Scientific Advice to Public Policy-Making

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Summary

A feature of policy-making today is its dependence on scientific advice to deliver public policies that are robust, credible, and effective. This paper discusses how policy-making profits from scientific advice in areas where science and technology are significant. Particular attention is given to issues holding a high level of uncertainty, either because of inherent variability, because science is incomplete or controversial, or because data are inadequate to support a definitive answer.

First, we analyse the social context that characterises the relationship between science and policy-making, with a focus on the decrease of public confidence in politicians and scientists. Second, we compare three different sets of guidelines on the collection and use of expertise in policy-making (issued by the UK, Canada and the European Commission, respectively) and identify two different approaches to scientific advice in policy-making. Third, based on a set of cross-national and multi-disciplinary case studies, we look at how the relationship between science and policy-making works in practice and propose a set of recommendations towards the establishment of a more robust and effective policy-making process.

Keywords: Scientific advice, Policy-making, Expertise

JEL Classification: D70, D81

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Introduction

Many public policies today enshrine a scientific or technological dimension and policy-makers often seek scientific advice to deliver public policies that are robust, credible, and effective. The relationship between scientific advice and policy-making is particularly difficult when the policy issue hold a high level of uncertainty, either because of inherent variability, because the science is incomplete or controversial, or because data are inadequate to support a definitive answer.

Section 1 discusses the evolving social context that characterises the relationship between science and policy-making. Amongst key issues is the decrease of social confidence in politicians and the scientific establishment. Within such social context, **Section 2** focuses on the different responses that have been given at national and European level to improve advisory processes. In particular, the UK, Canada and the European Commission have elaborated new strategies to the use and collection of expertise in policy-making. From a comparative viewpoint, responses differ in many respects and reflect the evolving approach to decision-making. **Section 3** analyses the theoretical debate that underpins two contrasting visions to the governance of science. On the one hand, there is a traditional approach (promoted by the UK and Canadian guidelines) where expertise is collected from those holding *scientific knowledge*. On the other hand, there is a new approach (fostered by the EC guidelines) that broadens the concept of expertise and calls for wider participation in policy-making. The EC vision is gaining wide interest in the academic community, although it is not uncontroversial. In **Section 4** we present some of the theses and antitheses that are high on public debates concerned with the case for a more participatory approach to policy-making. Finally, **Section 5** explores how the relationship between science and policy-making works in practice. A set of multi-disciplinary and cross-national case studies developed by ENSIPP is compared against national research systems. Their comparison sheds light on the inadequacy of current practices and indicates the timeliness of the debate. In particular, it leads to the identification of some fundamental questions that raise controversy and need further clarification. **Section 6** draws some conclusions on the basis of the theoretical debate and the state of the art in this research area. A main achievement is the identification of a set of recommendations aimed to inform future strategies towards the establishment of a responsive and robust interplay between science and policy-making.

This paper is based on the work carried out by ENSIPP, a European and multi-disciplinary Network on Scientific Input to Public Policy concerned with solicitation and elicitation of advice in policy-making (Contract No. HPTV-CT-2000-00001). A short overview of ENSIPP is provided in the Annex. Extensive information can be found at the Network's web page: www.ucc.ie/ensipp.

1. The place of science in public policy-making

This Section highlights the timeliness of the debate. It starts from the role of science in public policy-making and focus on the evolving social context that characterises the relationship between science and policy-making. Amongst main issues is the decrease of social confidence in both politicians and the scientific establishment[1].

1.1 The increasing role of science

The relationship between science and policy-making is twofold:

- It can relate to the way in which science advises policy-making when policies holding a high scientific ad technological component are to be taken;
- It can focus on the way public authorities provide incentives to boost scientific and technological research in order to exploit scientific knowledge and produce innovation that meets the requirements of the knowledge-based society.

Within the first strand, a wide literature at national and European level is increasingly devoted to investigate the role that science and technology play in everyday life compared to past times (Gallopin, Funtowicz et al: 2001; Healey: 1997; Jenses: 2000). In fact, "policy decisions increasingly involve scientific or technical issues. Technology has grown more complex and pervasive and planning has become more widely employed and systematic" (Adams and Hairston: 1995).

From a historical point of view, scientific advice is a fundamental aspect of the policy-making process since the Second World War. Its role has however changed significantly over the decades, due to phenomena that have imposed a thorough reassessment of former social, economic, and political paradigms. The dramatic events that marked WWII and the Cold War shed light on science as a means to either ensure military supremacy (e.g. the Atomic bomb) or win first place in the arm race (e.g. satellites and bio-warfare products). At that time, science was only solicited to serve the political authority, and no real interplay was established with society at large.

Nowadays, "economies are more strongly dependent upon the production, distribution and use of knowledge than ever before" (OECD:1996, p.7). Not only is knowledge creation at the core of scientific, technological and economic growth, but also scientific progress permeates everyday life. This means that public policy-making is influenced by considerations of science and technology, and governments are more and more dependent on scientific advice (Sheperd: 2000).

A related aspect is that society at large has now direct access to scientific and technological progress[2]. Latest developments make science both indispensable to governments and also visible and enjoyable to the lay people. Also, the knowledge-base society increases consciousness over problems. Most part of the highly scientific issues

[1] This Section draws significantly from Chris Elliott's contribution to ENSIPP Final Conference (Rome, November 28th/29th 2002).

[2] Examples showing how science and technology have entered the everyday life are: the current growth of the air transport sector, mobile telephones, the Internet and other ICT facilities that are part of a new way of communicating and allow people to access world-wide knowledge.

requiring public intervention raise great public concern (e.g. BSE, the release of GMOs, and nuclear waste disposal). Another strand comprehends those issues raising less immediate concern to the general public but holding considerable political importance, particularly where they are seen to have trade implications (e.g. safety of asbestos, setting of interest rates by central banks, and netting of tuna). Finally, other issues hardly attract public attention but still require public policies to be reconciled with the constraints of science and technology (e.g. the allocation of radio frequencies and the selection of optimal design of road junctions).

A first straightforward consequence is that science is no longer confined to serve policy priorities. It enters everyday life and is subject to the scrutiny of society. Consequently, the relationship between science and policy-making cannot be disjointed from social claims.

Another phenomenon affecting the role of science today is globalisation. The world is currently crossed by forces that transcend geographical boundaries and tend to bind together nation-States. An example is the creation in 1992 of the European Internal Market that abolished all barriers to the free movement of goods, services, people, and capitals within Europe. Again, the frequency of leisure travels and the development of the Internet as an easy way of connecting people across the world has over the last decades allowed overcoming geographical boundaries and accessing distant places with little efforts. The declining significance of national borders has profound impacts on social, economic and political patterns. Globalisation is a converging process that smoothes differences and spurs States to co-operate under a common denominator. This in time generates new social needs and raises the complexity of many policy issues. Some policy decisions may have an impact outside national boundaries and they affect a larger number of people other than national citizens. For example, policy measures in environmental matters cross borders and affect people living in two/more Countries.

The relationship between science and policy-making is also affected by broader concepts. For example, governance redefines the role of civil society in policy-making, making it an active player of policy-making rather than a passive viewer. The way society is interpreted has actually many relevant consequences on the relationship between science and policy-making, some of which are discussed below.

1.2 Science in an evolving social context

The changing role of society requires a redefinition of the relationship between science and policy-making. This can be explained from different angles.

First, society is changing the way it governs itself. The whole concept of civil society is emerging as something much wider than that simply referred to as “representative democracy”. The notion of governance is entering most political debates at national and European level as the process whereby formal institutions – legislative, executive, and judiciary powers – must interact with society in public policy-making. Governance is in fact “increasingly used by political scientists to describe a situation in which decision-making power is widely and unevenly dispersed, not only within central government, but also beyond it, throughout industry and civil society” (ESTO Report on Science and Governance: 2001, p.51). Dispersion of responsibilities in dealing with political issues

must be overarched by establishing a common framework for public procurement of scientific advice.

