European Commission

Welcome to the toolkit for Responsible Research for Policymaking:

R you Ready?

Joint Research Centre

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EU Science Hub

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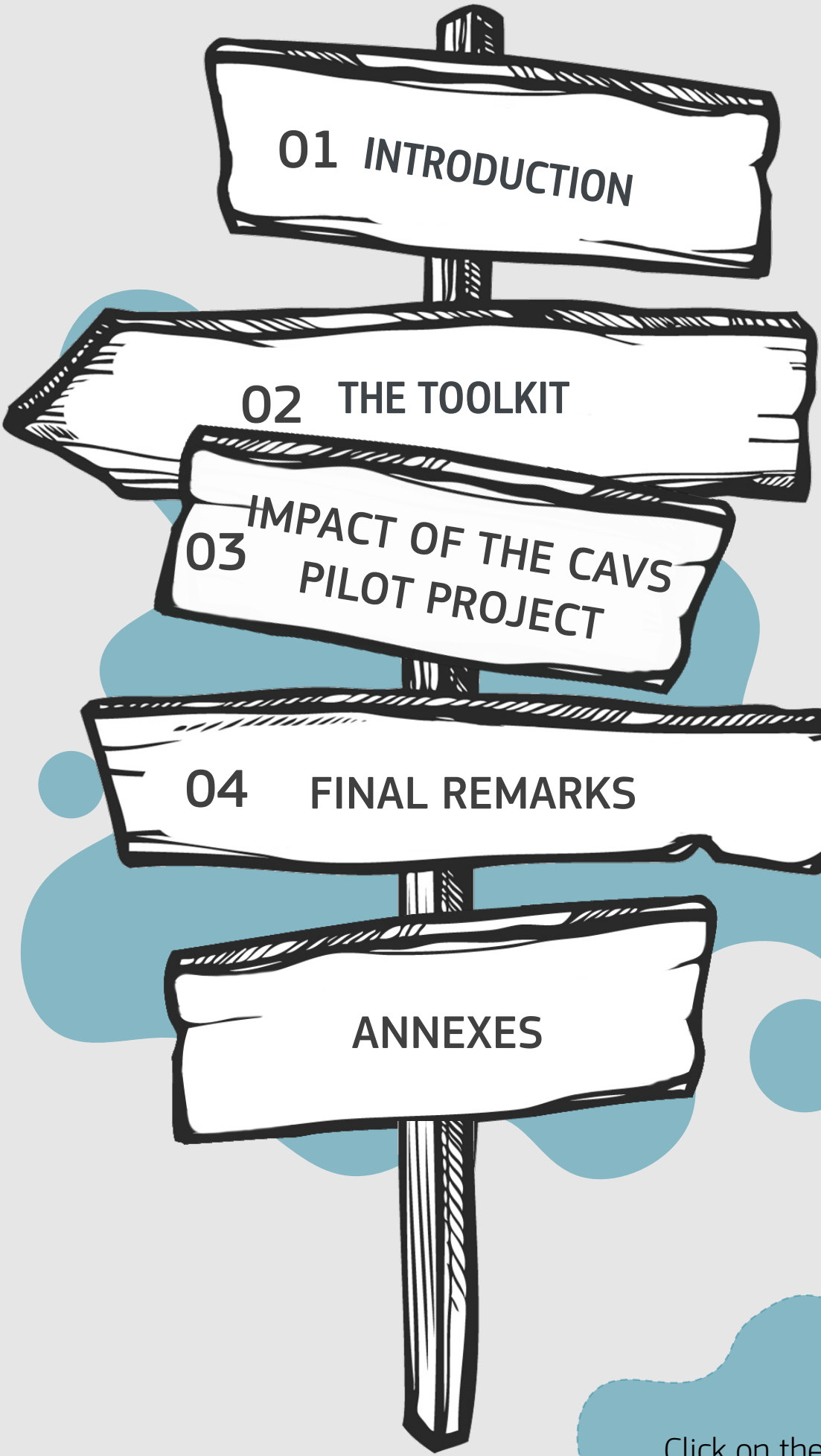

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Executive Summary

The work presented in this report was carried out during 2018–2019 in collaboration between the Joint Research Centre (JRC) and the Institute for Advanced Studies (IHS), Vienna, Austria within a consortium called NewHoRRIzon funded by the EU's Horizon 2020 programme (H2020). Until 2020, responsible research and innovation (RRI) was an important cross-cutting objective of H2020. RRI sought to develop actions on open access, gender, ethics, science education and public engagement. The RRI framework supported inclusive and sustainable research and innovation, outlining how to ensure desirable societal impacts. It emphasised the need for collaboration with stakeholders and citizen engagement throughout the whole research and innovation cycle to better align the process and its outcomes with the values, needs and expectations of society.

Although RRI is not prominent in Horizon Europe, it shaped it considerably, especially with regard to RRI's defining five pillars: open science, gender balance, science communication and, to a great extent, citizen engagement, and ethics. Although the first three of those are less dependent on individual researchers but rather on institutional strategy, our experience is that citizen engagement and ethics evaluations are meaningfully carried out if there is also an individual disposition to do it. Both systematically engaging citizens and carrying out ethics evaluations in research processes are about caring about the research's (and innovation's) societal significance while pursuing quality in more than one respect. This shift has considerable implications for the organisation, design and implementation of research.

This shift is also especially relevant when research is carried out to inform policymaking.

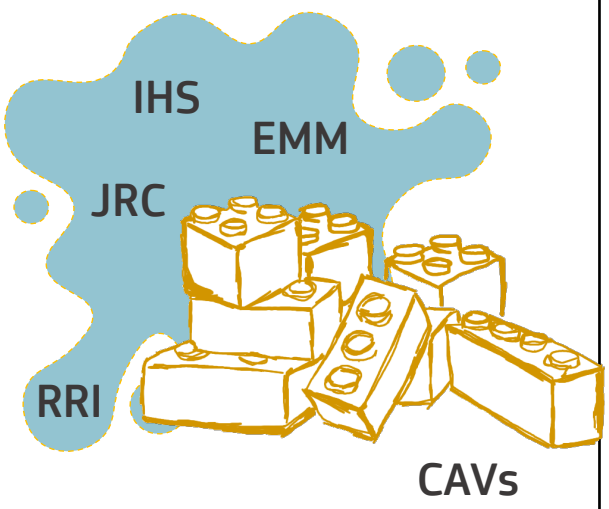
Executive Summary

As the in-house science service of the European Commission, the JRC is an open and future-oriented institution with a work culture built on some of the RRI principles (even though RRI may not be explicitly mentioned) ([1]). However, the least-developed pillars have been precisely the engagement of citizens in research and knowledge production processes, and ethics evaluations. Hence, this study aimed to extend niche work on that principle at the JRC. The current report is the backbone of a forthcoming interactive **toolkit** intended for JRC practitioners aiming to strengthen the engagement of citizens and participatory ethical evaluations in developing science for policy and innovation. In this toolkit, citizens are viewed not as recipients of outcomes, validators or data gatherers, but as partners in the knowledge production process, contributing to issue framing and, where necessary, to policy implementation. We hope the forthcoming toolkit is also of use in other organisations that deal with knowledge production for policymaking.

(1) These include, for example, gender balance, open access to publications, and reinforcing the knowledge management and communication dimensions of the JRC's remit.

