Floud**

Roderick Floud is Provost of Gresham College and Chair of the Standing Committee for the Social Sciences of the European Science Foundation (representing research councils and learned academies from thirty European countries). He is President Emeritus of London Metropolitan University, former President of Universities UK (representing 121 British Universities); former Vice-President of the European University Association (where he was particularly involved in the 'Bologna process' of converging European education systems). He holds honorary fellowships from Emmanuel College Cambridge, Wadham College Oxford, Birkbeck College London and the Historical Association, as well as honorary degrees from City University London and the University of Westminster. He was elected an Academician of the Social Sciences in 2000 and a Fellow of the British Academy in 2002.



### **António Correia de Campos**

António Correia de Campos is a Member of the European Parliament and the First Vice-Chairman of Science and Technology Options Assessment (STOA). He is member of the European Parliament Committee on the Internal Market and Consumer Protection and substitute member of Committee on Industry, Research and Energy. Correia de Campos was educated at Coimbra University in Portugal, ENSP (now Ecole des Hautes Etudes en Santé Publique) in France, John Hopkins University (Mph) in the United States and the Universidade Nova de Lisboa (PhD in Health Economics) in Portugal, and has been University Professor at Universidade Nova de Lisboa. For three years (1986-89) he was director for Science and Technology at the Luso American Development Foundation (Lisbon). He has worked as a member of the Committee on Health Services Research, WHO/EURO and as a Senior Health Care Management Specialist for the World Bank. He served Portugal as a member of the National Parliament, Secretary of State, and Minister of Health.

## Speakers



### Luc Soete

Luc Soete is Director of UNU-MERIT, a joint research institute on economic, innovation and technology of Maastricht University and the United Nations University (UNU).

He is professor of International Economic Relations and Director-Dean of the Maastricht Graduate School of Governance at Maastricht University, The Netherlands. Luc Soete is a member of the Royal Dutch Academy of Science (KNAW) and of the Advisory Council for Science and Technology Policy (AWT) in the Netherlands. He is also a member of the European Research Area Board (ERAB). His research interests cover the broad range of theoretical and empirical studies of the impact of technological change and innovation, in particular new information and communication technologies, on employment, economic growth, and international trade and investment, as well as the related policy and measurement issues.

### Introduction: The Science of Innovation

The science of innovation, often referred to as science, technology and innovation (STI) studies is now approximately 50 years old. From just a handful of researchers in the late 1950s, it has grown to become a significant field of research involving several thousand researchers. Innovation is studied in a variety of disciplines ranging from economics, sociology, social geography, social psychology, and business and management studies, and a real understanding of innovation requires a thoroughly multi- and interdisciplinary approach. As innovation has become a centre-piece of European policy, understanding its nature and dynamics has become crucial, and the 'science of innovation' has an important role to play in this.

### From creative destruction to destructive creation

'Innovation is good for you' appears to be a common feature of most science, technology and innovation (STI) studies over the last decades. In many ways this should be seen as surprising, given the fact that innovation failure rather than innovation success appeared to be a much more common feature. Hence the simple, but straightforward question: could it be that innovation is not always good for you?

In principle, innovation is characterised by a Schumpeterian process of 'creative destruction' renewing society's dynamics and hence leading to higher levels of economic development and welfare – destroying a few incumbents to the benefit of many newcomers. However, innovation can also present the opposite pattern: a process of 'destructive creation', to the benefit of a few rather than to many. In the case of destructive creation, new products and services diminish or destroy the usage value of existing ones before it is optimal to do so, whilst in addition incurring costs (e.g. environmental, health) that are not taken into account. It is possible that there is something like 'too much innovation'. In fact, in this period of 'crises' examples abound: unsustainable fossil-fuel based economic growth and financial innovation are only the most obvious ones. The STI community, especially its economists, seems to have not been sufficiently forthcoming in highlighting the limits of innovation in sectors where forms of destructive creation appear much more common than the usual forms of creative destruction, and policymakers may not be sufficiently aware of underlying trade-offs involved. As innovation is at the core of European policy, this is worth some in-depth reflection.



## Speakers



### Alan Hughes

Alan Hughes is Margaret Thatcher Professor of Enterprise Studies at Cambridge Judge Business School at the University of Cambridge.

He is also Director of the Centre for Business Research (CBR), and a Fellow of Sidney Sussex College, both at the University of Cambridge. He was, from 2000-2003, Director of the National Competitiveness Network of the Cambridge-MIT Institute, a joint venture between Cambridge University and the Massachusetts Institute of Technology. Professor Hughes has also held visiting professorships in the USA, France, Australia and Japan.