Second, the concept of human rights is changing. Most philosophers and political scientists indicate that human rights are historical by definition, meaning that the extension of rights to future generations is part of a natural process of historical development. According to the international theory of human rights, their multiplication and universality is the natural response to the unremitting process of political, social, and economic transformation. As societies change, menaces and threats change accordingly and new needs arise requiring recognition. In due time new human rights emerge as a response to the evolving social context[3]. The human rights of the new generation are connected to the desire to protect life from current technological and scientific menaces. The right to privacy claims redress from technology as a means to control private life. The right to live in a sustainable environment is a response to man-made disasters and violations to the ecological system that are leading to an increasingly vulnerable environment. The emerging right to protect genetic integrity indicates that the scientific capability to reproduce animal and human life in laboratory is socially scary, and draws attention on the ethical significance of scientific progress. As a consequence, the political agenda is continuously enriched with new issues and policy-makers are confronted with the need to regulate emerging social needs.

Third, science is changing. The current scenario is one of the public research sector being increasingly superseded by the private one. In previous times, science was essentially academic. Universities were the main containers of curiosity-driven research and researchers were seen as craftsmen independent from external pressures (Gallopin, Funtowicz et al: 2001). The main target of research was the pure advancement of knowledge: academics were primarily committed to long-term objectives and the final output of their efforts consisted in a research publication. Nowadays, research has become industrialised (Ravetz: 1996). Researchers are equated with employees and the final output consists in inventing new commodities and services. The main objective of mission-oriented research is to deliver products that can attract consumers, serve society, and be applicable on the market. Researchers enjoy less autonomy, and they are compelled to stick to external constraints. Besides, most part of the scientific research carried out by the public sector currently relies upon private funds (Scott Cato, Busby, and Bramhall: 2000) [4]. The shift in the production of knowledge has important implications for the inclusion of scientific input in public policy-making. The move from science as a public good towards science as a private property means that scientists must constantly cope with pressures not to upset the orthodoxy. As many public research activities are increasingly funded by the private sector, the distinction between objective public research and subjective private research is not clear. The private sector

[3] Kant predicted that a third class of human rights would in time be representative of the future generations. He called it *ius cosmopoliticum* and defined it as "the right of any citizen to be citizen of the entire world". The right to visit a foreign country and to be treated fairly once there is an example of this new class of human rights by which human beings would be part of a universal order where boundaries matter little (Bobbio: 1992).

[4] Over the last 20 years a huge amount of private capitals have been invested in the public research activities carried out by Universities. In the UK, for instance, Mrs. Thatcher's policy towards market-driven-research favoured links between research activities and private interests.

has vested interests in research, and it may be the case that scientific evidence is suppressed if it puts economic profit at risk. This is not the only change that is taking place in science. In serving political priorities, science has to stick to time constraints; it poses itself to social judgement; it is indirectly and exceptionally confronted with interested parties and political promises to the constituency; it enters a bargaining process that is not known to more traditional forms of research; and it is often confronted with irresolvable problems.

This analysis shows that a new relationship is emerging among science, society and policy-making. A most paradoxical feature is that the more science is indispensable to deliver efficient public policies the less is trusted. It is now interesting to investigate where social distrust comes from, and to explore to what extent it affects the way public policies are made.

1.3 Social disenchantment in governments

Social trust is a basic ingredient of the process by which efficient public policies are delivered. As European Institutions often acknowledge, the success of most European actions stands or falls on confidence. This is especially true when public policies have a direct impact on society at large. Trust may be viewed from two angles: 1) trust in politicians and 2) trust in science.

Citizens all across Europe are politically disenchanted. This lack of confidence is acutely felt both at national and European level and largely investigated by academics (Maddox: 1995; Jensen: 2000; Gallopin, Funtowicz et al: 2001). The European Commission acknowledges that "people increasingly distrust institutions and politics or are simply not interested in them" (EU White Paper on Governance: 2001, p.3). European processes and Institutions are often seen too bureaucratic and complex to be clearly understood by the public. The whole system is perceived as too distant from citizens across Europe, and not capable to interact with the ordinary man. The widening gap between the European Union and its citizens also derives from a lack of proper communication on European activities from member States. Citizens rarely credit the European Institutions for improvements in the quality of their lives or the efficiency of measures taken to tackle specific problems, generally interpreting them as national achievements.

Claiming that the main reason for European citizens' distrust lies in the absence of visibility of European Institutions and actions seems partial. Citizens throughout member States feel alienated from their representative governments and are extremely sceptical to national political leaders, as well. Mass media clearly play a role as they represent a main vehicle of information. Sometimes, they may in fact exert an influence over society. Whatever the role of visibility and proximity, such increasing distrust reflects a lack of democratisation and legitimisation of political leaders.

1.4 Social distrust in science

It is widely held that "expertise, while being increasingly relied upon, is also increasingly contested" (EC Working Group 1b Report: 2001, p.2) and that people are losing trust compared to some decades ago. This shift in public opinion is reflected in the 2001 Eurobarometer 55.2 survey. Results indicate that while a majority of Europeans still have a positive attitude toward science and technology, there is wide scepticism about its capacity to resolve specific problems.

This standpoint needs some clarifications. Some 100 years ago, science and society were two separated worlds hardly getting into direct contact. Science had a limited impact on everyday life and society was very little attracted by scientific wisdom. Nowadays, science is largely visible to the public due to the historical and economic developments mentioned in the previous pages. The experience of the public is therefore that of "science evolving over a period of 100 years from a position of obscurity to a position at the centre of societal development" (Jensen: 2000). Paradoxically, social distrust also derives from its entering everyday life to such an extent that public opinion is becoming increasingly aware of its existence. As Sheperd puts it, trust is in fact more likely to dwindle when literacy increases and citizens can understand (and judge) the process that underpins scientific and political choices (Sheperd: 2000).

The relevant literature offers different theories to explain this lack of public satisfaction in the scientific establishment. It is assumed that none of them can solely represent an exhaustive motive for the diminishing social confidence in science.

Some authors argue that public trust in scientists is decreasing because the growing allocation of private capitals to public research blurs the traditional separation between objective-University research and subjective-private research. This, in turn, puzzle society and generates distrust. Also, NGOs act as mediators between science and society, and they may directly or indirectly mould public views (sometimes this may happen because scientific information is difficult to translate into plain language). Also, Universities' search for publicity may be socially counterproductive, especially when scientific findings are later found to be erroneous (Jensen: 2000). Current trends towards academic competitiveness may push researchers to tailor results to the expected hypotheses, with the consequence that suppression of evidence grows (Scott Cato, Busby and Bramhall: 2000).

Another strand of literature focuses on a historical reconstruction of scientific behaviours. In a nutshell, science may have over the years laid itself open to criticism, exaggerating its potentiality to act as the master healer (Maddox: 1995). The development of new information technologies prepared the ground for more social expectations. Scientists fostered too many hopes on scientific foresight and its capability to anticipate natural hazards and resolve man-made disasters. They also made exaggerated claims about the innovative strength of science and the benefits that innovation would bring to human wealth. Reality then turned over-optimism into scepticism, and led the path to major unfulfilled promises.

It is commonly held that the public lost confidence in science mainly after the inadequate scientific responses to complex controversies that have captured largest

social attention (Maddox: 1995). Among others, the 1986 Chernobyl accident or the 1997 BSE case proved that science has been incapable to protect societies from natural and man-made disasters; other cases showed that scientific experiments may in the end turn out to be harmful or scary (e.g. the sheep Dolly[5]). Evidence seems to suggest that scientists have not been able to anticipate the harmful consequences caused by natural disasters and human activities to human health and the environment. Considering that the BSE outbreak has been managed differently at different national levels[6], people started doubting scientific objectivity. Sharp differences between scientific and veterinary scientists on how to contain the spread of the BSE disease panicked the public. Some authors state that the political decision to keep BSE-contaminated beef on the market was based on the best available scientific evidence (Scott Cato, Busby, and Bramhall: 2000)[7]. Mostly renowned researchers assured the UK government on the unlikeness of any harmful transfer of the infection to human beings. What followed was that risks to human health were officially denied. By the same token, the Chernobyl accident proved that events occurring in one State can have consequences in another one and they can protract for a very long time.

Overall, popular cases such the BSE and the most recent GM food showed that it is very difficult to separate scientific and political responsibilities. The BSE has been in fact quite a scientific and political issue, which led the public to mix up scientific and political roles. Many authors actually draw the attention on the fact that the lay people often match scientific performances with political outcomes, and blame the former for failures that belong to the latter. The Chernobyl case suggests that both scientists and politicians were not capable to protect society, the former due to uncertain or not accurate knowledge, the latter due to a democratic commitment to serve the will of society. The BSE case also showed that political leaders may sometimes choose to suppress scientific evidence in order not to upset the public.