Background

Already in 2015 the JRC's ex post evaluation performed by Cunningham et al. (2015) specifically recommended that the JRC act to improve interdisciplinary research and involve social scientists in every thematic area. Moreover, the panel recommended that the JRC embraces the RRI principles, which ultimately means engaging with different ways of knowing, namely 'engaging with all societal stakeholders' (p. 25) in order to ensure the social and ethical robustness of policymaking.

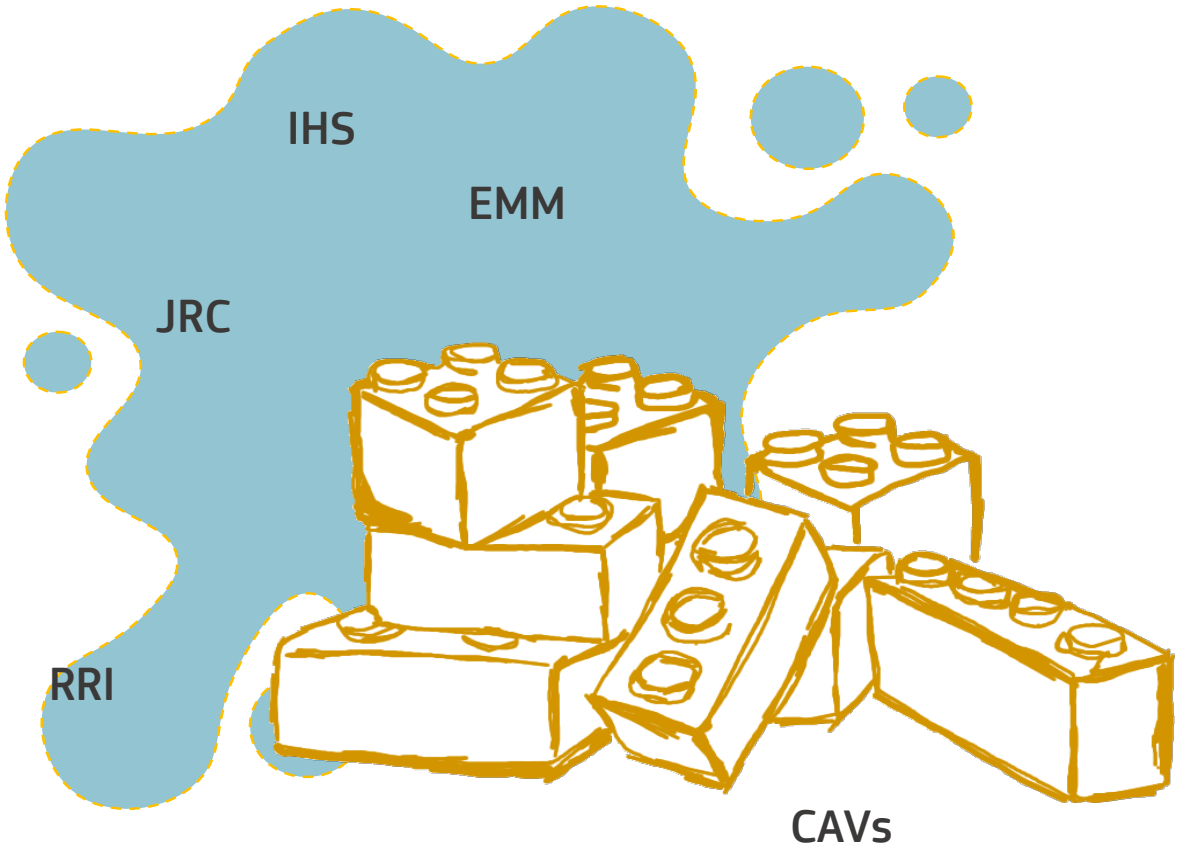


The H2020 project NewHoRRIzon, led by the IHS in Vienna from 2017 to 2021, provided the JRC with the opportunity to push further the application of some of the RRI principles at JRC by working with a concrete example. This initiative highlighted ways in which RRI principles could be made more explicit in JRC research, in particular the citizen engagement and participatory ethics assessment dimensions. Using the participatory approach called social lab and in collaboration with IHS, the JRC conducted a pilot project on connected and autonomous vehicles (CAVs) focusing on the social and ethical issues they raise in the context of European policymaking.

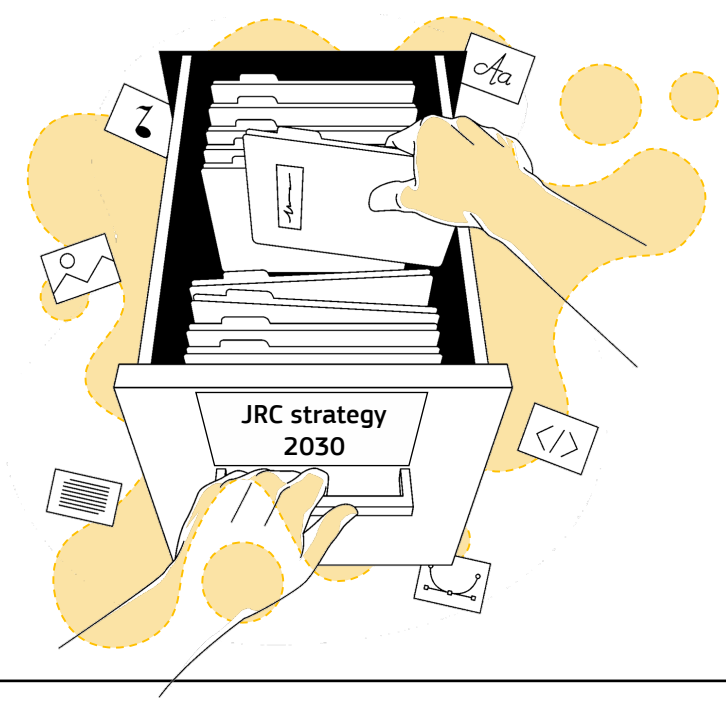
The JRC strategy 2030 and the JRC's reorganisation during the period in which this work was carried out have contributed to creating conditions for facilitating responsibility and social robustness in the research and innovation process and to engaging societal actors in co-designing, co-creating and co-determining socially desirable outputs.

