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Against the Science-Policy Binary Separation: Science for Policy 1.0

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Key takeaways:

- Science and policy are often seen as different worlds, ‘two communities’ which operate under different regimes.
- Their relationship requires more contact, cooperation and co-creation: science and policy separation prevents us from solving complex problems.
- Policymaking is not, as often assumed, a regular and linear cycle. Knowledge and evidence enter the process at many stages and in dispersed ways. With information overload, interests and even deliberate disinformation, it is unclear where to place trust. Closer links of scientists and policymakers build relationships necessary for sense-making.
- However, technocracy is not the answer. Policy is not made by science, or at least not science alone. It includes values, political concerns and a need to build majority coalitions. Evidence needs to be useful for developing policy solutions, but it will not replace politics.
- Co-creation, understood as interlinked collaborative approaches aimed to increase dialogue, trust, understanding of needs and diversity of input, can increase the importance and impact of evidence for the benefit of public policies.



A traditional view of the science–policy interface portrays two separate communities, each with their own principles, cultures and ways of working. Science and policy differ on multiple grounds: in the way they define and approach problems and solutions, the nature of their questions, timeframes and time horizons, attention spans and breadth of perspectives, attitudes to uncertainty. These contradictions are further heightened by the challenging environment in which they meet: messy multilateral political processes, floods of information, a changing media landscape and the growing importance of social media, both for content dissemination and identity building for voters.

Science has been involved in policy for many years, so the calls advocating for its prominent role are not revolutionary. However, 60 years since the inception of the JRC, we acknowledge that the times have changed. Supporting policy at arms length is not enough. The urgency of complex societal problems relies on the right combination of the best knowledge and a collective dialogue about values, to define directions for the future. This requires a new, more effective model of science–policy co-creation, in which not only scientists but policymakers should be involved.

Policy Is Not All (or Even Mainly) About Science

At the JRC, a scientific organisation with a mandate to inform policy, we are by definition convinced about the value of scientific evidence for public policy. However, this value should not blind scientists to the limits of scientific evidence in addressing policy issues.

The ideal of ‘evidence-informed policy’ is of a system of government where all pertinent evidence is considered (provided by a value-free scientific process), the full range of opinions listened to and a decision taken that optimises the values preferences of the citizens. The debate about the facts (‘analytical’) is ideally clearly delineated from the debate about values (‘normative’), with a linear policy cycle which establishes the evidence base, agrees the normative objectives of the policy before proceeding to identify options and then weighs their costs and benefits in order to make a choice. For various reasons, this model does not represent the reality of evidence-informed policymaking.

As [Jerome Ravetz \(1999\)](#) claimed, scientists often live with a flawed assumption about the nature of the policy environment, as if it welcomed routine puzzle solving by experts as an adequate knowledge source for decisions. In reality, the fundamental reason why evidence-informed policymaking is a difficult process is the fact that policy problems are of a different category to scientific problems because they not only have an analytical, scientific dimension but also a normative, values-related one. Policymaking needs to simultaneously find the necessary trade-off between the different values at stake and to find practical solutions to policy problems. Policy problems are ‘wicked’ ([Rittel and Webber, 1973](#)), which means that they cannot be unambiguously and neutrally defined, nor ever really solved. Their resolution, which has to be repeated over time, depends on political assessments (see more in [Chapter 6](#)).

Policymaking is a complex process that includes both an analytical and a normative dimension. This leads to a twofold problem. On the one hand, scientists and policymakers will define problems differently: one as something to solve technically, the other as a much more social process of negotiating solutions that have majority support. Therefore, their thinking and



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problem-solving strategies will be different, given that policymakers need to find the best knowledge and make sure it leads to a consensus or at least a majority on values, i.e., is both technically and politically feasible. This parallel normative track interferes in the analytical one, as the norms and values must determine what evidence is commissioned, selected and how it is framed. Moreover, these ways of working form the culture of these groups, which shapes what they expect from their interlocutors. Unsurprisingly, they are sometimes puzzled why the other side is not playing by the same rules.