The OXERA Report concludes that unsatisfactory scientific responses to major controversies may be due to (1) the very complex characterisation of the issue at stake, likely to make it extremely difficult to formulate a proper political strategy; (2) a hasty scientific commitment to provide reliable advice to policy makers; or – reversibly - (3) an insufficient or superficial political commitment to take due account of scientific evidence; (4) inefficient co-operation procedures hindering communication and understanding among the actors of public policy-making (OXERA Report: 2001).

Current surveys confirm that society is increasingly scared of the impact that greenhouse gases and the release in the atmosphere of new chemical species may have on global climate change. The public is also sceptical to genetically modified organisms for the potential harm to human health they may cause. Whilst such trend is common to most contemporary societies, people still expect political leaders to find efficient

[5] Dolly, the first animal cloned from an adult cell was put down in February 2003 after veterinary examinations showed that she suffered from progressive lung disease.

[6] The UK, France, and the Netherlands - to name just three states that have been heavily struck by the disease.

[7] The authors alert on the difference between scientific and political evidence. The former implies that there is not, up to date, scientific data providing empirical evidence on a given hypothesis, the temporal reference being extremely important. Conversely, the latter refers to the achievement of a consensus view of the state of scientific art or to evidence provided by interested corporations.

solutions to their claims. A reasoning behind such paradox is that "people have disappointed expectations, but expectations nevertheless" (EU White Paper on Governance: 2001, p.7). Moreover, scientists are still increasingly solicited to advise and offer evidence on issues holding a robust scientific or technological component. The current prevalent distrust in the scientific establishment collides with recognition of its having been crucial in making our lives healthier, wiser, and happier (Maddox: 1995)[8]. As the OXERA Report considers, many scientific theories are in fact highly successful and can inform analysis leading to policy decisions (OXERA Report: 2001). Examples of beneficial science are the in vitro fertilisation and the plants genetically engineered to take over chemical pesticides.

There is clear need to improve policy-making processes when a socially relevant policy issue holding a high scientific dimension is at stake. The UK, Canada and the European Commission have already attempted to give some answers by elaborating new strategies to the use and collection of expertise in policy-making. The following pages present these theoretical responses.

2. The guidelines on the collection and use of expertise in policy-making

In December 2002, the European Commission issued a set of guidelines on the collection and use of expertise in policy-making. At national level, the UK and Canada identified some core principles to improve advisory processes, respectively in 1997 and 2000. These sets of guidelines are an important point of reference to understand the complexity of this topic. This Section offers insights into the different responses that can be given to tackle a same problem. This is done by identifying both points of agreement and disagreement on how the policy-maker profits from scientific advice when uncertainty is at stake[9].

2.1 A common understanding of current challenges

All sets of guidelines aim to provide guidance to policy-making towards the efficient collection and use of scientific evidence. In particular, they all focus on the need to reformulate the relationship between science and policy-making in the light of major social scandals. The following points of agreement can be identified.

First, science is no longer considered infallible. There may be a lack of data, or they may be incomplete, not trusted, or inaccurate. The policy issue may be intrinsically unpredictable, or there may be conflicts in terms of alternative theories and models. Furthermore, one cannot get independent, uncontested and objective scientific advice.

[8] The most advanced societies are healthier, as the standard expectation of life and investments in health care policies have both risen in the last decades; they are wealthier, as a large amount of commodities are at hand for improving the quality of life (mobile telephones and other communication services, the Internet); they are wiser thanks to increases in literacy, education, and training.

[9] This Section draws inspiration from the contribution of Oliver Wolf, Johan Hauknes, and Silvio Funtowicz to ENSIPP Final Conference.

Most of the issues that raise political and social attention are scientifically controversial and hold high levels of uncertainty. Also, it is held that science is inherently flawed and not able to provide value-free evidence. As personal motives and interests are part of the process by which scientific knowledge is delivered, an *independent advice* is more important than an *independent adviser*.

Second, the process by which scientific advice is used at governmental level can still be credible despite increasing social distrust. Science still represents a fundamental asset in public policy-making, but efforts towards the establishment of a more coherent process must cope with the acknowledged intrinsic limits of science. Decision-takers must choose between options giving appropriate weight to scientific evidence. They must also be aware that many dimensions may fall under the term *science*: e.g. medicines, health, economics, environmental and agricultural sciences, trade, the ethical dimensions connected to each discipline, and so on.

Third, as to purely procedural aspects, no definition of terms (e.g. *stakeholders* and *experts*) is given in any of the three sets of guidelines. This of course raises more questions than supportive answers to current doubts. Within the literature, the OXERA Report defines a "scientific adviser" as "a person or organisation responsible for providing scientific input to policy-making or decision-taking. This includes both scientists expert in narrow disciplines relevant to the problem in question, and more broadly-based scientists able to integrate different disciplines, and those within and outside the civil servants. (…) A stakeholder representative is a person or organisation representing the interests and opinions of a group with an interest in the outcome of a particular policy decision" (OXERA Report: 2000, p.ii).

Conceptualisation of terms is difficult because there may be huge overlaps between scientific and stakeholders' roles. In fact, an expert may hold an interest in the issue under policy scrutiny and be at the same time a stakeholder. Stakeholders may serve two clashing roles within the policy-making process: they can either be solicited to consult policy-making because of the practical knowledge they hold in a policy area; or they can be affected by the consequence of the policy-decision, and acting as interested parties. Further, the term stakeholder may comprise an extremely vast range of categories with diverse interests and roles in society (e.g. experts, NGOs, industry associations, the public, mass media, and so on). If everybody can be a stakeholder, then it is extremely difficult to refine the policy-making mechanisms, particularly when there is a need to take account of everybody's views (in ideal terms, a viable solution would be the setting up of a joint decision-making process, which is clearly unattainable: for examples, transaction costs would be too high).

Last but not least, the three sets of guidelines recognise that the policy-making process is more complex than it may look at a first sight. Both policy-making and the scientific arena are two social and behavioural systems, where solutions are produced in a context of internal conflicts, defending interests, and bargaining processes with the outer world. In particular, a diverse range of actors and interested parties may influence final strategies. This means that there is also clear need to separate roles and responsibilities between science and policy-making. In fact, "the Commission is politically responsible for its initiatives and must not appear to hide behind experts advice" (European Commission guidelines: 2002, p.9).

Despite this common view of policy-making and its relationship with science and society, the sets of guidelines propose different solutions to tackle current deficiencies. In the following pages we briefly analyse main differences between the European Commission's on the one hand and the national guidelines on the other hand.

2.2 Scientific versus practical expertise

There are wide differences between the approach proposed by the UK and Canadian guidelines on the one hand and the European Commission's ones on the other hand. Most of them revolve around the type of advisory procedure envisaged to fit science into policy-making. In particular, a main difference concerns the conceptualisation of the term *expertise*.

The UK guidelines adopt a pragmatic approach to the theme. As science is often uncertain and not always able to provide definitive answers, risk must be accepted as part of the process. It must be carefully assessed and purposefully communicated. Policy-makers must be made aware of the impact associated to the risk, so that policy decisions can be taken considering all relevant information. As science may be unable to reach scientific consensus over a question due to controversial, alternative, and non-conformist visions, a wide range of scientists must be assembled to obtain the best information possible. Further, policy-makers have the duty to listen and be transparent to citizens.

The Canadian guidelines employ an advisory structure that is similar to that outlined in the UK's. Both sets reflect the need to guarantee that the government responds promptly to social controversies, assuming responsibility in public policy-making. This is done by ensuring that all relevant scientific knowledge from any sources is available when a scientific problem arises. A variety of efforts must be collected to ensure that the science employed is sound, reliable, and respectful of quality and integrity. In the developing a risk management framework. In accordance to this, early issue identification is an essential aspect of the whole process.

In both the UK and Canadian guidelines, *expertise* seems to be limited to those holding *scientific knowledge*, e.g. academics and experts. In the policy-making mechanism science plays an extremely difficult (it is not always possible to provide society and policy-making with immediate responses aimed to tackle the problems raised by scientific and technological progress) but still primary role (scientific advice is clearly indispensable to deliver credible public policies). In such pattern, society has the right to be comprehensively informed about policy decisions but no real provision for inclusive participation in policy-making is made. Transparency and openness guarantee that the process is democratic, but the policy debate remains confined within the boundaries of scientific knowledge and policy-making.