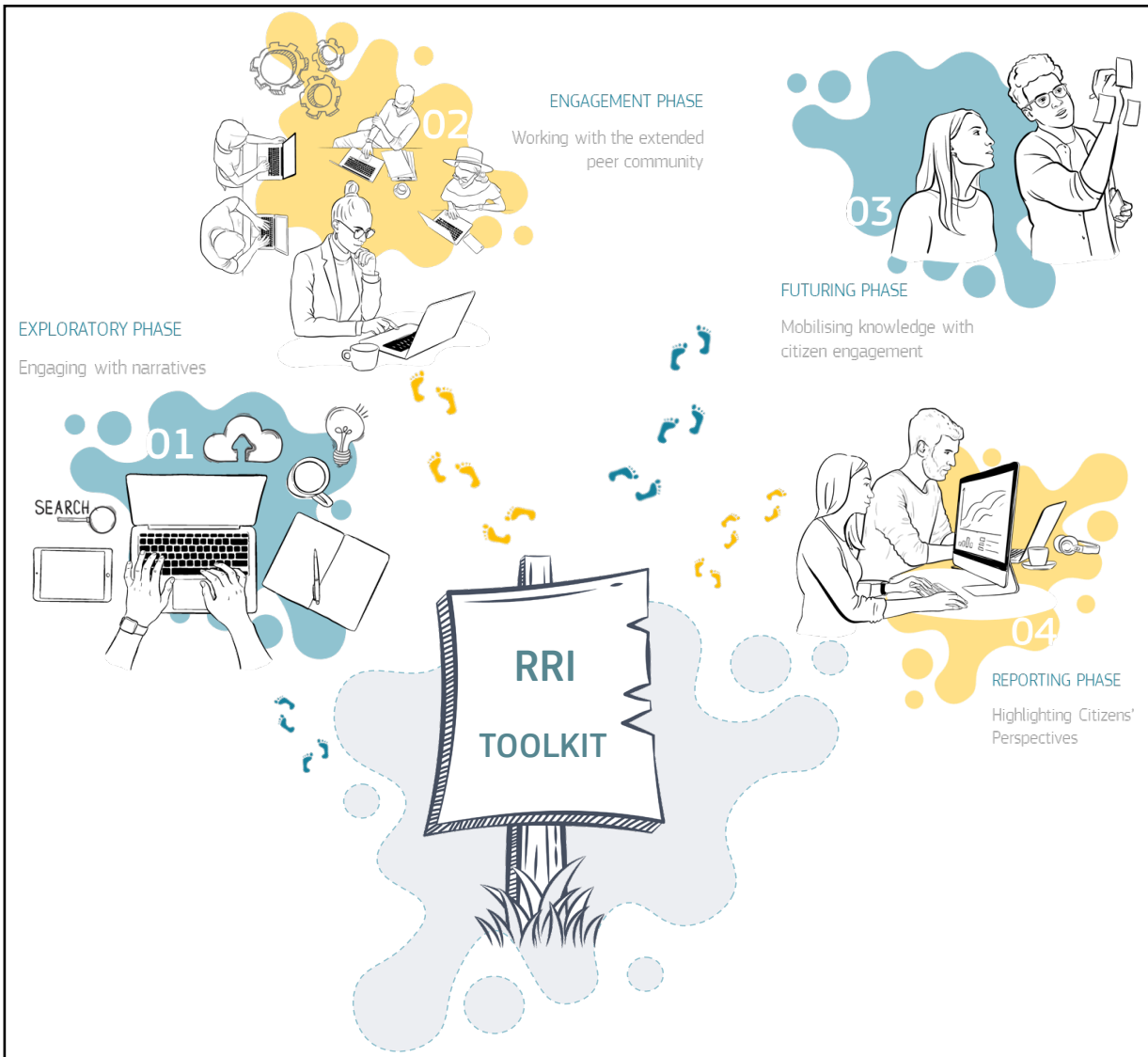
[1]Cunningham, P. et al. 2015. "Ex-post Evaluation of the direct actions of the Joint Research Centre under the Seventh Framework Programmes 2007-2013".

Background



Several JRC units working together contributed to different activities to evaluate the technological promise of CAVs, including their plausibility and desirability as the future of mobility in Europe. The experiences gained with the transdisciplinary collaboration on the topic of CAVs and the future of mobility, focusing extensively on the citizen engagement journey at the JRC, are summarised in this document. The transdisciplinary and collaborative experience has been turned into recommendations for future responsible research practices at the JRC, constituting the backbone of an interactive toolkit (Van Wynsberghe et al., 2022), which will need to be tailored to each situation. As with any toolkit, this will be a work in progress, enriched as more case studies are pursued.





The **toolkit** aims to guide the user with rationales for conducting responsible research and responsible innovation, especially in an institution that conducts research for policy. It will help the user with the questions of how to account for diverse societal needs and, in particular, how to implement citizen engagement around social and ethical issues of science and technology. It does this by delineating five design and implementation phases, the **exploratory, discovery, futuring, reporting and policy phases**. In each phase, the **toolkit** details **methodological tools** and **approaches** that can be used by researchers, including **narrative analysis, media analysis, surveys, interviews, and social research techniques** such as **focus groups** and variants of them. The toolkit provides JRC colleagues and other interested readers with case studies, practical tips and further reading to implement in their research.

Our experiences show that citizen and stakeholder engagement and ethical reflection on policy-relevant science and innovation allow researchers to approach complex matters with a better understanding of the issues that matter to citizens and stakeholders.

Engaging the community concerned is a humble and reflexive institutional move, to the extent that the institution recognises that some types of problems cannot be addressed with scientific knowledge only, but need to be addressed with all relevant knowledge and with all relevant knowledge holders.

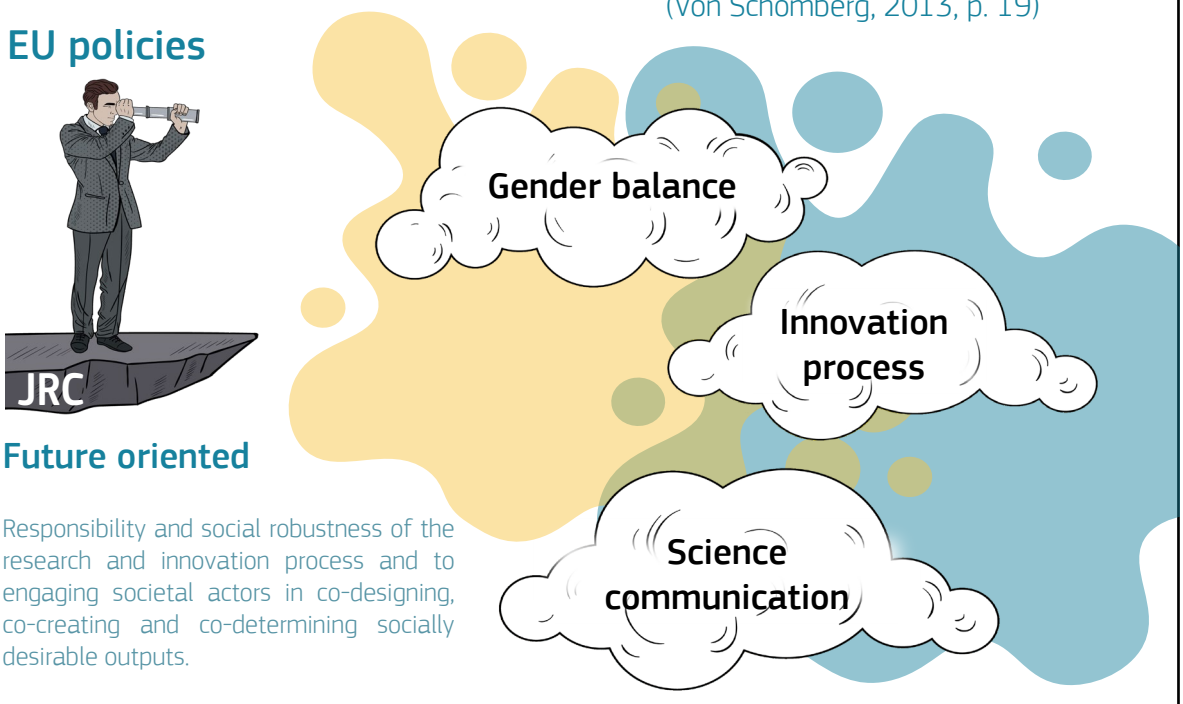
The pillars of RRI, especially citizen engagement and ethical assessments, allow institutions to question and even contest prevailing ways of working that reinforce the gap between institutional practices and the social and political aspects of everyday life. This **toolkit** aims to narrow that gap. The journey that led us here suggests that engaging with and making sense of citizens' matters of concern and care should become a new standard for researchers at the JRC who are investigating pressing and complex issues with impacts on the lives of Europeans.