This duality does not make it impossible to include science in a policy process, but it is not an easy task, nor one to be taken for granted. The quality of the solutions notwithstanding, policy decisions can certainly be taken without science. Scientists and policymakers do not recognise sufficiently that the desire to inform public policy through scientific knowledge and evidence is not a law of nature but a value proposition that needs to be argued for. The case for informing policy through evidence needs to be made more explicitly by those who support it in a way that resonates with the values of citizens, not only of fellow scientists.

There are different types and definitions of evidence, but the assessment of them is also affected by these different standpoints of science and policy. Scientists can reject some of them as ‘unscientific’. Policymakers, due to the nature of their problems, need to take into account different types of evidence as legitimate (Schultz, 2013) such as their judgement of the trade-off between competing values, political ideologies, religious principles, their moral sense of right, anecdotes and a word of mouth, and so on. These concerns are all valid and must be incorporated in the decision-making, and the right mix of them is not scientifically quantifiable. After all, public debate in a democracy by definition must contain factual arguments and moral reasoning, the latter of which cannot be solved scientifically. Decisions in a democracy are therefore not cost–benefit optimisation equations. The values bases for policymaking may also be a better guide to public and political reactions, and thus the level of support for and success in the implementation of a policy.

A political process limited to claims based only on *scientific* consensus would therefore amount to a form of scientism and an alienating technocracy. Antiintellectualism and antiscience views are already becoming troublesome for scientists (albeit more nuanced than could be perceived, see Rutjens et al., 2018), and any claims to higher *moral* ground could heighten that trend. Therefore, with all good will to see their science influence policy, scientists need to understand that designing public interventions is a delicate balancing act between societal values, political priorities, competing interests and scientific knowledge making up evidence. The fact that scientists produce empirical data does not follow that they as a group should have a more privileged voice for their values in public decision-making than any other group.

Whether a solution to a question falls more under the realm of science or that of policymaking depends on two factors: how technical an issue is and at what point of policy



intervention it is considered. For instance, moral questions, such as abortion regulation, leave almost no room for scientific input, which cannot become the basis of a solution. [Pielke \(2007\)](#) used the cases of tornado response, ecstasy regulation and abortion to illustrate how a general principle of balancing between the science and political realm depends on how technical an issue is (see also an interesting discussion in [Craig, 2019](#)). Equally, science can play a more leading role at the level of policy implementation, as most often the crucial debates on values are resolved before a policy is adopted.

Not All Science Becomes Evidence Useable in Policy

In a digital world filled with unfiltered, decentralised information, everyone can claim to have some kind of ‘evidence’ backing their position. How should we define *legitimate* evidence to be systematically incorporated into the policy processes?

The terms ‘science’ and ‘evidence’ are often used interchangeably, but since evidence is a broad and ambiguous category with connotations beyond the realm of science, it is essential to clarify its meaning. In the context of public policy ‘knowledge based in science is presented as evidence to support reasons used in a policy argument (...) [it] is broadly taken to mean data, information, concepts, research findings, and theories that are generally accepted by the relevant scientific discipline’ ([Prewitt et al., 2012](#), pp. 7–8). Hence, evidence in the policy process provides a basis to help identify policy options and reach a decision, even if ultimately it happens by balancing knowledge with values and political priorities. However, as opposed to the justice system, judgements made using scientific evidence do not carry claims to absolute moral right or wrong.

Not all science automatically becomes evidence *for policy*. The road from science to evidence leads through an interpretative process and there is an inherent inferential gap between scientific findings and the ‘real-world’ conclusions ([Douglas, 2009](#)). Evidence always means *science contextualised*. [Justin Parkhurst \(2016\)](#) offered a useful framework for defining good evidence and good *use* of evidence in policymaking. It implies that while the overall scientific production is rich and potentially relevant for policy, only a fraction of it will become evidence useable for a particular policy decision. According to Parkhurst, good evidence for policy needs to fulfil three criteria to be appropriate for a specific policy in question:

- address policy concern at hand, instead of any loosely related topic;
- be constructed in ways useful to address policy concern, methodologically able to answer the questions at hand;
- be applicable to a local policy context.