The European Commission guidelines set out a different strategy that centres on the role of society at large as a provider of knowledge rather than a passive viewer of policy processes. In the European vision, science is treated just as one source of knowledge among many others. Scientists are no longer seen as holding the monopoly of truth. The involvement of social players and interested parties in the process ensures that different opinions are taken into account. The EC Report from the WG 1b to the White Paper on

Governance states in fact that expertise may be grouped in at least three different categories (EC WG 1b Report: 2001, p.2):

- *Official experts* (those appointed from governmental authorities);
- *Industry experts* (representatives of the private sector);
- *Counter experts* (from non-governmental authorities).

A new typology of expertise arises. Different levels of society hold different types of knowledge, and each may represent a valuable asset to deliver efficient public policies, particularly those with an interest (direct or indirect) in the policy issue. Expertise may be distinguished in:

- *Scientific expertise* (those studying the subject, e.g. academics and experts);
- *Practical expertise* (those practically linked to the subject by means of working in the sector under political scrutiny, e.g. stakeholders).

Expertise in the EC guidelines is multi-sectoral and multi-disciplinary: it can take the form of both scientific knowledge and practical experience, and both academic scientists and stakeholders may be taken into account as long as they can offer valuable contributions, alternative viewpoints, and non-conformist visions to policy. A consequence of this approach is that the spectrum of possibilities broadens, not-known problems are as important as known-problems and ignorance becomes relevant. There is also wide reference to the Precautionary Principle. In the European strategy, this is a political tool used to avoid risky measures when the consequences to human health or the environment are uncertain, but its degree of application is affected by what is defined to be *dangerous*. This comparative analysis shows the existence of two contrasting visions to the governance of science. In the following Section, we briefly discuss the theoretical debate backing the need for a more inclusive and participatory policy-making process versus a more traditional approach.

3. The need for a new model of policy-making

The analysis conducted in the previous Section shows that different responses can be given to a same problem. In particular, the EC guidelines on the one hand and the UK and Canadian guidelines on the other hand reflect two contrasting visions to public policy-making:

- The traditional vision to science and policy-making, as devised by the UK and Canadian guidelines;
- A new approach towards a more inclusive and participatory process, as proposed by the EC guidelines.

This Section presents the theoretical debate backing the two contrasting visions to the governance of science[10].

3.1 The case for a more participatory approach

The relationship between science and policy-making must be re-conceptualised taking into consideration that in a representative democracy terms such as *political leadership*, *citizenship* and the *role of Parliaments* are important. In particular, each of them may affect the way public policies with a scientific dimension are made.

First, representative democracies are built on the concept of citizenship. Parliamentarians are elected by citizens and it is their democratic responsibility to ensure that proper political solutions are found to matters raising social concern. The role that science and technology increasingly play in decision-making risk hamper the link between democratic institutions and society at large. As some authors claim, "technology is implicated in perpetuating antidemocratic power relations and in eroding social context for developing and expressing citizenship" (Sclove: 1995). An approach centred on scientific knowledge may create a technocratic dominating scenario. It may generate anti-democratic forces that cast citizens out of the policy-making process, and hinder the basis of democratic institutions. This in turn may further distance citizens from policy processes. In democracy citizens have the right to be informed about policy actions. Failure to properly inform society would end in a deficit of representation, a deficit of knowledge and competence and a deficit of engagement.

Second, science and technology cannot proceed without checking back to citizens. Recent controversies have highlighted the risks associated with a policy-making system that hinge heavily on science:

- Science is sometimes dismissive of public and NGOs concerns and people do not automatically accept scientific evidence (how to take proper weight of social and scientific needs? Once the scientific problem is resolved, is it correct to claim that the public issue is resolved, as well?)
- Science cannot be independent and there is a need to guarantee that evidence is reliable (how can this match with the increasing power that science hold over society

[10] This Section draws inspiration from the contribution of Seamus O'Tuama, David Cope, and Alan Cross to ENSIPP Final Conference.

and policy-making choices? How is the place of citizenship tailored to fit within a scenario of scientific authority?)

- There is a lack of communication among science, the public and policy-making (how can this be resolved?)

In the light of the emerging approach to science in policy-making, it is important to re-conceptualise the concept of citizenship and to adapt it to the EC strategy. For example, what does *citizenship* mean in a science-dominating policy-making? How is it related to democracy? How to involve citizenship in the policy-making process? How does citizenship react to emerging issues such as human cloning? Frankenfeld defines *technological citizenship* as: "(…) a set of binding equal rights and obligations that are intended to reconcile technology's unlimited potentials for human benefit and ennoblement with its unlimited potentials for human injury, tyrannization, and degradation" (Frankenfeld: 1992). According to this vision, basic criteria constituting technological citizenship are the right to knowledge and information, participation, guarantees of informal consent, and limitation on the total amount on endangerment.

The new approach to policy-making proposed by the EC guidelines goes in this direction. In particular, it sets a new political order where concepts such as *responsibility* and *citizenship* are re-formulated to meet basic democratic requirements. This is true both at national and European level. As Jasanoff stressed, the development of a new EU structure is important because it allows "rethinking the constitutional relationship between science and governance"[11].

Many European documents put wide public participation at the core of the new approach to science in policy-making. Public policy-making is no longer the result of a top-down process by which political leaders only are empowered to take decisions. It is a mixed top-down and bottom-up structure by which different sectors of society wield power and authority, and can influence and enact policies concerning public life, social end economic developments. Moreover, it is no more assumed that science can always reach certainty, and that once advisers have spoken uncertainty is removed. A notable consequence of this new socio-political vision is that fresh social actors (e.g. NGOs, interested parties, associations, and lay people) are entitled to actively participate in decision-making.

The European Commission supplied a great impulse in this field in 2001, when the White Paper on Governance was issued. This document frames a new political process where consultation and co-operation with different levels of society is included in policy-making. The objective of the White Paper is to emphasise the emerging concept of governance as the "rules, processes, mechanisms and behaviours that affect the way in which powers are exercised at European level, particularly as regards openness, participation, accountability, effectiveness and coherence" (White Paper on Governance: 2001; p.8). Governance is "the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken. It includes formal institutions and regimes empowered to enforce

[11] See the JRC IPTS Workshop on Science and Governance, June 2000.

compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest".

This changing vision of policy-making today is parallel to the changing meaning of responsibility over time:

- Trascendental framework:
    - Individual responsibility: everybody is responsible *per se*
    - Collective responsibility: society is jointly responsible[12]
- Post-trascendental framework:
    - Co-responsibility: anyone is personally responsible for his/her actions, as each individual is an active member of the collectivity.

In a co-responsible society, everybody is part of the process by which public policies are made and hold responsibility for their own actions. A joint policy-making calls for a boost of communication and co-operation among the diverse actors of society. The implications of this approach for the governance of science are of immediate understanding. If everybody is entitled to raise attention over an issue and manifest his or her own idea in policy-making, ignorance is as important as uncertainty. If science is flawed then expertise is not confined to scientific knowledge only, but is broadened to practical and lay knowledge, and policy-makers must act in accordance to a multi-sectoral and multi-disciplinary expertise.

The EC new approach to policy-making is not uncontroversial. Assuming that policy-making should be opened to broader participation where public knowledge holds a central role in policy-decisions may hinder the effectiveness of the process. Main theses and antitheses on the implementation of a more inclusive approach are presented in the Section below.

[12] By way of example, collective responsibility manifests in the area of environmental protection.

4. The danger of fashion

There may be risks associated with an inclusive policy-making process. As discussed above, the emphasis on wide public participation and the trend to broaden expertise to lay knowledge may lead to an over application of the Precautionary Principle in cases of *unknown unknowns*. In particular, some claims that the new policy-making model risks relying excessively on social claims and fears. A major consequence may be political inaction and a blur of roles between science and policy-making. The following pages analyse the pros and cons of the new EC model[13].

4.1 Scientific knowledge versus emotional wisdom

The EC guidelines and many other European documents (such as the White Paper on Governance and related documents from the Working Groups) propose a policy model where social perceptions of a policy issue are as valuable as scientific evidence. Lay knowledge enters policy-making and ignorance is as important as scientific uncertainty.

There are however preoccupations that an excessive heeding on public concerns may open the policy-making process to major risks.