With this **toolkit**, we encourage JRC colleagues and members of other science for policy institutions to use the learning and recommendations we record here to systematically implement citizen engagement and participatory ethics assessments in their daily research activities. This **toolkit** is conceived as a living document. Our aim is to include in the future more methods and additional experiences within the responsibility objectives of research and innovation. To this end, we invite researchers who work in transdisciplinary modes, and with RRI practices and methodologies in their research activities, to share their experiences so that others can continue to benefit from this JRC blueprint.

1. Introduction

Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).

(Von Schomberg, 2013, p. 19)



1.1 The Joint Research Centre strategy 2030: a transformative agenda

The Joint Research Centre supports EU policies with independent scientific evidence and data throughout the whole policy cycle. The JRC is an open and future-oriented institution with a work culture built on some of the responsible research and innovation (RRI) principles (even if RRI may not be explicitly mentioned), such as open science, gender balance and science communication. For example, the JRC has opened its research infrastructures to external scientific use and it has followed an open access policy for its publications.

The **JRC strategy 2030** and the JRC's reorganisation in 2017–2019 have contributed to creating conditions for facilitating **responsibility and social robustness in the research and innovation process and to engaging societal actors in co-designing, co-creating and co-determining socially desirable outputs.** They have contributed less to engaging citizens ([2]) in research processes.

[2] We use here the word 'citizen' to mean any person, not a holder of particular rights.

However, the European Commission's priority 6, 'A new push for European democracy', has been a definite opportunity to change the ways in which citizens are involved in science and policymaking. And the JRC has been following this new commitment with very important moves. The added value of working to address citizens' matters of concern and engaging them in research and policymaking has been acknowledged by various initiatives such as the creation of a Community of Practice on Citizen Engagement and Deliberative Democracy ([3]), the building of a makerspace (see definition in Section 2.3 below) and the launch of the Competence Centre on Participatory and Deliberative Democracy ([4]).

Several research groups have started to strategically embrace a more inclusive approach to research by considering the opinions, knowledge, active participation and contribution of citizens in their work. These activities do not occur in isolation. There is a general trend in research and policymaking and it has been an integral part of several Horizon 2020 (H2020) projects dealing with RRI, the cross-cutting approach that aims 'to anticipate and [assess] potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation' (European Commission, 2020b).

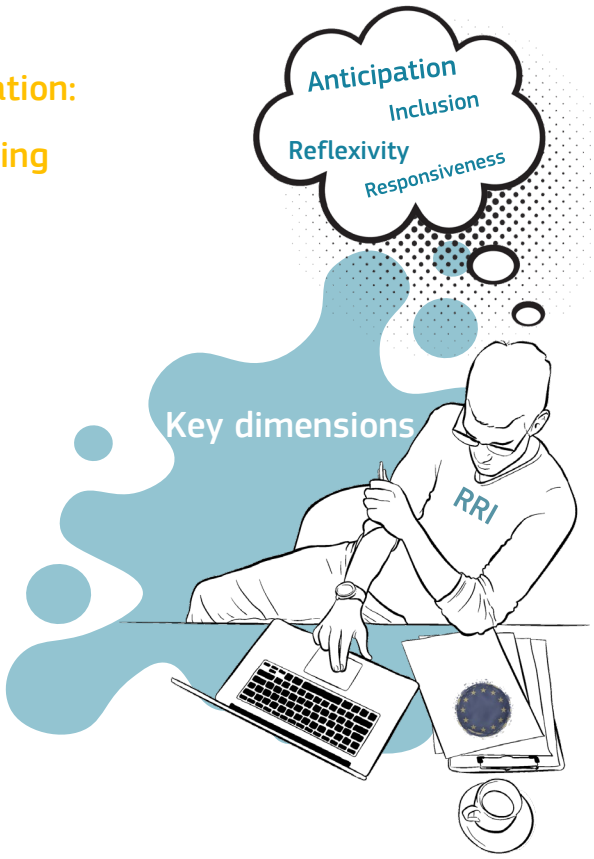
[3] https://cop-demos.jrc.ec.europa.eu/

[4] https://knowledge4policy.ec.europa.eu/participatory-democracy/

1.2 Responsible research and innovation: understanding the agenda and framing

Research and innovation is often dominated by economic perspectives and exclusively technological solutions (Blok and Lemmens, 2015). RRI emphasises the need for collaboration and the engagement of the public, especially for addressing wicked problems, which are 'complex, systemic, interconnected, and urgent, requiring insights from many perspectives' (Mazzucato, 2018, p. 803) - but see also much earlier Funtowicz and Ravetz (1990) in their insights about what they describe as post-normal science situations.

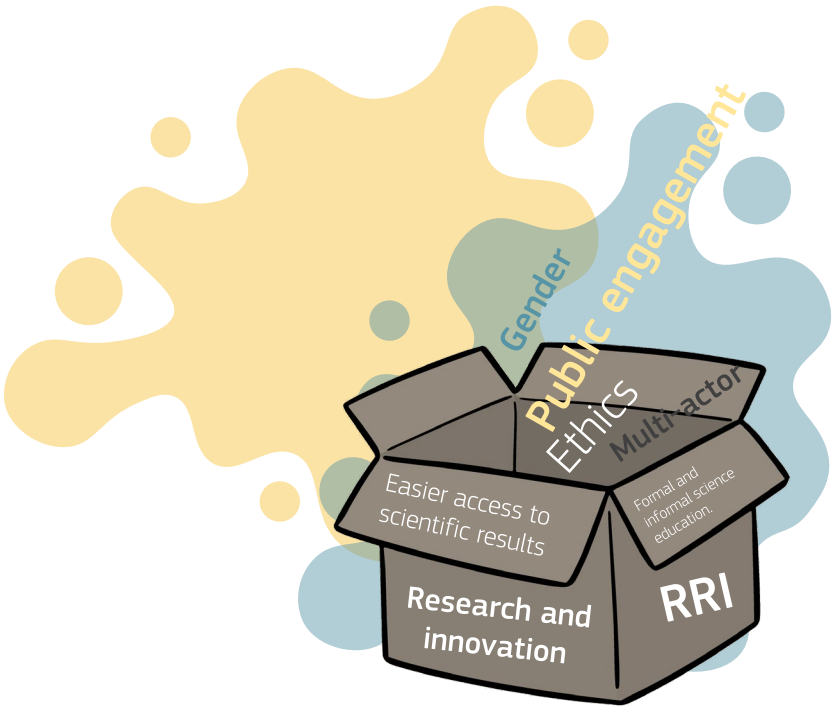
RRI focuses on governing research and research-based innovation and thus has a strong normative dimension. Owen et al. (2012) argue that RRI stimulates discussion about research targets and innovation, and how these can be accomplished ethically, inclusively and democratically. RRI also addresses how to ensure that the impacts of research and innovation benefit society, reflecting what is regarded as desirable (Stilgoe et al. (2013); Genus and Stirling (2018); Fløysand and Overton (2019)).