Therefore, assessing whether the arguments made in a policy context are backed not just by any science but by proper scientific evidence relevant to the issue should be a concern in the policy process. It should be a task for scientists and scientific advisors.

Such contextualisation cannot happen without strong collaboration and sound mutual understanding between science and policy. For this, the science for policy field must move away from 1.0 model of parachuted, ad hoc advice delivered either unsolicited when it suits scientists, or in rush when policymakers suddenly need it. Instead, it should embrace



the continuous, long-term relationships with policy stakeholders, throughout the policy processes. To be relevant and incorporated into policy and societal debates, scientists cannot avoid engaging with the world outside of science (more on how to reconcile it with traditional norms of science in [Chapters 5 and 10](#)).

At the JRC, both in our conceptual thinking and in our daily practice as a scientific organisation, ‘evidence’ is inevitably understood as the result of a scientific process. It extends beyond impact evaluations or formal and informal data related to intervention programmes, as it is often framed ([Ball, 2018](#)). We link the definition of evidence with the values and standards of robust, systematic scientific methods, their objectivity, transparency and openness for scrutiny. Democracy may not be all about science, but science remains the most reliable and systematic way of gathering knowledge about the world, even if not perfect. Simple opinions and anecdotes are not evidence, although we all, as citizens, have the right to them. They form an indispensable part of the policy ecosystem, give crucial context to final decisions and affect the success of a policy. If evidence is to be appreciated and incorporated in the process, they cannot be neglected ([Oliver et al., 2014](#)), and often can be incorporated into the evidence generation (see, for instance, [Chapter 8](#)). Still, they do not *constitute* evidence.

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In View of Trade-offs, Why Care About Evidence?

While almost all politicians and civil servants say that they appreciate how useful evidence is in building policy solutions ([Andrews, 2017](#); [Talbot and Talbot, 2014](#)) and are often ready to support ‘evidence-based policy’, the perception often remains that the uptake of research knowledge in government is low ([Head et al., 2014](#)). The recent ‘post-fact’ debate also appears to have devalued the place of science in policymaking, with some politicians pointing to the alleged citizens’ fatigue with expertise, although others saying this is exaggerated ([Institute for Government, 2016](#); [Jasanoff and Simmet, 2017](#)).

There is no growing trend in the high incidence of policy being uninformed, and the insufficient use or misuse of science is nothing new ([Oreskes and Conway, 2010](#)). Nonetheless, our democratic system, underpinned by the values of the rule of law and enlightened decision-making, assumes that the policy process is at least to a large degree rational. Politicians have at least paid lip-service to the value of expertise and rationality. In more and more countries, more radical views on the role of facts in policymaking appear to gain acceptance. There is also some evidence of acute disinformation on politically salient (or politicised) questions, like migration or vaccines. Hence, there is some urgency to strengthen the thinking and capacities of advocates for evidence-informed policy. Scientists and their organisations are natural contenders for that title.



Using evidence in policymaking clearly is a choice, given multiple other bases for policy interventions and decisions (Newman, 2017). But if we acknowledge that the policy decisions are legitimately influenced by a mix of factors and result from a political trade-off, why should we care about a strong role of evidence in this process? In our view, two arguments make a pragmatic case for evidence-informed policymaking, not reducible to values and simple preferences: 1) the complexity of global policy problems and the interconnectedness of global policymaking/governance systems and 2) the challenging environment that they create for development of robust, successful policies. The object and environment of policymaking are so complex that without evidence, we are at high risk of unintended consequences (Chalmers, 2003).