A first counter argument to a more participatory approach is that policy leaders should not undisputedly hinge on social concerns. Listening to public worries is not always sensitive, because they may provide emotional hypotheses rather than factual evidence. The public has an instinctive wisdom and public opinion is sometimes fickle and not very helpful. Moreover, public perceptions of scientific and policy issues often depend on mass media's broadcasts.

Of course it is important that policy-makers are sensitive to social claims. Politicians are elected to serve society and their re-election depends on the ability to satisfy their constituencies. Therefore, it is important to pay attention to the process by which a mere fact is transformed into a socially and politically relevant issue. This may help avoid unnecessary propaganda over a fact. In particular, mass media hold an active role in transferring scientific evidence from scientists to policy-makers and the public. Their power can be viewed from two angles. First, mass media select the flow of information that is passed on to the public. In performing this task, they may influence the public emphasising or manufacturing stories that capture wide social interest. Second, the complexity of scientific evidence makes it difficult to translate the scientific jargon into easily understandable concepts. Third, dissemination of both conformist and non-conformist science may be misleading and distort public perceptions.

Surveys conducted on public understanding of climate change policy show that public perception of climate phenomena vary across States and do not always reflect the actual

[13] This Section is indebted to Dick Taverne and Hans Von Storch's contributions at ENSIPP Final Conference.

physical phenomenon[14]. Results demonstrate that scientific evidence is not thoroughly comprehended by the lay people and that the lack of communication between science, policy-making and society at large is a limit to a credible output. Among main consequences is that sometimes the public may be induced to fear the implication that scientific advancements have for the quality of life.

4.2 Over application of the Precautionary Principle

A second thesis enshrined in the EC policy-making model is that we should not only take account of *uncertainty that is known about*, but also of *uncertainty that is unknown about*. This implies that the Precautionary Principle should be invoked also in the case of *unknown unknowns*. This approach originates from the fact that science is no longer seen as likely to deliver definitive evidence. Also, past experiences showed that governments failed to protect society from major disasters and natural hazards. This second thesis can be counter argued in many respects.

A second antithesis considers that invoking the Precautionary Principle in case of *unknown unknowns* might be the recipe for no action at all. The Precautionary Principle is a political principle that should be applied in the absence of sound scientific certainty. Its implementation should not be excessively affected by public fears. Many scientific theories are in fact highly successful and inform analysis leading to policy decisions (OXERA Report: 2001). One should not loose their belief in reason and their optimism in science. From a methodological point of view, science aims at testing a range of hypothetical explanations of natural phenomena by means of predictive models. By relying on the principle of scientific induction, it is "a philosophical development that looks primarily to experiment and to empirical data to provide evidence about truth". This means that science can still be capable of providing "objective consideration of the results of experiment" (Scott Cato, Busby and Bramhall**:** 2000), The public has not fully abandoned their belief in the scientific establishment. This shows in the fact that society still expects science to provide reliable solutions to tackle socially relevant problems. Scientists are still and increasingly solicited to advice on issues holding a robust scientific or technological component. The current prevalent distrust in the scientific establishment collides therefore with recognition of its having been crucial in making our lives healthier, wiser, and happier (Maddox: 1995).

4.3 Political versus scientific responsibility

A third antithesis to a participatory approach in policy-making is that an increasing recourse to the Precautionary Principle may mix scientific and political responsibilities up. This may also jeopardise the success of the policy-making process and the effectiveness of the final output.

Science cannot be subject to a form of political control. This would lead to the pre-enlightenment days where politicians had official and ideological control over scientific

[14]The reference is to surveys conducted among North Americans, Italians, German and Danish climate scientists by D. Bray and H. von Storch and among German policy-makers (federal and States) by D. Bray and K. Krűck.

findings. Science and policy-making belong to two separated worlds and ideology should not mix with the scientific method. Also, science has always been an elite activity that responds to meritocratic and not democratic principles. On these assumptions, it is fundamental to maintain a separation between scientific and politicians' roles within the policy-making process.

Politics is for politicians. Their critical functions consist in determining the legislative framework in which policy-making can operate; defining the boundaries of that framework and embark on a daily interactive dialogue with society. It is important that they wield their legitimate role of political leaders over questionable social claims and scientific authority. The public must be consulted and involved in policy-making but not made the judge of what a public policy should be: past practices show that unpopular legislation may in time become popular[15]. In the words of the European Commission, "coherence - one of the principles of good governance - requires political leadership" (EC White Paper on Governance: 2001, p.10). Politicians are elected to take decisions and exert their political role, not to hand over their power to non-elected scientists. Policy-makers must also ensure that science is applied in a profitable way, and that the best use is made of uncertain and vested knowledge.

Responsibility applies also to policy advisers. Scientists need recognise their role within the policy-making process, be responsible for the advice provided and endeavour to better interact with policy-makers. Policy-making requires strength of analysis and good scientific judgements, and science must provide explanations for their evidence and findings (EU guidelines: 2002, p. 10). The emphasis on accountability allows reviewing current expertise while being used (an exercise typically confined to peer reviews), thus offering the ground to amelioration and adaptation strategies to scientific advice.

On the basis of the theoretical analysis conducted in the previous pages, the following Section focuses on a set of case studies that has been produced by ENSIPP to provide a practical overview of the relationship between science and public policy across Europe.

5. The case studies

This Section analyses how the relationship between science and policy-making works in practice. This is done by presenting a set of case studies that have been developed by ENSIPP in a year of networking activity. Current practices have been mapped with a threefold objective: (1) to understand where we are in terms of actual procedures; (2) to detect examples of good and bad practice; (3) to identify a set of questions that address main shortcomings of the process, with a view to provide the ground for further studies in this area.

[15] E.g. the introduction of a law against drink and compulsory seat belt when driving.

Table 1 provides an overview of the case studies. Three working groups have been identified along the policy-making cycle.

Table 1: Overview of case studies

WG	PARTNERSHIP	CASE STUDY
WG1 PRE-POLICY DEFINITION	Rathenau Instituut – Rapporteur	The Dutch debate on cloning: agenda setting as a matter of process.
	UCC	The controversy over MMR vaccine in Ireland.
	JRC IPTS	The Communication of the European Commission on the Precautionary Principle.
WG 2 POLICY DEFINITION	Pitchill Consulting Ltd. – Rapporteur	Fish catch allocation.
	VDI-TZ	The definition of health policy priorities in Europe.
	Ministry of Trade and Industry (Finland) Technology Department	Use of research in the preparation of decision-in-principle of construction of a new nuclear power plant in Finland (the preparation especially in the Ministry of Trade and Industry).
	FEEM – Rapporteur	The 1996 EC review of the Single Market Programme.
	JRC IPTS	Input of scientific advice in Integrated Pollution Prevention and Control (IPPC).
WG 3 POST-POLICY DEFINITION	IRSN	Application in France of the European directive on basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation.
	CFS - University of Athens	Thematic evaluation on RTDI in the less favoured regions.

5.1 A wide spectrum of approaches

The case studies focused on solicitation and elicitation of scientific advice across States. The analysis has been conducted along the following stages of the policy-making cycle:

- Pre-policy definition phase (framing and identification of new needs and problems; agenda setting);
- Policy definition phase (decision-making phase);
- Post-policy definition phase (implementation, ex-post assessment).

Two remarks can be made. First, the comparison among case studies showed that varying typologies of approaches are employed at national level to resort, use, and apply scientific advice in policy-making.

Second (and connected to the first remark) public procurement of scientific advice bears heavily on the typology of the national research system (centralised versus decentralised systems). States characterised by a highly centralised and bureaucratic research system are likely to opt for a *close approach* to advisory processes. Conversely, States traditionally opener to social consultation are opener to participatory procedures in public policy-making. Many Countries are currently striving to revise their in-house advisory bodies. This is particularly true for those Countries that are undergoing a comprehensive domestic reform or that are building a before-missing framework on public procurement of scientific advice. This is mostly a response to the latest developments in science and technology and the subsequent emergence of socially sensitive problems requiring political intervention (e.g. BSE, GMOs, and so on).

Based on these findings, we developed a matrix for the governance of science. The aim was to classify all case studies depending on the degree of *openness/closeness* of their advisory procedures. The *open* and the *close process* represented the extremes of the matrix. Results are merely indicative and purely aimed at facilitating comprehension of the issue at stake.