He has pioneered the development of a long-term interdisciplinary research programme into business structure organisation and performance, linking scholars from economics, law, engineering, geography, social and political sciences, social psychology and management studies. He co-developed a unique longitudinal research programme covering several thousand small and medium-sized enterprises in the UK. Professor Hughes has published several books and over 200 journal articles and other publications. He has been policy advisor to amongst others HM Treasury, the Department of Trade & Industry, the Department for Education and Skills, the Bank of England, Eurostat, the International Labour Organisation, the World Bank and the UN World Institute for Development Economic Research.

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### European Innovation policy as cargo cult: myth and reality in knowledge-led productivity growth

During the Second World War in the Pacific, vast amounts of war supplies were air-dropped into the Polynesian islands. When the war ended, American military bases closed and the flow of goods and materials ceased. The native islanders however really wanted the planes to return, and this led to the emergence of 'cargo cults', some of which still persist today. The isolated islanders generally had little knowledge of modern manufacturing, and the supplies of the Americans were seen as a form of magic. Followers of cargo cults engaged in ritualistic practices such as building crude imitation landing strips, aircraft and radio equipment made of thatch and wood. By conducting rituals imitating behaviour they observed among the soldiers receiving the

desired wealth, they hoped the wealth might come to the islands again. But no planes ever came back.

There is a danger today that the evolution of innovation policy structures based on copying perceived characteristics and structures of the US innovation system will also fail to deliver the goods. The key 'ritual structures' are increased R&D expenditures, an emphasis on commercialisation of science through university based spin-offs and licensing routes in high technology producing sectors, the promotion of entrepreneurship and new business entry, support for risk taking in venture capital, and the development of the SME sector more generally. While all these elements of course do matter, they have been greatly exaggerated to the neglect of other key factors when one considers the innovation system as a whole.

In the US, it is in fact in existing, large firms rather than small new start-up SMEs, and in non-R&D intensive sectors rather than R&D-intensive sectors where the main productivity gains are being realised; the real importance of universities in the innovation system is not the direct commercialisation of research-derived knowledge, but rather a range of highly influential indirect effects; and the state is key to innovation, as the business sector consistently relies on the state to trigger major technological improvements. Innovation policy has to beware of myths and rituals, and needs to be highly context-specific (national, regional); and this presents a big challenge for those who want to develop European level innovation policy.

## Speakers



### Merle Jacob

Merle Jacob is Professor in Research Policy at Lund University and the UNESCO Chair in Research Management and Innovation Systems. She is currently Director of the Research Policy Institute at Lund University's School of Economics and Management. Merle has previously been Director for the Centre for Technology, Innovation and Culture and the University of Oslo (09/2006-08/2010) and Professor at the Copenhagen Business School. Professor Jacob's research specialisation is the relationship between science and policy. Her two specific areas of empirical focus are research and innovation policy and environmental policy. She has published extensively in both areas and is especially interested in the governance of higher education and research and the challenges posed to governance by globalisation and the integration of innovation into the mission of university.

### Trade-offs in European policy on research, innovation and higher education

Due to the adoption of the 'knowledge society' as the leitmotif for economic development, higher education and research are now conceptualised as central engines of economic growth and national competitiveness. In this process, higher education and research have been reclassified from the status of public good to that of a globally-traded service. This has profound changes on the way higher education institutions operate, what they do, how they do it and why they do it. The most immediate consequence of this is the expansion of the tasks of universities to include not just the supply of higher education and research but also to take responsibility for contributing to economic development via the diffusion and commercialization of research results.

Within the policy for the ERA, researchers have to be very well networked in order to be able to secure European funding for their research. This is a challenge for those areas where resources are scarce, infrastructure is underdeveloped, and teaching loads do not allow for extensive time for travel and network maintenance. Thus, the effect of European science and innovation funding is in practice uneven, as it presents opportunities only in so far as the individual researcher and his/her institution can afford the entry price.

The focus on innovation as an output of research and higher education has led to a policy interest in steering funding towards areas that are seen as strategically important for improving national competitiveness. Impact, excellence, critical mass and international collaboration have become key aspect for funding decisions. Studies of technology transfer, academic entrepreneurship and governmental policy directed toward increased contribution from the university to economic growth, have contributed to a specific grand narrative of the university. Knowledge transfer from other sectors of the university, and other forms of knowledge transfer, have been largely omitted from the discourse.

Rather than innovation policymakers being passive consumers of scientific knowledge, they often commission and even cooperate with scientists to produce knowledge for innovation policy. The policy process however possesses its own cognitive frames, and knowledge is increasingly framed in a fashion that allows it to be easily integrated into the extant cognitive frames in policy, legitimating already existing views. The increased proximity between innovation policy and innovation research may therefore have the effect of inhibiting the creation of new knowledge that could change the direction of policy, if our research funding mechanisms are too tightly coupled to preconceived notions of what is relevant.