In the era of the ‘wicked problems’ (Rittel and Webber, 1973), the solutions developed without sufficient expertise and evidence are likely to fall short of success. The scale and inevitability of unintended consequences are too large to risk a nonevidence-informed decision. Costly regulatory or investment errors would likely follow. Equally, the interconnectedness of the global governing systems means that the spill-over effects of one policy action often bring consequences for other actors, on a global scale. Real responsibility can rarely be assumed only for the area directly under one’s formal jurisdiction, and the price of action extends beyond direct consequences in a local context. Complex governance also brings with it many actors with particular interests and often unequal power, which create ground for ‘proxy wars’: situations in which facts – and ‘alternative facts’ – are then exploited to back up value-based positions.

Using knowledge in a structured way can help distinguish values and power dynamics from facts in these debates. Even though science will not resolve the underlying value conflicts, it can help disentangle facts and values and refocus the debate. This can be achieved when science moves from periodical advising to participating on equal terms throughout the entire process. Advocating for the incorporation of scientific knowledge in the policy process is a value choice, even if it often seems like an *obvious* choice to scientists. There are no guarantees that an evidence-informed solution will inevitably be successful, but given the complexities, it may be the best bet.

Mismatches in Supply and Demand: What Separates Science and Policy?

Global science provides a cornucopia of knowledge of robust quality and relevance to nonscientific audiences. If policymakers and politicians want to arrive at working solutions, they have more than enough material to consult in their decision-making. Thus, this supply-demand equation should give a good basis for collaboration. Then why is engaging in evidence-informed policymaking an extremely difficult process, more of an art than pure science (Gluckman, 2014)? We offer two major explanations: one related to the differences between science and policy and their resulting separation. A ‘Two-Communities Theory’, stating that science and policy form distinct worlds, was formulated already in the 1970s (Caplan, 1979), and despite obvious evolutions (Newman et al., 2016), it remains relevant in some aspects. The other relates to broader factors which operate around the science-policy interface and limit the possibilities of even well-meaning actors on both sides.



What Divides Science and Policy?

The current separation between science and policy can be partly explained by large differences in institutional and organisational setups. Science advisory structures are often separated from the policymaking process, while universities and research institutes often do not have easy channels of access to policymaking. However, institutional setups are not all to blame.

Cultural divisions between science and policy are perhaps more pertinent. The two are so distinct that any fruitful collaboration between them requires major adaptations from both sides. Their practical modes of operation, as outlined earlier in this chapter, are difficult to align. The lack of flexibility to move beyond them poses a threat to successful evidence-informed policymaking, even despite plentiful supply and demand of knowledge. Mutual adjusting of norms and expectations can only be achieved through dialogue, relationships and mutual learning. Detached science, ‘injected’ without proper context, can only be half effective at best.

- *Timeframes*

A common cartoon image of a policymaker as someone facing urgent deadlines and demanding all inputs for yesterday is not so far from reality. With increasing pressures on governments to deliver, the life of policymakers is extremely fast-paced, with even tighter schedules for decision-makers ([Andrews, 2017](#)). This gives rise to spontaneous requests for knowledge and evidence, with high expectations and difficult timelines for scientists. Policy develops fast and expects answers to problems almost immediately, while creation of scientific knowledge, especially through new research, can take years. In such an environment, especially when scientists are not systematically kept in the policymaking loop, the effectiveness of scientific support is limited.

- *Attention Span*

Policymakers lack the time necessary to digest complex information and expect simple, clear messages. Given the typical scientific standards of methodological transparency and objectivity, researchers (with good intention!) often present material which is far too detailed and thus inadequate for the reality of decision-makers. The situation is less extreme for more operational, junior policymakers, but the mismatch often still exists. This gives little time for deeper reflection and making optimal use of evidence, and may result in ignoring scientists’ message entirely, if it fails to capture the attention or loses the competition with a more gripping policy brief or communication. For more on how to adapt to this reality in your communications efforts, turn to [Chapter 15](#).

It is also true that researchers, especially academics with additional teaching responsibilities, are extremely busy as well. Their tight schedules affect their willingness to engage with policymakers in the first place. Especially in situations where science is separated from and not solely mandated to contribute to policy, researchers have to juggle competing priorities, as a result often excluding policy engagement. Their current incentive structure for career progression puts it low on the priority list. However, once they include it within their activities, they tend to overestimate the amount of detail policymakers can process, simply because in their working culture, there is much more room for slower reflection.