> *Open process*. The public is involved, stakeholders and pressure groups are invited in, and scientific evidence is treated just as another stakeholder community. Both dissemination of information and public participation is widely sought.
>
> The case study on *the Dutch debate on cloning. Agenda setting as a matter of process* developed by the Rathenau Institute offers a good example of an open advisory process. Following public unrest and wide interest showed by mass media on the cloning of sheep Dolly, in the spring of 1997 the Dutch Parliament asked the Minister of Health Care to organise a public debate. The Rathenau Institute was asked to organise the public debate and to provide advice to set the political agenda. The main objective was to start a public debate on a political sensitive and emotional issue and to inform politicians on the ethical and societal implications of cloning. The advisory process was a success in the sense that it had a structuring impact on the political agenda:
>
> - It broadened the array of issues to be considered at policy-making level (e.g. it drew attention on GMOs);
> - It generated wider societal interest.
>
> The process represented a clear attempt to define what a (organised or proper contribution to a) *public debate* is. Different types of actors were involved in the process, distinguishing *experts* from *institutional stakeholders* (e.g. associations and organised interest groups) and the *general public*. The public was duly informed of the proceedings, but not overloaded with information. It was also clear that a distinction between the concepts of *representative of the public* (i.e., likely to say similar things as the whole of the public; this is what the public panel was for) and *representing the public* (i.e., speaking on behalf of the people; this is left to the representative institutions of the democratic process) was necessary.

Close process. It is assumed that the government knows best, and central staff from the government is entitled to decide how science has to enter the policy-making process. No consultation with society is sought during the different phases of policy-making, and the procedure is kept internal.

The French case study on *the application in France of a European Directive on basic safety standards for the protection against ionising radiation* produced by IRSN represents the other extreme of the advisory process.

The advisory process was initiated and solicited at ministerial level. An inter-ministerial Committee was created for the purpose, and supervision activities rested on the Department of Health and the Department of Work. Further, the Department of Health consulted two experts groups to resolve the questions left over by the European Directive. Expertise was formally external to the political body but deeply intertwined with it. The process was completely internal to the political sphere:

- No real mechanism of selection was followed as France uses a specific permanent advisory structure and independence does not play a major role;
- Neither participatory procedures nor dissemination of information heeded.

The French case study sheds light on the interaction between science and policy-making in a Country where the organisation for safety and radiation protection is rather centralised. This is a very border example of public procurement of scientific input. Conversely, the Netherlands are traditionally opener to inclusiveness and participatory procedures. Between WW 2 and 1970 scientific input to policy grew in importance in the Netherlands. This led to the establishment of a knowledge infrastructure that, although repeatedly restructured, is still in place.

Between these two extremes, a wide spectrum of different approaches is employed. There is an array of procedures on many aspects of the interplay of science and policy-making. This applies to the definition of terms (what is an expert, which categories are comprised in the term *stakeholder*), and the procedures followed to initiate the process (expertise is oddly sought along the different stages of the policy-making process: pre-policy definition; policy-making, and post-policy definition); the type of expertise sought (*scientific knowledge* vs. *practical knowledge*) and the degree of interaction with policy-makers (interviews, workshops or other means); the role of stakeholders in influencing policy decisions, the means of public consultation (interviews; advertisements; meetings targeted to gather up the public, conferences, social participation to policy-making meetings), the typology of advisory bodies (e.g. ad-hoc, long standing advisory bodies, in-house vs. external advisory bodies) that is largely dependant on the existence of national scientific reference systems vs. reshaping on domestic frameworks. Other relevant dimensions include the selection of experts (in-house expertise vs. external consultants, individuals vs. groups of advisers, governmental selection, tendering processes) and the criteria to select the experts (independence vs. competence and integrity, transparency and openness). Risk management, risk assessment, and risk communication, the breadth and forms of participatory procedures (participatory procedures as robust involvement, mere

consultation along different phases of the procedure, simple disclosure of information when a public policy is taken) are other important points, but there is not a clear theoretical understanding over them.

The existence of disarray of approaches to solicitation and elicitation of scientific advice increases the options and demonstrates that a multiplicity of alternative frameworks can be adopted. The topic is also delicate because it is related to the type of national research system. On hindsight, although chosen to represent a good example of open advisory process, the Dutch case study showed some inadequacies, as well. First of all, the issue of human cloning was rapidly put aside, notwithstanding widest public concern and worries. Secondly, the process was criticised by the Minister of Health Care for failing to reach the public at large. Such scenario confirms that a lot still need to be done to improve understanding on public procurement of scientific advice.

Fragmentation of advisory procedures across national cases confirms that a classification system is urgently needed to efficiently address public procurement of scientific advice. In particular, the case studies raised some fundamental questions that point to the main shortcomings of the current relationship between science and policy-making.

5.2 Main questions for research

Based on the case studies' comparison, we identified a set of core questions that address main critical points and controversial dimensions that came out of the debate and that need further investigation. It is our belief that the provision of valuable answers to these questions may improve the way in which a responsible government takes account of scientific advice.

A first class of questions concerns the procedures for recruiting and selecting scientists in policy-making.

> Which scientists? Who chooses them? And following which set of criteria? Who decides which scientists to exclude? Which scientific discipline or disciplines? What questions will they be asked? How will their biases and prejudices be managed? Can the experts detach themselves from their interests? Can experts put their interests aside? If decision-takers exclude their advice, are they taking appropriate account of science? If decision-takers rely on science, are they failing to take proper decisions? Can we distinguish between independent science and lower-order science?

A second set regards the role that stakeholders may play in the process.

> Which categories does the term stakeholder refer to? Those who are involved in the decision? Those who are affected by the consequences of that decision? How are they involved in the process? Whom do the NGOs represent? What is their role in policy-making? Do they represent society? Do they speak for the activists? Can it be argued that NGOs' role is to reach a compromise between industry associations' interests and the public? Who speaks for other stakeholders, those affected by the decision? Is it purely the elected representatives in the parliament? Is it the government ministries? Is

it the lobbies? Who speaks for the unrepresented? Can mass media be considered as stakeholders?

A third class centres on the need to open the process to public participation.

> How to involve the public? Who should be involved? The people? NGOs – meant as a filter between policy-making and society? And whom do NGOs represent? How to exclude some and include some others in the process? By means of interviews, meetings, and workshops? Is public involvement evenly important regardless the policy level? If not, along which phase of the policy-making cycle? In regulatory bodies? In the discussion? In policy formulation? How to balance between public claims and political responsibility?

A fourth class of questions focuses on the fact that sometimes decision cross borders.

> How is the view of people indirectly affected heeded? Giving that whatever is decided someone might lose how are the farmers, the public, the Institutions of the State all taken on board? How is an issue likely to affect different states to be handled?

A fifth class of questions concerns the place of science in parliamentary democracies.

> What is the role of politicians if they hand over responsibility to scientists? Can a blur of roles have reverse effects on the democratic process? And to what extent can the democratic system be hindered? How to balance between scientific evidence and political leadership? Are politicians equipped to fully understand scientific evidence? Where do the problem of understanding between science and society comes from? Can policy assume that once the scientist has spoken uncertainty is removed?

The above-listed questions try to cover the many dimensions that make the relationship between science and public policy-making today. Based on main conclusions drawn from the case studies and capitalising on the theoretical analysis presented in the previous Sections, we identified a set of recommendations to improve the public policy-making process. In particular the set aims at providing guidance in cases of scientific uncertainty and high social relevance.

6. A set of recommendations

The case studies show that a wide richness of procedures inform the relationship between science and policy-making across States. Variety reveals that it is not possible to identify a *best advisory process*. The achievement of a *better governance* – where no ultimate solutions are given - is more feasible than *best governance*. The latter is in fact a desirable ideal, whereas 'better governance' is achievable in real terms. As the European Commission reports, "European debates on key issues using expertise can either exacerbate national cleavages (…) or may contribute to 'Europeanising' the debate (…)" (Working Group 1b Report: 2001, p. 2). Current practices also show that there is ample disagreement across national procedures over the concept of public

participation in policy-making. In particular, the place of experts and stakeholders in the advisory chain and the extent of their inclusion need further investigation. A clarification on definition of terms is strongly advocated.