The concept calls for designing mechanisms for reflection and inclusion in research and innovation. It focuses on the purposes of innovations, their rationales and the narratives that support them, and their potential impacts. RRI is driven by a strong stakeholder orientation, engaging different actors and publics to exercise collective responsibility as stakeholders to ensure the positive impacts of research and innovation. Stilgoe et al. (2013) described RRI as revolving around four key dimensions: anticipation, **reflexivity, inclusion** and **responsiveness**. In all definitions and theoretical orientations, engaging and involving different publics, including citizens and non-governmental organisations, it is considered key to address everyone's needs, concerns, expectations and values. Therefore, several studies have addressed ways to implement RRI frameworks in publicly funded research institutions in Europe and the United States (Kerr, Hill, & Till, 2017).

RRI implies that societal actors such as researchers, citizens, policymakers, businesses or third sector organisations work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society (Braun & Griessler, 2018). In practice, RRI may be implemented as a package that includes multi-actor and public engagement in research and innovation, enabling easier access to scientific results, the addressing of gender and ethics in the content and process of research and innovation, and formal and informal science education. There is a good number of RRI tools and publications stemming from the large number of projects financed under H2020 (see for example https://rri-tools.eu/).

NB: The JRC has been part of science and technology studies debates for a long time, as well as part of a community focused on exploring and experimenting with participatory styles of governance and knowledge production in policy milieus. It has developed a great deal of work in this area as part of European consortia, contributing practical inclusive ways of dealing with relationships between science, society and policy. However, recent political and social events have shown that citizen engagement is becoming more important than ever. Therefore, this study aimed to further support this trend towards more open and transdisciplinary research at the JRC, ultimately supporting other services and projects to integrate, in particular, citizen engagement and participatory ethics assessments. This work can serve as inspiration to other science for policy organisations.



1.3 Duly intersections: responsible research and innovation and its relevance to the Joint Research Centre

In 2019 the President of the European Commission, Ursula von der Leyen, sent mission letter to Commissioner Mariya Gabriel, who oversees the operations of the JRC. It clearly states that a stronger relationship with citizens starts with building trust and confidence. Key to this effort are scientific knowledge; research and innovation activities; making sense of knowledge to support European policies with independent evidence; developing innovative tools and making them available to policymakers; and anticipating emerging issues that need to be addressed at EU level.

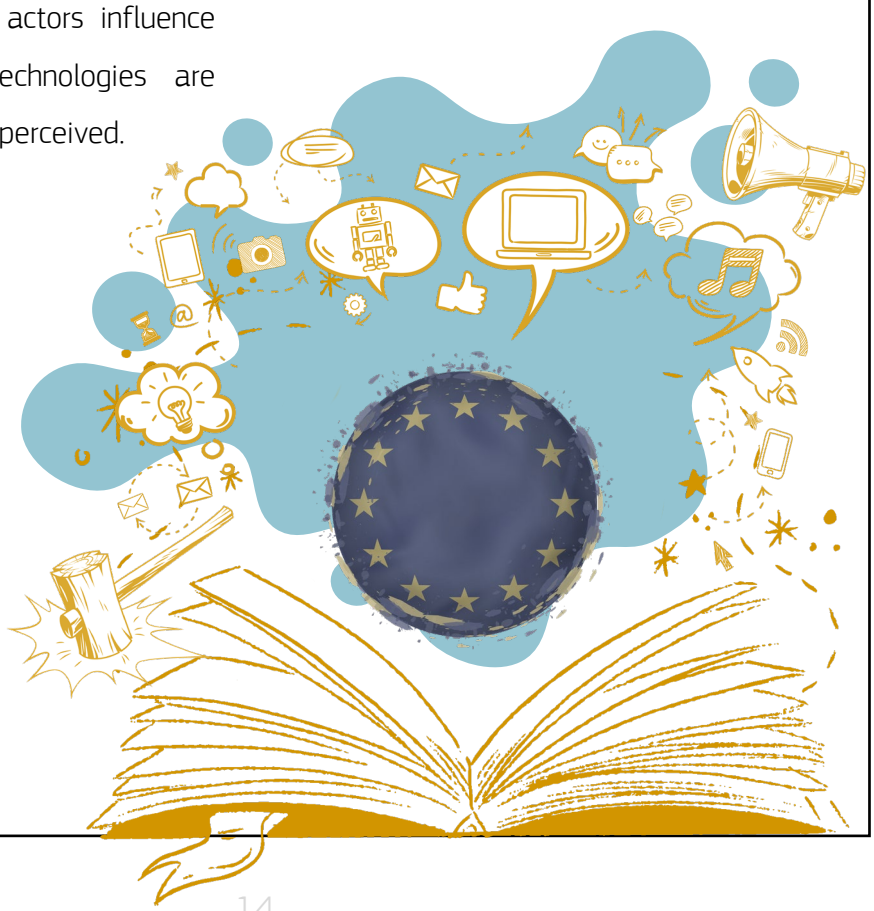
As the European Commission's science and knowledge service, the JRC has a great impact on the lives of the almost 450 million EU citizens, and people beyond the EU. We therefore believe it is mandatory for the JRC's recommendations and outputs to account, as much as possible, for the needs of different societal sectors and different publics. Some dimensions of RRI have had only a very small number of projects dedicated to them thus far; mainstreaming them across the JRC would strengthen the ongoing transformation towards openness and reflexiveness in the JRC, as RRI may be seen as an 'on-going process of aligning research and innovation to societal values, needs and expectations' (Gerber, et al., 2020, p. 708). With Horizon Europe's current emphasis on addressing social challenges by research, especially the sustainable development goals, RRI and its focus on societal needs have become an operational objective. RRI is a mode of doing research in which socially desirable research and innovation is established by engaging all relevant actors in those processes. In order to enable RRI and the change that it enables, it is necessary to create conditions for facilitating responsibility and social robustness in the research and innovation process. Institutional change to drive collective responsibility at organisational level, engaging societal actors in co-designing, co-creating and co-determining socially desirable outputs, is crucially important.

The JRC is a scientific research organisation that provides policymakers with evidence for robust EU policymaking and, therefore, creates, circulates and manages knowledge that affects the lives of all European citizens.

Such a mission requires that knowledge production embrace interdisciplinary and transdisciplinary methods and approaches that break out of disciplinary silos and transcend methodological boundaries. For example, the JRC could and should champion the inclusion of social science and humanities findings in its predominantly technological and economic research activities. The RRI framework responds to this need by extending the knowledge production process to all actors concerned.

Research and innovation shapes the life of European citizens in countless ways. Some of the implications are seen as positive; others are assessed as controversial. Policymakers, the media, industry and business, and other key actors influence how knowledge and technologies are produced, embedded and perceived.

Since the reorganisation in 2016, the JRC has been applying a more open approach to knowledge hierarchies, emphasising interdisciplinary and transdisciplinary research, hence working with different actors beyond expert communities. It is important and relevant that the JRC in its research activities, as well as its policy support, reflect on the interactions related to the different modes and ways of knowledge production. Therefore, it is essential that the JRC continue experimenting with new approaches and methods to engage society and other systems of knowledge production, because these may provide new evidence and wisdom to inform the policymaking process at European level – not least because, as this pandemic has shown, in the process of co-designing the future of the EU we need to mobilise all types of knowledge and take decisions in accordance with the values we wish to live by.