- *What Counts as Future?*

Scientists and policymakers also differ in their usual definitions for what constitutes long-term and short-term visions and solutions. Purely scientific questions do not have strict deadlines. While research efforts are structured through funding cycles and specific projects, the production of knowledge is never finite. The horizons of scientific enquiry do not need to be limited to short-term timelines. Policymakers, on the other hand, most often prioritise short-term goals over long-term objectives. As [Andrews \(2017, p. 4\)](#) points out, ministers – as an example of particularly high-level decision-makers – have limited time to achieve their impact. Their typical mandates do not necessarily correspond to election calendars: ministers rotate much more often, which instils a mode of constant campaigning. On top of pressure for delivering, it also has a negative impact on the state of institutional memory. Both have important consequences for the science for policy relationship: loss of analyses already delivered, reinventing the wheel, and lack of incentive to think about the cycles ahead. In such a climate, policymakers rarely have comprehensive knowledge strategies which could strengthen the anticipatory culture and lessen the burden of unexpected urgent requests dictated by the fast pace of policymaking.

Scientists will not easily change this pattern of behaviour. Nonetheless, they may prepare themselves better by understanding the drivers of their policy areas, state of the debates, and anticipating knowledge needs on the policymakers' agendas. [Chapter 12](#) explores the techniques for building this anticipatory culture.

- *Attitudes Towards Uncertainty*

Science by definition incorporates uncertainty in its pursuit. Scientists are therefore more aware of its inevitability and perhaps more able to accept it as part of the interpretative process. Policymakers are less comfortable with scientific uncertainty and expect scientific knowledge to be 'more certain' than other sources. They also know that uncertainty in a policy proposal can undermine its success or even put an end to it ([Oreskes and Conway, 2010](#)). Therefore, communicating inherent uncertainty of scientific findings or policy projections in a constructive way is a difficult but also extremely important aspect of the science–policy interaction, which can have a decisive impact.

All these differences become even more heightened when an issue enters an openly political debate. The stakes are then usually even higher, with a debate that is less technical and less attentive to detail and nuance.

What Are the Challenges in the Science–Policy Environment?

- *Myth of a Mechanistic Linear Policy Cycle*

To understand the difficult reality of informing policy through evidence, one must also realise how misleading the metaphors describing policymaking really are ([Cairney, 2016](#); [Cairney et al., 2019](#)). The famous policy cycle is far from a logical and structured sequence of events, especially once an issue enters a political debate. The debates move in different directions and sources of knowledge influencing it are both numerous and difficult to scrupulously map. The ambiguity and complexity of policy problems, the inherent uncertainty of evidence (whether from knowledge gaps, poor communication of knowledge, conflicting evidence or information



overload) and the growing plurality of values preferences and difficulties in organising effective debates about values (including distinctly from analytical debates) mean that the policy process is very far from the ideal linear discussion.

The picture is even messier when one realises that the policy cycle would not repeat itself without people, who bring their values, inherent human biases and mental shortcuts into the process. Add to it multiple political interests and considerations and policymaking becomes more of a drama (Greenhalgh and Russell, 2006) than a calculated machine. While this chaos does not by default predetermine wrong decisions, often a perfectly rational course of action in the eyes of a scientist may be unacceptable due to the complexities of this process (Rittel and Webber, 1973).

There are no convenient, predetermined slots in the policy cycle where evidence can be mechanically injected and followed by a direct reaction. Timing is of course vital as policy processes are not random, but engagement happens not through one-off contributions in a defined stage of the cycle, but rather through continuous interactions with multiple actors. And even if evidence manages to reach the policy- and decision-makers at the right time, its final role in the debate and the decision is far from predictable.