The debate on the case studies has however allowed identifying the following points of agreement: **(1)** independence is never attainable; **(2)** competence and integrity are 'musts' in selection advisory procedures. Most case studies showed a tendency towards **(3)** a wider participation, although there is no agreement over the breadth and degree of public involvement in the process is not clear. Also, the whole process by which scientific input is included in public policy-making must be more transparent. The boost of transparency may represent a great impulse to restore public confidence in scientists and politicians. It covers the following dimensions: **(4)** transparency is not equal to openness; **(5)** public participation is essential; **(6)** experts must be distinguished from stakeholders; **(7)** targets must be distinguished from mechanisms. Whilst being strongly advocated by ENSIPP, no agreement was achieved on the strategy needed to boost transparency in all its dimensions. Each principle is briefly discussed in the following pages.

6.1 Independence is never attainable

> Current practices across States show that there is no such thing as an independent scientific advisory body. Independence is not attainable in reality as experts have often personal motives and vested interests in the decision-making process.

Independence of experts would be ideal to ensure that scientists do not have personal interests in the issue under political scrutiny. Reality proves that scientific evidence is not *value free*. That may be due to institutional links between advisory bodies and policy-making, personal interests with the issue at stake, or financial interests (as in the case of stakeholders). Current practices show that advisers are often part of the national scientific system (e.g. the UK case study). Policy-makers hinge on in-house expertise because it is easier, it is trust, or it shares political viewpoints. In-house expertise sometimes weigh more than that supplied by other forms (e.g. external consultants) and its contribution to policy-making is more incisive. It may also be the case of established long-standing relationships with the political system that make it unlikely to claim interested-free science (e.g. the Italian or the Greek case studies). Sometimes independence is formally a *conditio sine qua non*, although it is informally accepted that advisers hold some form of personal judgements and beliefs due to long-term established relations and repeated work with policy-makers. Finally, some other practices exclude outright the recourse to external advisory bodies, and internal expertise is considered sufficient to provide reliable advice (e.g. the Finnish case study).

6.2 Competence and integrity of experts are 'musts' in scientific advice

> Most case studies show that competence and integrity are core principles of any scientific selection procedure. Their consolidation as eligibility criteria counteracts the absence of independent advisory bodies. Moreover, they guarantee the excellence of scientific advice.
>
> Established expert bodies may be freer, as long as a distinction with the policy makers is maintained and some degree of competition is guaranteed.

In the absence of independent scientific advisory bodies, it is fundamental to ensure that experts are competent and act with integrity. Some case studies report that there is no trade-off between independence and competence, and that the latter is largely preferred to the former (e.g. the IPTS case study).

Overall, scientists must hold scientific/practical knowledge in one or more disciplines, familiarity with alternative and non-conformist views, proven experience, capacity and aptitude to interact with others (e.g. the Greek case study). Further, they must guarantee that sound methods of analysis are employed and a well-established network of highly qualified advisers is built (e.g. the Italian case study). These criteria assure that the expertise consulted is multidisciplinary and multi sectorial and that a scientific problem is analysed from a variety of perspectives. Integrity is another important criterion for eligibility in the selection procedure (e.g. the Greek case study). Experts must engage to behave properly – i.e. not taking personal advantage of the policy making process - and perform the tasks assigned to the highest possible standards. They must also declare any interests they may have in advising the policy-maker.

The promotion of competence and integrity is a means to ensure the excellence needed to provide a robust and credible scientific advice. This in turn may improve the quality and efficiency of policy outputs.

6.3 Transparency is not equal to openness

> The process by which scientific input is included in policy-making must be more transparent. It is important to distinguish between transparency and openness.

Society at large must be proficiently connected to science in policy-making by guaranteeing that the public is informed. This is especially important in the case of issues raising widest social concern. It is important to stress that transparency is not the same as openness. The former means making the process visible to the public by (1) allowing access to policy-making, e.g. to meetings where scientific advice is produced; (2) publishing scientific information and proceedings, minutes, reports, main findings; (3) and clarifying the process by which a policy-decision is taken.

Transparency implies that the public must be informed in an intelligent way, and not overloaded with unnecessary information. The boost on transparency does not mean that all pieces of information should be evenly disclosed to the public. Sometimes, information is disclosed in a way that makes the policy-making process obscure rather than more understandable (e.g. the Irish case study). Attention should be paid to the way

non-definitive, controversial and alternative scientific visions are disseminated to society, particularly when they are likely to puzzle the public or cause fears in society.

A transparent process would benefit the relationship between society, the scientific establishment and politicians. As the European Commission suggested, more transparent procedures would reduce public distrust in the scientific establishment and in political leaders (Report of the Working Group 1b: 2001). Second, transparency guarantees that the advice is socially robust and credible because it has been conceived keeping the public duly informed. Third, a more transparent process enhances accountability.

6.4 Wider participation

> It is essential to promote wider public participation in policy-making. This may help increase the visibility of the advisory process and strengthen its final output.

It is largely held that society should play a larger role when public policies enshrining a scientific component are made and that the public at large should be involved to scientific policy-making. It is also important that political strategies are understood, shared, and accepted by society. The pervasiveness of policy decisions depends in fact on the ability to ensure that policy procedures are representative of society and grant equal opportunities of participation to all parties.

The strategy towards a more socially inclusive policy process may help regain social trust. A wide participation is also at the core of a democratic process, and an instrument through which politicians may maintain a broad social consensus.

Current debates and practices show that there is no agreement on the exact extent and breadth of participatory procedures. For example, public involvement cannot be equated with public concern (e.g. the Irish case study). If citizens do not express an opinion over a topic, it does not mean that they do not hold an interest in it, but that they might not have been consulted adequately. It may be the case that a public panel represents the people but it is not representative. In this case, there is the need to promote more incisive participatory procedures that respond to the needs of society, particularly when the policy issue affects everyday life or has ethical implications. It is important to offer some criteria of common understanding that do not de-legitimise the process. In fact, “participation is not about institutionalising protest. It is about more effective policy shaping based on early consultation and past experiences” (EC White Paper on Governance: 2001, p.15).

It is also important to consider that citizens may provide emotional hypotheses rather than factual evidence. The public has an instinctive wisdom; public opinion is sometimes fickle and not always helpful, particularly when it depends on what is disseminated by the mass media. If we take account of *uncertainty that is known about,* but also of *uncertainty that is unknown about*, we risk invoking the Precautionary Principle in the case of ignorance. An over application of the Precautionary Principle in case of 'unknown unknowns' may lead to political inaction. A second major risk is to blur roles and responsibilities between scientists and policy-makers.

6.5 The need to distinguish between experts and stakeholders

> It is fundamental to distinguish experts (academic knowledge) from stakeholders (practical experience).

To be effective, expertise must be multi-sectoral and multi-disciplinary. It can take the form of both scientific knowledge (e.g. academics and experts) and practical experience (e.g. stakeholders). Both types of experts may offer valuable contributions, alternative viewpoints and non-conformist visions to policy processes. However, it is not easy to draw a distinction between *what is an expert* and *what is a stakeholder*. As expertise may bear relevant at any stage of the policy-making cycle, it is also difficult to decide at which stage consultation of scientific vs. practical knowledge may be more important.

The case studies confirm that a variety of approaches can be employed across governments to define experts/stakeholders role in the policy-making cycle. Also, the term *stakeholder* may cover a vast range of categories holding diverse interests and roles in society (NGOs, consumers, experts, mass media, and so on). Therefore, stakeholders can serve two different and clashing roles within the policy-making process: they can either be solicited to consult the policy-making because they hold practical knowledge in a policy area; or they can be affected by the consequence of the policy-decision, and acting as interested parties. Overall, this concept raises more questions than supportive answers and further investigation is needed.

6.6 Targets and mechanisms

> It is important to maintain a clear separation between targets and mechanisms. Targets are a political responsibility, whereas mechanisms are a scientific exercise.

It is a political responsibility to define a policy target. This comprises the identification of the remit and the framing of the questions to advisers. Politicians' critical role consists in determining the legislative framework in which policy-makers can operate, define the boundaries of that framework, and embark on a daily interactive dialogue with society. It is important that they exert their legitimate role of political leaders over social claims and scientific knowledge.

Conversely, it is on scientists to define mechanisms. This exercise encompasses risk assessment and communication of scientific evidence to policy-makers. Advisers must perform their tasks with competence and integrity, disclose any interests they may have, provide explanations for evidence and findings to the policy-making, and supply strength of analysis and good scientific judgements.