1.4 The invitation: transdisciplinary work at the Joint Research Centre

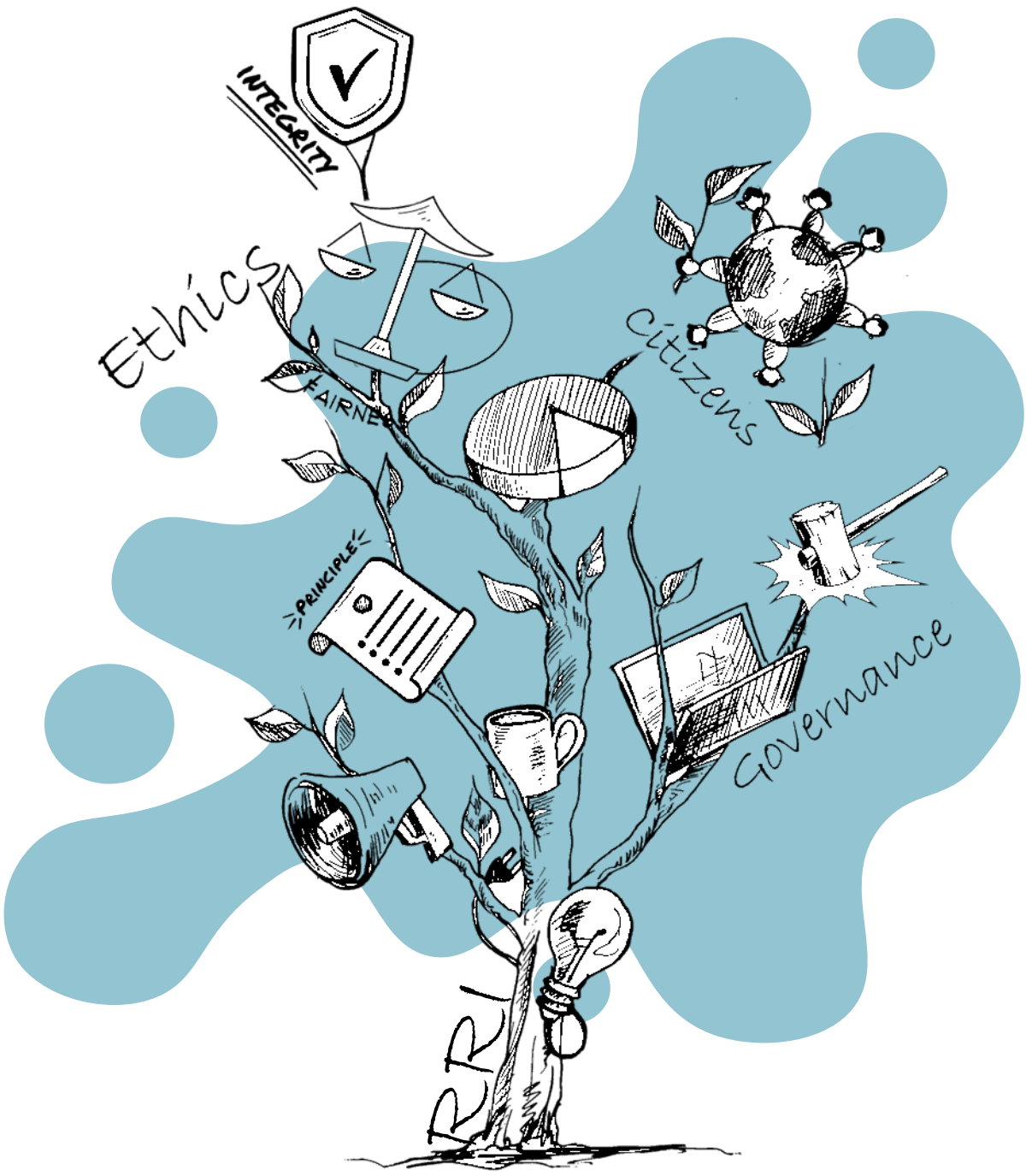
In 2018, the Institute for Advanced Studies in Vienna, as part of the consortium of the NewHoRRIzon project (https://newhorrizon.eu/), contacted the JRC in order to experiment with RRI through a social lab experiment that included workshops on ideation and challenge definition, real-life research experimentation and workshop-based reflection on the specific RRI pilot project. NewHoRRIzon engagement started with a first assessment of how aspects of RRI were present in the JRC, and reported that the JRC had started to apply a more open approach to knowledge hierarchies, emphasising interdisciplinary and transdisciplinary research, gender aspects and conducting outreach beyond expert communities.

Although the RRI pillars are not made explicit in JRC documents, a number of structures and activities align with those core RRI pillars, and some JRC research groups were exploring transdisciplinary work to spread more inclusive research approaches, focusing on both the citizen engagement and ethics pillars of RRI. However, this assessment also emphasised that not all units and activities follow the open and participatory approach sketched out above.

The collaborative process that was initiated following this invitation to become a social lab for NewHoRRIzon was a multiphase one. Various conversations were held, including some workshops facilitated by the H2020 consortium. During the first social lab workshop, JRC colleagues from different units, together with the NewHoRRIzon consortium and other invited researchers, compiled a number of challenges faced by the JRC that could be linked to the RRI keys.

A majority of these challenges referred to questions of governance and public engagement, such as the implementation of new governance strategies across the many levels of the JRC, or the need to further integrate perspectives of citizens in research activities. As a concrete outcome of the social lab process, various JRC members suggested experimenting with RRI-related citizen engagement methods on the topic of the future of mobility and the place of connected and automated vehicles (CAVs) in those visions.

A major aim of this pilot was to experiment with open and participatory research in the context of an existing research project and to foster collaboration across disciplines and units, and beyond the JRC, and to co-develop an understanding of how the RRI concept and related ideas (engagement, ethics and governance) can be taken on board in the daily work of the JRC.



1.5 The experiment: the connected and automated vehicles pilot project

The pilot project assessed the potential implications and societal expectations of CAVs and explored various mobility narratives, considerations of ethics and other values, and matters of concern regarding this new type of mobility. This pilot provided the JRC with the opportunity to investigate whether a more persistent and broader approach, focusing on public engagement, could deliver more comprehensive knowledge to sustain policy design in the area of future mobility.

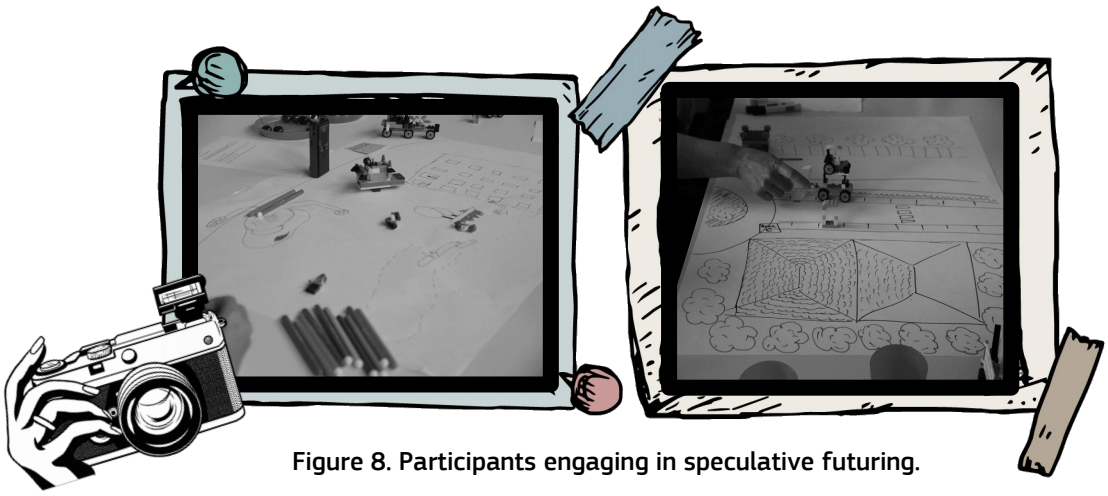


Figure 8. Participants engaging in speculative futuring.