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• *Information Overload*

Evidence-informed policymaking is highly difficult simply because we are flooded with too much knowledge and information. Sounds paradoxical? Although at first glance, we may appreciate a large supply of easily available facts, with this abundance of knowledge come issues of quality, robustness, choice and trust.

The amount of information available at our fingertips has skyrocketed throughout the years. We dispose of more and more sources of information, but do not necessarily have more consensus or clarity on *knowledge* that emerges out of it. Navigating this ocean of sources is almost physically draining and may pose further threats to rationality in decision-making (see Part 3 of Hallsworth et al., 2018). First and foremost, however, it creates several structural difficulties for using scientific evidence for policymaking, such as

- the challenge of properly assessing the quality of information, for the policymakers, decision-makers and the public, and ensuring that it is right and relevant for a given context;
- the competition between science and other sources of knowledge;
- the issues of legitimacy of using one piece over the other;
- the possibility to find ‘evidence’ backing any position;
- the lack of a universal canon and a broad community of knowledge (manifested in echo chambers and filter bubbles), where a real debate would be possible, leading to more consensus and clarity on the issues at stake.



All these structural challenges mean that making sense of knowledge is increasingly difficult, especially under time pressure in complex policy environments.

- *Media Landscape and Internet*

Too often the media misrepresent the scientific consensus and treat new or dissenting pieces of information with equal weight, for the sake of a 'balanced approach' or by attracting attention to novelty (Boykoff and Boykoff, 2007; Cook et al., 2018). Deliberate disinformation campaigns which target the public with false and carefully crafted messages further complicate this landscape. This ecosystem creates a dangerous playing field where different types of information compete for the scarce attention of the public and policymakers, especially in crucial public debates. At the same time, despite the sense of overload, the access to *high quality* information is substantially hindered, with many academic publications residing behind paywalls. Scientists' traditional ways of communicating need to evolve and adapt to better fit the public and political discourse. More on this can be found in [Chapter 15](#).

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Science for Policy: From 1.0 to 2.0

The challenges seem even more insurmountable when science and policy keep to their distinct cultures. Currently, in what we call a Science for Policy 1.0 mode, science and policy are too far apart. They cannot fully deliver on their promise of robust solutions in the era of complexity. Instead of a tight partnership across all stages of policy development and debate, they too often base their interaction on one-off interventions and detached, even unsolicited recommendations. This divide does not help with finding a more cooperative middle ground between the worlds of science and policy.

The separation of science and policy also hinders the creation of trustworthy relationships, which is of extreme importance in sensitive and dynamic policy environments. Trust is a direct function of the understanding of needs, relevance of support, reliability and quality of human relationships. Given the complexity of the challenges, policymakers need reliable partners able to objectively and confidently guide them through the state of knowledge on their given subjects. Honesty is required, but it will not come without trust.

Bringing science and policy closer together can be achieved by engaging them in co-creation at all stages of policymaking, as well as in evidence-making ([Chapter 10](#) discusses the ethics and dilemmas of such a proposal). Co-creation manifests itself in different aspects of the development of science for policy (e.g., co-creation of research questions, of evidence base, of anticipatory knowledge strategies, co-creation *through* collaboration with stakeholders or citizens, *through* participation of scientists in the whole of policymaking). It involves people in different roles on a spectrum between science and policy. For some it means moving closer towards the



middle, developing distinct skills, facilitating mutual understanding, leaving the traditional expectations of their professional environments. Trust is vital and truly possible only if science and policy come genuinely closer together.

Does it mean we should primarily focus on institutional design in order to implement the ‘merger’ of science and policy? On the one hand, the onus for the effectiveness in science–policy collaboration lies in the quality of the relationships, trust, timing, form and format of the interaction and the scientific products used in the policy process. Blaming institutional arrangements is certainly too simplistic. However, eventually the results of a philosophical reflection on the relationship between science and policy inevitably need to be translated into some institutional changes. Closing the gap between science and policy through co-creation requires new principles for institutional practices. This handbook further explains how to experiment with co-creation at different stages of science and policy development.