This separation of roles must be maintained also when political power is devolved to science. Devolution can be productive (e.g. the UK case study). However, it can only be useful when strategic political targets and tactical choices are distinguished. Such strategy allows for socially relevant targets to be more reachable. Besides, democracy gains power in the sense that power is shifted from the few lobbies to the many electors because they participate in the socially relevant target influencing its achievement. This ensures that the system is not hindered by a de-legitimating dynamics. In this

perspective, the deliver of reliable and efficient policies depends on political leaders and advisers' ability to reinvent their core mission.

6.7 Communication strategies between science and policy-making

> The essence of a proficient connection between science and policy-making lies on the ability to set off positive communication procedures.

There is a lack of proper communication between science and policy-makers. Science is made up of a variety of application fields. It is characterised by a federation of diverse specialist fields, and politicians often get confused by the wide range of scientific terminology and the lack of a common language. Politicians are also misguided by the scientific tendency to explain and present their models before presenting facts. Scientific evidence is more likely to be acted on and discussed when it is delivered in an understandable language. Sophisticated economic statements may in fact generate uncertainty to those supporting the government proposal, and provide counter arguments to those whom are not sympathetic to the government proposal.

In this context, the ability to give scientific advice to policy-making requires a twofold action. First, science needs insights into the policy making process; second, the ability to solicit inputs from the scientists requires knowledge on the scientific world. The public also must be educated to enter the policy-making and instructed to cope with scientific innovation, whose effects are often long termed, unpredictable and irreversible.

6.8 The definition of success

Based on the case studies, we tried to develop a definition of success. Success can be defined from two different angles, depending on the process (e.g. agenda setting, frequency of resort to expertise, mechanisms of selection, etc.) and the actors involved (e.g. the role played by experts, stakeholders, policy makers and takers).

In broad terms, it is difficult to define what makes a case study successful or not. A case study may in fact be successful in reaching the public and stimulating societal debate. It can be a failure in transposing expertise into the policy making, or in disseminating results. Two approaches to the notion of success have been identified, neither of which is meant as exhaustive.

The first approach focuses on the definition of a *successful process*.

> A process is successful if it reaches the political objective using all relevant knowledge available and if it is perceived as such by the public. It is assumed that a process is not successful if it fails to convince the public.
>
> In a successful process the question is properly framed and iterated. Stakeholders are properly and intensively consulted. Essentially, they are recruited to frame the questions, get sound policies, and get informed consent and trust.

The final decision is taken by the proper decision-taker, not by stakeholders or scientists.

The second approach addresses the definition of a *successful output*.

The definition of a successful output is relative. It can be viewed from different angles:

- Stakeholders (according to their interests)
- Society as a whole (according to the degree of protection guaranteed and the impact)
- Decision-takers (according to political targets)
- Everyone

There is no comprehensive definition of a successful output. It is also important to consider the time perspective adopted: in the long term positive short-term effects may in fact turn negative.

Concluding remarks

The principles listed above are considered complementary and interrelated. Success depends on the ability to pursue them in parallel, by means of co-ordinated actions and a common framework that is respectful of national systems. It is clear that further efforts are needed to identify main shortcomings of policy processes across States and improve policy uses of scientific knowledge. In the end., the desired outcome of an improved strategy to scientific input in policy-making may be twofold. First, an improved advisory procedure may enhance the credibility, soundness, and effectiveness of public policies. Second, the set of recommendation may help restore public trust in the scientific establishment and policy-making.

Annex - what is ENSIPP?

ENSIPP brings together policy makers, advisers, and researchers studying this subject with the primary objective to examine, inform, and improve the process by which governments make policy in areas where science and technology are significant. This main objective can be broken down into the following four subsidiary objectives:

- To characterise the problems that regional and national governments and international organisations have when making policies in which science and technology are significant;
- To identify the mechanisms by which they solicit and elicit scientific advice;
- To share examples of best and worst practice;
- To test mechanisms for obtaining scientific and technological advice against a range of governmental structures.

ENSIPP examined the process by which science is incorporated in the policy-making process by:

- Comparing and classifying a set of case studies, with a view to identify examples of good and worst practice;
- Reviewing the literature in the field, particularly considering the contribution provided by the White Paper on European Governance and the sets of guidelines on the collection and use of expertise issued by the UK, Canada and the European Commission;
- Enhancing understanding on the relationship between science and policy-making, especially favouring interaction among ENSIPP members. Different classes of actors holding varying backgrounds and interests are assembled in order to provide a wide range of perspectives on the field at stake while offering momentum for co-operation and comprehension.

Attention is on issues where there is scientific uncertainty, either because of inherent variability, because the science is incomplete or controversial, or because data are inadequate to support a definite answer. Many issues are also characterised by a balance of risk, where there are costs and benefits linked to different policy options, and the policy-maker must choose. Finally, *science* needs be interpreted broadly in order to avoid considering only policies that depend on the physical sciences; analogous problems in fact occur where the advice is based on social or economic sciences alike.

ENSIPP focused especially on the role that stakeholders have in proficiently consulting and advising the policy-making. The network also investigated the role of public participation in public policy-making. The place of society in policy-making is another important dimension. In fact, most part of the highly scientific and technological issues that require public intervention raise great public concern (BSE, the release of GMOs, nuclear waste disposal). Another strand comprehends those issues raising less immediate concern to the general public but holding considerable political importance, particularly where they are seen to have trade implications (safety of asbestos, setting of interest rates by central banks, and netting of tuna). Finally, other issues hardly attract public attention but still require public policy to be reconciled with the constraints of science and technology (the allocation of radio frequencies and the selection of optimal design of road junctions).

A.1 Work plan

Three phases can be distinguished.

The First Phase - Introduction and Definition of the Programme – was targeted to favour understanding among partners holding different backgrounds and competence and provide insights into national approaches to scientific input to public policy. The First Network Workshop was organised and hosted by University College of Cork (UCC) and held in Cork (Ireland) on November 14th/15th 2001.

The Second Phase - Parallel Working Groups –explored the 10 case studies developed by the 3 working groups with the aim to come out with a set of useful recommendations

on how to improve the system. The Second Network Workshop was organised and hosted by Fondazione Eni Enrico Mattei (FEEM) and held in Milan (Italy) on June 3rd/4th 2002.

The Third Phase - Synthesis and Dissemination of results — was designated to present the ENSIPP results to the attention of an invited audience of proven advisers, experts, and policy-makers chosen among a plurality of methodological and disciplinary areas. The Dissemination Conference was organised by Fondazione Eni Enrico Mattei (FEEM) and was held in Rome (Italy) on November 28th/29th 2002. The Conference was structured along four Sessions, each of them focused on a specific topic.

Lastly, a group of ENSIPP partners were invited to report and exchange views on the network's major results to the representatives of VAST (the Italian Parliamentary technology assessment body - an acronym for Comitato per la Valutazione delle Scelte Scientifiche e Tecnologiche)[16]. The special audition was organised on November 27th 2002 and held at the Italian Parliament in Rome.

A.2 Definition of the Working Groups and the Case Studies

One of the priorities of the First Network Workshop (Cork, Ireland, November 14th/15th 2001) was the definition of the working groups (WGs) and the case studies (CS). The network decided to frame the WGs out of the policy-making cycle:

- Pre-policy definition phase (framing and identification of new needs and problems; agenda setting);
- Policy definition phase (decision-making phase);
- Post-policy definition phase (implementation, ex-post assessment).

The case studies were discussed on the basis of the following agreed objectives:

- Compare case studies as to identify common trends and discrepancies;
- Define and identify *success stories* and *failure stories*;
- Define the role played by stakeholders' consultation in determining success;
- Detect a common set of "good practice" in order to construct some "general minimum set of guidelines".

The case studies supplied a wide richness of procedures, attitudes, and relationships. The debate brought in new issues and raised fundamental questions to be addressed in the future. More exhaustive information concerning ENSIPP can be found at www.ucc.ie/ensipp. The web site is a major achievement of the network and is regularly updated to facilitate exchange of information and understanding among partners.

[16] VAST is responsible for co-ordinating parliamentary initiatives and activities relatdd to scientific research and technology application. The VAST takes part in international inter-parliamentary initiatives related to space, within the European Inter-parliamentary Space Conference.

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(lxx) This paper was presented at the 9th Coalition Theory Workshop on "Collective Decisions and Institutional Design" organised by the Universitat Autònoma de Barcelona and held in Barcelona, Spain, January 30-31, 2004

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