



How to Use the Handbook

Scientists and policymakers need to work closer together to deliver progress for our societies, economies and our planet. For the last 60 years, the Joint Research Centre (JRC) has been working at this interface for the European Union. This handbook collects what we have learnt about the science–policy environment and shares our vision, best practice and innovative ideas to deliver impact for our societies.

This short section gives readers some background on the JRC. Together with an overview of this book contents, this will provide the necessary context for understanding how you could apply our advice in your organisation.

Institutional Context of the JRC

The Joint Research Centre is part of a system of scientific support to the European Union. We are an integral part of the European Commission, which means we interact primarily with the Commission's policy departments. The Commission also receives independent scientific advice through the Scientific Advice Mechanism.¹ We work both with policymaking staff at all levels and their Commissioners and also with MEPs and national governments as well as other EU bodies such as the Committee of the Regions. We are independent from any national, commercial or civil society interests. We are publicly funded from the EU Framework Programme for Research & Innovation and the EURATOM research and training programme.

The JRC supports policymakers in all formal phases of the policy cycle: problem definition and agenda setting, policy formulation, implementation and evaluation. Policy development and decisions taken on the EU level are diverse: they cover broad thematic areas and have various forms (different legislative acts, recommendations, support mechanisms and programmes). Therefore, JRC's support to policymaking is quite diverse, and not all advice from this book will be 100% applicable to all cases. Still, main principles apply to most contexts in which we engage.

Our institutional setup gives us more direct access to policymakers than it is the case of research bodies (although the majority of our scientists work in campuses away from Brussels: in Italy, Spain, the Netherlands, Germany and Belgium). However, the institutional access does not itself guarantee a seamless relationship. Trust, good communication, innovations in processes and other aspects covered in this handbook determine the quality of collaboration and results. As any organisation, the Commission has its silos, which sometimes hinder collaboration and mean that we are familiar with many of the challenges other scientists experience when working outside government.

¹<https://ec.europa.eu/research/sam/index.cfm>, accessed 05.05.2020



Differences Between Science for Policy and Academic Science

The fact that we are an organisation working not only in a policy context but also inside a policymaking institution is an important lens through which the advice in this book has to be interpreted. We support policymaking at all stages of the policy cycle and often in direct collaboration with policy departments. While we take a policy-neutral stance, our mandate is to produce science relevant for policy and generating insights needed to create policy options. Our values of integrity, openness, innovation, accountability and inclusiveness are aligned with those of a broader scientific community, but we have partially different drivers and incentives.

Many scientists in academia work driven purely by curiosity. Our areas of research priorities are strongly influenced by the policy agenda, with some room for exploratory research. We fully believe that all types of research are valuable, blue-sky and applied, including in arts and humanities. At the same time, this book may not be of so much use for researchers who do not have an ambition to have an impact on policy.

The following typology describes the differences between regulatory and academic science as developed by Ruggles (2004)², adapted for the EU context. Science and knowledge management for policy, though broader than regulatory science, encounter very similar challenges. In the majority of cases, we situate ourselves closer to the regulatory side of Ruggles' spectrum, and our advice in this book should be viewed as coming from that realm.

	REGULATORY SCIENCE	ACADEMIC SCIENCE
INSTITUTIONS	Government/industry	Universities
GOALS	Information needed to meet regulatory requirements and to provide reliable information for decision-makers. Research 'questions' are framed by legislators and regulators and have immediate social and economic implications.	Original research framed by scientists and driven by rational analysis, curiosity and expert judgement. To expand the understanding and knowledge of the natural world through an ongoing process of questioning, hypothesising, validation and refutation.
ROLE OF UNCERTAINTY	Predictive certainty is required by the political process and the legal system. Knowledge is frequently and necessarily generalised to situations very different from those in which the original data were collected. Uncertainty is unwelcome by the public, legislators and the courts.	Uncertainty is expected and 'embraced'.