## Speakers



### Jakob Edler

Jakob Edler is Professor of Innovation Policy and Strategy and since 2010 Executive Director at the Manchester Institute of Innovation Research (MBS). He joined MBS and MIOIR in January 2007 after having been Head of Department for Innovation Systems and Policy at the Fraunhofer Institute for Systems and Innovation Research. He was awarded his PhD in political science by the University of Mannheim (with distinction) having previously completed two separate Masters degrees at the University of Mannheim and Dartmouth College, US (Business Administration/Management and Political Science/Economic History). During his PhD he had an internship at the European Commission, DG Research, Brussels. He has led numerous projects; the biggest ones currently are a large study on innovation procurement (UNDERPINN) funded by ESRC/NESTA/TSB/BIS and a study to develop a COMpon the Compendium on the Effectiveness of innovation policy for NESTA. Jakob also regularly advises the EU, OECD and a range of governments through contract research, expert group involvement, invited presentations and organised seminars and workshops.

erable attention from academics, with the lessons already summarised in comprehensive literature reviews. Other interventions have been studied in various settings, but the findings have yet to be summarised in a systematic way. For further interventions the evidence is still very scarce.

This presentation will first introduce the 'Compendium project', commissioned by the National Endowment for Science, Technology and the Arts (NESTA) in the UK. This project will develop an overview of evidence on the effectiveness of innovation policy, through reviewing, analysing and summarising a variety of existing published work. The project has developed a new, tailored synthesis of the major existing international typologies of innovation policy measures and an analysis of the portfolio of measures as compiled at EU level and in various countries. It will result in around 20 sub-reports reflecting the selected intervention topics. The aim is to increase the collective learning in the area of science and innovation policy, making it more evidence-based and effective.

The presentation will then discuss more in general the merits and challenges of policy analysis for the purpose of policy design and re-design.

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### Learning from evidence? Merits, limits and challenges of innovation policy analysis

Science and innovation policy is rooted in recognition of the value of knowledge and learning. It is therefore crucial that science and innovation policy itself is optimally basing itself on knowledge about science and innovation; however this is only partially the case.

Governments have implemented a wide range of policies to encourage innovation with a view to stimulating economic growth. These range from local interventions (such as the establishment of science parks designed to build local innovative clusters) to system-wide policies (such as R&D tax credits, public venture capital investment or innovation procurement programmes). Evidence of their impact, however, is often limited, widely dispersed and exists in many different forms – from academic research to internally-commissioned programme evaluations.

The amount of evidence varies according to the types of interventions. Some have received consid-



## Speakers



### Mariana Mazzucato

Mariana Mazzucato is R.M. Phillips Professor in Science and Technology Policy (SPRU department) at the University of Sussex. After receiving her PhD in 1999 from the New

School University, she became Assistant Professor of Economics at the University of Denver, and then joined the London Business School through a Marie Curie Post-Doctoral Fellowship. She is currently the Coordinator of a 3 year EC FP7 project on Finance, Innovation and Growth (FINNOV, 2009-2012, [www.finnov-fp7.eu](http://www.finnov-fp7.eu)) and Economics Director of the ESRC Centre for Social and Economic Research on Innovation in Genomics (Innogen).

Her primary research interest is the feedback between the innovative efforts of companies and the impact this has on their growth and the structure of the industry in which they compete. Her research on financial markets and innovation looks at the possible links between innovation and stock price volatility, and how financial markets can be structured so that they reward rather than penalise innovative firms. In her recent book 'The Entrepreneurial State' (2011) she examines a more pro-active role of the state in stimulating innovation.

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### Financing innovation, financial innovation and the implications of the financial crisis

The relationship between innovation, finance and public policy is one of the key questions of our time. Governments that get that relationship right can use it to build a sustainable economy. Governments that get it wrong will pay a high price.

Over the past decade, the financial sector has created dysfunctional incentives and opportunities across a range of sectors that can undermine productive investment. This dysfunction goes beyond simple short-termism, to situations where unproductive value extraction is encouraged at the expense of value creation.

Part of the problem is that our collective understanding of financial markets remains stuck in the past. It emerged at a time when financial technologies for pricing and (re)trading assets and risk were immature, national markets were relatively unconnected, and banks and firms did not have electronic markets to assist them in the allocation of resources. Under such conditions, private and public risks and

rewards were generally aligned, and conventional economic theory could reasonably assume that markets would self-correct, and that market-based trading, combined with private ownership of assets, would ensure the convergence of public and private benefits.