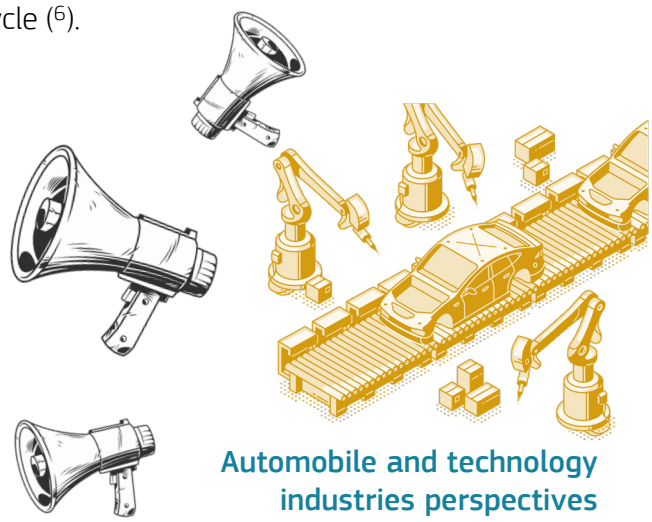
The pilot project incorporated transdisciplinary and non-solutionist perspectives, as well as a bottom-up, citizen-focused anticipatory, speculative and reflective approach to the future of autonomous mobility. Its main aim was to critically evaluate the promises made by the CAV sector and to explore citizens' alternative imaginaries of mobility. These imaginaries often challenge the vision of automated mobility presented by vehicle and technology companies.

NB: The H2020 project Moving towards Adaptive Governance in Complexity: Informing Nexus Security (MAGIC NEXUS) ([5]) supported the CAVs project by mobilising different types of knowledge within the transport sector. It evaluated the social and technological promises of CAVs, including their plausibility and societal desirability for the future of mobility in Europe. Stakeholders that had been previously neglected were included in debates about the future of mobility in Europe, and the role of CAVs in that future.

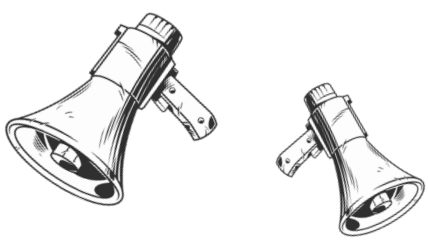
Through the social lab pilot, we investigated key societal values, such as safety and security, data and privacy, users' agency, and sustainability, but also aspects related to implementation: hybridity, mixed driving and car sharing, and regulation in the EU and competitiveness.

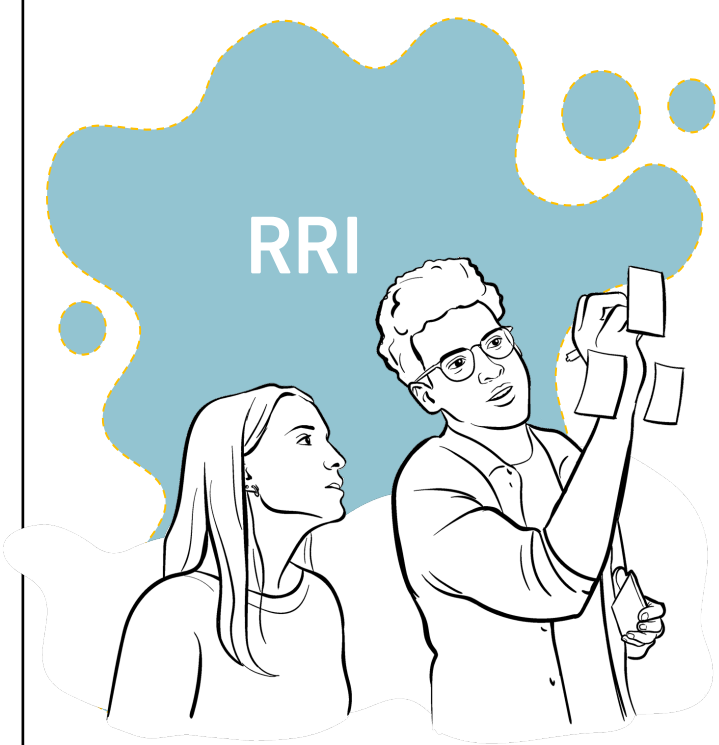
[5] https://cordis.europa.eu/project/id/689669 and https://magic-nexus.eu

There is often limited representation of citizens in debates about the future of mobility and the potential implementation of CAVs. Indeed, the RRI pilot project found that the discourse in this field was saturated with voices from the automobile and technology industries, and many of the reviewed studies and documents focused on evaluating 'user acceptance', a framework that takes for granted that mobility futures will be automated everywhere and for everybody (Van Wynsberghe and Guimarães Pereira, 2021a, b). An inclusive and responsive RRI approach is needed to tackle the complexity inherent in policy issues around CAVs, which have repercussions for digital policy and transport policy that could affect the future of cities and how citizens work, move and live. The many effects of CAVs on industry, politics, town planning and society mean that other kinds of actors needed to be included in the conversations from the start of the research process. Through this project, the JRC has therefore proactively engaged heterogeneous actors, including citizens, in order to understand their actual needs and expectations and question established narratives. JRC's transformation has led Unit H.1 (Knowledge for Policy: Concepts and Methods) to work on how citizens can be involved in earlier stages of the policy cycle ([6]).



Automobile and technology industries perspectives





[6] See examples of environmental and technology governance: https://cop-demos.jrc.ec.europa.eu/ and https://knowledge4policy.ec.europa.eu/participatory-democracy/

1.6 Extending the invitation: from responsible research and innovation to responsible research for policymaking

As explained earlier, the authors of this background document, which sets out an RRI **toolkit** for the JRC, argue that there is an underpinning and cross-cutting need for all professionals engaged in delivering science for policy, at the JRC and beyond, to mainstream RRI methodologies and practices in their research activities, in particular **citizen engagement** and ethics. The invitation is to go from responsible research and innovation to responsible research for policymaking.

The RRI pilot project described here and also by Van Wynsberghe and Guimarães Pereira (2021a, b), combined engineering and social sciences with policy perspectives, and engaged stakeholders and citizens in order to examine, from multiple vantage points, the announced transition towards connected and automated mobility.

This collaborative pilot clearly illustrated that science for policy can only gain in quality from these types of inclusive practices. Therefore, we argue that this transdisciplinary experiment can serve as a blueprint for research at the JRC.

Hence, based on the experience of the CAVs project, there has been developed a toolkit that provides JRC colleagues, and others who work at the interface of science and policy, with a full range of tools and practical tips, illustrated from the CAVs project, as well as further reading to help them carry out participatory practices in their research projects and activities. The future toolkit is proposed as a living document in which we hope to record more RRI-inspired research processes and additional experiences at the JRC and beyond.