²Ruggles, A., 2004. Regulatory vs. Academic Science. CIRES Center for Science and Technology Policy Research. http://sciencepolicy.colorado.edu/ogmius/archives/issue_9/research_highlight.html, accessed 05.05.2020



	REGULATORY SCIENCE	ACADEMIC SCIENCE
INSTITUTIONS	Government/industry	Universities
COMPLETENESS OF INFORMATION	Must frequently act before all the necessary information is developed.	Publish when a body of information has been developed, tested and validated.
STATISTICAL SIGNIFICANCE/ ACCEPTABLE ERROR/BURDEN OF PROOF	Often work with a legal mandate to minimise Type II error with the result that Type I error is increased.	Strive to minimise Type I error.
ROLE OF VALUES	Regulatory scientists are required to consider and work with the values of many including the public, politicians, the scientific community and the regulatory community.	Academic scientists work primarily with their own and their collaborators' values; seldom have to incorporate public or political values.
PRODUCTS	'Grey literature' baseline data, monitoring data and regulatory documents.	Published, peer-reviewed papers and books, presentations at professional meetings.
TIMEFRAME	Determined and driven by statute, regulation and the political process; finite and often quite short. Resolution of problems being reacted to is often crisis driven or driven by court-mandated timelines.	Open-ended; usually carried out relatively free of an urgent need for the information generated.
POLITICAL INFLUENCE	Directly exposed to political priorities.	Indirectly influenced by the researcher's own political philosophy and by their perception of the preferences of grant and tenure review committees.
ACCOUNTABILITY	Legislatures, courts and the public.	Professional peers.
INCENTIVES	Compliance with legal requirements, working for the public good.	Professional recognition, advancement in tenure system; university administration.

Collective versus Individual Reading of the Handbook

When writing about a transformation of science for policy practices, it is difficult to separate advice for individuals and organisations. Scientists need to adapt their ways to achieve more meaningful contributions to policy (and so do policymakers). Equally, a successful adaptation is not possible without a culture change in teams, collective new capacities, structural innovations, new priorities, incentives and mechanisms approved top-down, and broader organisational transformations (see [Chapter 3](#)).

Equally, not each and every person working in a science for policy context will have a direct contact with policymakers. However, science for policy is about teamwork and collaboration of multiple actors. Even if close interactions with policymakers are a task of a narrow group, the input they



provide comes from a chain of reactions in the broader organisation. Having an understanding of what policymaking requires and how the science–policy interface operates (and differs from pure science) is helpful for everyone and helps increase the relevance of scientific support.

Some of the advice can seem overwhelming for one individual to implement. However, this book is not intended as a one-to-one recipe that can be realised by superhuman scientists. We hope that individual readers get inspired, incorporate what is possible in their personal behaviour and become the advocates for a broader change in areas beyond their immediate control. We want people to experiment and adapt our advice to their reality.

Finally, we need to acknowledge that it takes two to tango. The burden of improving the science–policy relationship does not fall on the scientists alone. We engage in transformative activities with policymakers, too, and are currently developing work targeting skills, capacities and understandings of science and evidence for policymakers. However, this book is written for scientists and knowledge organisations, as this is the essence of our practice.

What This Handbook Offers

The scope of this book focuses on *science for policy*: not on all science, nor on the details of the scientific process. The main ingredient which underpins all discussions about the effectiveness of science–policy interaction is good science. Writing this book, we consciously omit discussing tips for being a better scientist. We assume that every reader has the standards of excellence and integrity of their discipline well-internalised. Where we see a need to debate and learn more is the *science for policy*, the area which adds new questions to the scientific practice, bringing it closer to a political process, value-laden trade-offs and different timeframes.

We see a twofold urgency now: to increase the understanding of how science for policy is different from academic science and to bring science closer to policymaking. Throughout this book, we discuss the need for a transition from Science for Policy 1.0, where the two are separated and cross occasionally, to Science for Policy 2.0, where they are integrated. This change is a difficult one to navigate, but necessary if science is to bring meaningful input to solutions for our societies.

We are not expecting all science to change, but we see a need to keep experimenting with how working in a policy context changes the role of scientists. Aiming to achieve policy impact requires new tools and skills, rethinking norms and practices and figuring out ethical codes.

The vision and practices presented in this book are a work in progress that will continue to be updated. As such, it is crucial to note that the book was written before the global COVID-19 outbreak. This crisis has highlighted the importance of much of the advice given here and it has played a part in the JRC's response.

At the same time, such a significant crisis inevitably calls for deep reflection. We are committed to learning from this crisis, together with the wider science for policy community. It is necessary both to be prepared for any future crises, but also to constantly develop more and more effective and democratically legitimate science for policy mechanisms.