Today, however, changes in markets and financial technologies have allowed risks and rewards to be separately managed, creating the potential for strategically positioned actors to make substantial profits while transferring risks to other stakeholders - notably employees, small savers and the state. The 'financialisation' of the economy has allowed parts of the financial services sector to extract and privatise value, while socialising the risks it generates. The result has been a more inequitable, unstable economic system which has the potential to obstruct innovation, and increase the size and frequency of financial crises.

The current financial crisis has dramatically exposed flaws in the conventional economic analysis of these processes and the policies and regulations that support and control them. As a result, certain myths about the role of the financial system in supporting innovation-led growth have been created. The challenge now is to find ways of reforming the financial system to help move the economy out of the current crisis and into a period of more creative, sustained and sustainable innovation-led, inclusive, equitable growth.

## Speakers



### Barry Bozeman

Barry Bozeman is Ander Crenshaw Professor and Regents' Professor of Public Policy at the University of Georgia (2003-present). He has served as Adjunct Honorary Professor of Political Science at the University of Copenhagen, Visiting Research Professor at LATTS, Université de Marne-la-Vallée (Université Paris-Est). He is Fellow, Consortium for Science Policy and Outcomes and a Research Team Leader for the NSF-funded multi-university Center for Nanotechnology and Society. At Georgia Tech (1993-2003), he was first full-time Director of the School of Public Policy and founding Director of the Research Value Mapping Program.

Bozeman's research focuses on two fields, science and technology policy and public management and organisation theory. He is the author or editor of sixteen books, including most recently, *Public Values and Public Interest* (Georgetown University Press, in 2010). Bozeman's more than 200 research articles have appeared in every major international and U.S. journal in the fields of public policy and public management. On many occasions, his research has been summarised in a mass media, including, for example, *Wall Street Journal*, *New York Times*, *The Economist*, *Nature*, and *Chronicle of Higher Education*. Bozeman has served as a science policy advisor to a variety of nations including most recently Canada, Australia, New Zealand, Japan, and France. He is an elected fellow of both the American Association for the Advancement of Science and the National Academy of Public Administration.

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### Public Value Failure in Science and Innovation Policy

There is near universal acceptance of the assumption that science is one of the most important, perhaps even the most important, means of achieving the fundamental collective goals of societies, including economic growth, national security, health, and life itself. To be sure, many in the 21<sup>st</sup> century are well aware that science is not a 'cure all', and that science sometimes contributes to social and individual 'bads' as well as to positive outcomes. But, nonetheless, when societies confront challenges or seek new opportunities, it is to scientists and institutions of science to which they most often turn.

We have placed tremendous burden of expectation on science and innovation and, from decades of results, we have a good reason to believe that our expectations are not entirely unrealistic. The high social expectations are accompanied by ample resources provided chiefly through tax money. However, in spite of this, we have no satisfactory tools for understanding how large-scale social impacts occur and, by implication, few useful guideposts for 'managing' their occurrence.

As a result of the mismatch of intent and method, most of what we know about large-scale science and technology efforts' social impacts is derived from historians. These accounts are often quite useful, but generally do not provide guidelines for prospective analysis, program design, or even evaluation. Science and innovation policies aim at mobilising knowledge in support of a wide range of societal aspirations and values. However, analytical tools and models for the assessment of science and innovation policies focus predominantly on economic values (e.g. benefit-cost analysis). Values not easily expressed in economic terms receive less attention, simply owing to the absence of compelling and concrete ways of thinking about them.

'Public Value Mapping' can provide the theoretical and methodological foundation for assessing and informing investment in science and innovation using public values as the measure of success in an operational way. At the core are two fundamental questions: What are the public values that justify particular science and innovation policies, and what is the capacity of a given science and innovation policy to yield outcomes that support and advance those values?





**European Science Foundation (ESF)**

The European Science Foundation (ESF) was established in 1974 to provide a common platform for its Member Organisations to advance European research collaboration and explore new directions for research. It is an independent organisation, owned by 72 Member Organisations, which are research funding organisations and research performing organisations, academies and learned societies from 30 countries. ESF promotes collaboration in research itself, in funding of research and in science policy activities at the European level.

[www.esf.org](http://www.esf.org)

**Science and Technology Options Assessment (STOA)**

STOA is an official body of the European Parliament, whose task is to carry out expert, independent, assessments of the impact of new technologies and identify long-term, strategic policy options useful to the Parliament's committees in their policy-making role.

[www.europarl.europa.eu/stoa](http://www.europarl.europa.eu/stoa)