Section I of the book sets the scene and describes the current challenges with the deficit model of scientific advice to policy: Science for Policy 1.0. Section II presents the turn towards Science for Policy 2.0. There, co-creation and close, permanent collaboration between scientists and policymakers, as well as other policy actors – experts, stakeholders, citizens – is at the core of the model. We present the building blocks and its different facets: from institutional setup and individual skills, working through communities and engaging citizens, preparing



for policy impact and defining relevant research questions, towards co-creating new policy processes with big data and AI. Section III describes cross-cutting approaches necessary to implement co-creation: anticipatory thinking with foresight, design for policy, learning from monitoring one's impact and knowing how to communicate strategically. Finally, [Section IV](#) takes the readers through the principles of Science for Policy 2.0 in selected specific areas, which are particularly crucial for robust evidence-informed policies.

The list below offers an overview of different topics covered in this book.

For Starters...

1. Check Foreword and Chapter 1 for a rationale why science and policymaking need a new relationship.
2. Check Chapter 2 to learn about Post-Normal Science and how it underpins Science for Policy 2.0.

Organisational and Institutional Setup

If you want to know...

1. ...how the JRC transformed itself in recent years to be a more agile knowledge for policy organisation, check [Chapter 3](#).
2. ...about our Knowledge Centres, organised around multidisciplinary policy areas and stimulating cross-boundary conversations on what knowledge is needed, check [Chapter 6](#), [16](#) and [19](#) for specific examples.
3. ...about our Competence Centres of policy-relevant methodologies, helping policymakers apply them to generate relevant evidence, check [Chapter 3](#) and [12](#) for specific example.
4. ...how we systematically help scientists and policymakers get to know each other better, check [Chapter 6](#).
5. ...how we support the interaction of science and policy through the work of in-between facilitators, check [Chapter 6](#).
6. ...how we plan and coordinate the work of the entire organisation so that it is both scientifically excellent and useful for policy, check [Chapter 6](#) and [3](#).

New Skills, Competencies and Behaviour for Moving Towards Science for Policy 2.0

If you want to know...

1. ...what collective skills of staff are needed to be an effective science for policy organisation, check [Chapter 4](#).
2. ...how to strategically plan for impact of scientific evidence, check [Chapter 5](#).
3. ...how to monitor the uptake and impact of evidence on policy and society, and later collectively learn from that monitoring, check [Chapter 14](#).
4. ...what mechanisms to use to translate policy problems into research questions, check [Chapter 6](#).



5. ...how to navigate interests which interfere into Science for Policy 2.0 and evidence-informed policymaking, check [Chapter 10](#).

Adapting to Complexity

If you want to know...

1. ...how to mobilise collective intelligence of staff, partners and stakeholders through communities of practice, check [Chapter 7](#).
2. ...what a Policy Lab approach - creating a space for exploration, experimentation, openness and understanding - can offer, check [Chapter 13](#).
3. ...how to promote an anticipatory culture in policymaking and knowledge generation, e.g., through horizon scanning, megatrends monitoring, scenario building, speculative design and serious games, check [Chapter 12](#).
4. ...how to explore problems systemically, gain a better understanding of complexity of given issues and contribute to more holistic problem definitions or solutions, check [Chapter 11](#) and [Chapter 13](#).
5. ...how big data can transform the landscape of evidence for policy, and policymaking itself, check [Chapter 9](#).

Science for Policy 2.0 in Specific Areas

If you want to know...

1. ...what the principles for evidence-informed advice in a crisis are and which tools are appropriate for such context, check [Chapter 16](#).
2. ...which quantitative modelling approaches prove useful in the policy cycle, including uncertainty and sensitivity analysis, multicriteria decision analysis, composite indicators and ex-post impact evaluation, check [Chapter 18](#).
3. ...how to support regional development and innovation strategies with tailored solutions involving multiple stakeholders in the process, check [Chapter 19](#).
4. ...how to better understand human behaviour and use this knowledge to design more effective policies, including using randomised controlled trials, experiments or qualitative research, check [Chapter 17](#).

Outreach, Partnerships and Collaboration

If you want to know...

1. how to include citizens both in scientific projects and in broader deliberation on policy objectives, values and solutions, check [Chapter 8](#).
2. ...how we run institutional science for policy communications, including insights on key principles, target groups, as well as increasing clear writing and effective visualisation skills, check [Chapter 15](#).
3. ...how to mobilise collective intelligence of staff, partners and stakeholders through communities of practice, check [Chapter 7](#).
4. ...how we promote evidence-informed policymaking with national and regional parliaments, check [Chapter 6](#).