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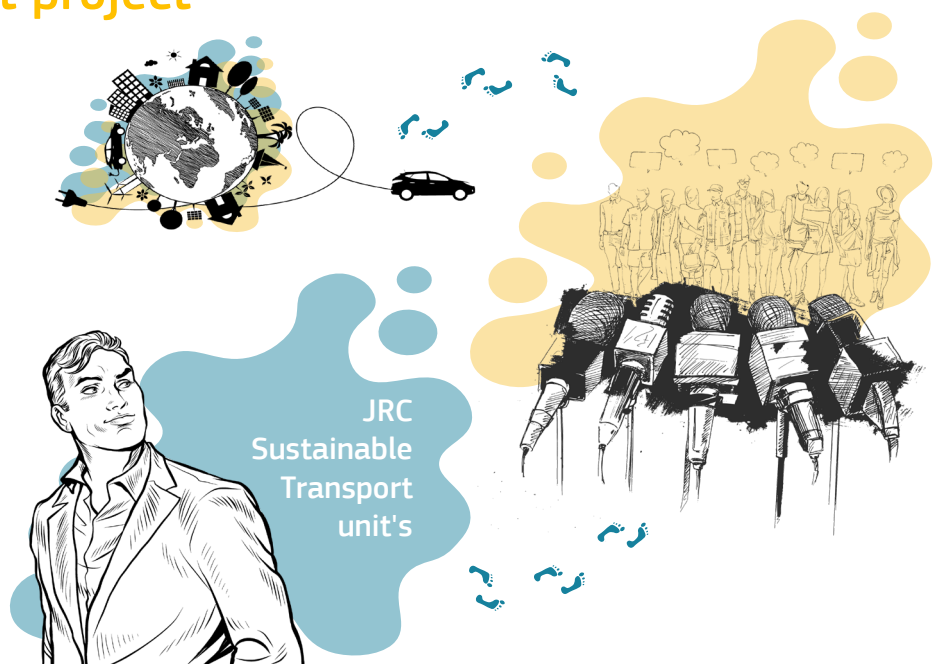
3. Impact of the connected and automated vehicles pilot project



Here we account for important impacts or 'reinforcements' of the CAVs participatory journey supported by the social lab at the JRC..

One of the biggest impacts of this pilot project is that citizen engagement has become an important part of the JRC Sustainable Transport unit's (C.4) work to find innovative mobility solutions and opportunities to improve governance of key mobility issues in the EU. Engaging citizens in the research and innovation process is a crucial element to take account of citizens' needs, expectations and values, which may lead to a better alignment of research and innovation with various needs within the EU and among its diverse citizens. Before the implementation of the pilot project, citizen engagement had limited application, in only a few activities, and it was largely practised by only two groups at the JRC in Directorates H and I.

The pilot project improved Unit C.4's understanding of how to consider scientific enquiry in a wider context, in order to better align both the innovation development process and its outcomes (i.e. the innovations) with societal expectations, values and needs. One of the outcomes is the use of focus group activities by the unit.

In 2020, Unit C.4 organised, together with the German Aerospace Centre and the University of Cantabria, 15 focus group discussions on CAVs with 72 participants living in 24 EU and non-EU countries. This activity was developed based on and complementary to Eurobarometer Survey 496 and the sentiment analysis. The focus group discussions served to uncover attitudes and beliefs of citizens and other stakeholders. Through group interaction, Unit C.4 has gained a better understanding of the reasoning behind users' choices and expectations related to CAVs.

3. 3. Impact of the connected and automated vehicles pilot project

The CAVs pilot project also sparked the living labs initiative including a Future Mobility Solutions living lab (FMS-Lab) at the JRC's Ispra site, entailing the genuine involvement of all relevant stakeholders, such as private actors, public authorities, academia and citizens, in their research activities. Living labs represent a powerful approach to fostering open collaborative innovation among citizens and other societal actors to involve them in the ongoing deliberations and listen to their voices. Within its living labs, Unit C.4 has implemented various aspects of the RRI framework, such as inviting diverse stakeholders to collaborate, engaging in interdisciplinary and cross-unit collaborations, and continuing to involve citizens in its research through focus groups and other citizen engagement activities. The unit is also inviting small and medium-sized enterprises and start-ups to bring their innovative solutions to be tested at the FMS-Lab. In 2022, three projects related to mobility are running in the FMS-Lab: a social ride-sharing application, an electric robotised vehicle platform for transport of both people and goods, and an automated drone for last-mile delivery of goods and food. Another side effect is that the inclusiveness of the LL approach has also uncovered other social and ethical dimensions such as gender equality for more careful consideration.

Even though not as a direct result of this project, but as a way to reinforce citizen engagement as default practice at the JRC to support policymaking, the **Commission's new Competence Centre on Participatory and Deliberative Democracy was created in 2021**. One of the key pillars of the competence centre is **to guide and support the design and implementation of citizen engagement** at the JRC and other services of the Commission, and of EU Member States.

4. Final remarks

Participatory approaches to policymaking are helpful when dealing with complex problems. Citizen interventions are essential in order to examine and question the existing policy framework and to challenge solutions that do not take into account matters of concern to European citizens. The H2020 CAVs pilot project's implementation of RRI keys explored the alternative mobility futures of citizens.

The JRC pilot on CAVs focused on the implementation of three RRI keys, namely engagement, ethics and governance. The project challenged solutionist narratives dealing with emerging technologies and used citizen engagement settings to explore alternative mobility futures. Citizens can offer new insights into novel (mis)uses of technologies and provide alternative mobility futures that depend not necessarily on technological innovation but on doing or trying things differently.

The futures-making ateliers showed that the purported drivers of CAVs do not always resonate with relevant actors, and especially ordinary citizens, who may challenge techno-centric solutions and offer alternative visions of mobility. Such visions included eliminating car use in cities and moving around less. The pilot project has shown interdisciplinarity in practice: how a variety of new methodologies and research practices can be implemented by different JRC units and how citizen engagement can enrich research and innovation processes. Based on the experiences gained, the project developed proposals for changing the way the JRC conducts research to inform policymaking. A practical result of this pilot study is the toolkit, (Van Wynsberghe et al., 2022) which aims to provide JRC colleagues with methodologies exemplified through the application to a policy case study, practical tips and further resources to implement responsible research practices in their research for policy.

Engaging in meaningful ways with the matters citizens care about should become a new standard for JRC research on pressing issues affecting the lives of Europeans. This move will also yield higher-quality research. Citizen engagement and ethical assessments speak to responsibility, as they allow institutions to question prevailing ways of working that deepen the gap between institutions and the social and political aspects of everyday life. Adopting a responsible approach to research and innovation, and in particular engaging citizens and ethics in design and appraisal, is in the present authors' view an act of humility in the face of complexity and uncertainty, as well as an act of institutional reflexivity.
Again, the Commission's Competence Centre on Participatory and Deliberative Democracy can help JRC researchers to implement meaningful citizen engagement, including on ethical issues, throughout their science for policy work and contribute to the quality of EU policymaking.

ANNEX 1

Planning your citizen engagement activities - Step by Step Guide

Research phase	Guiding Questions	Aim	Concepts
I. The exploratory phase: engaging with narratives	• What are the narratives circulating in the wider discourse on this policy issue? • What is the justification narrative? What and whose matters of concern are signalled in relevant policy and stakeholders' narratives? • What are the claims, the promises and the assumptions? • Who is represented? Who is not represented? Who is advancing the narratives? • What narratives are they, and whose values are entrenched in them?	• Taking stock • Discovering the key issues	• Narratives
II. The engagement phase: working with the extended peer community	• Who needs to be engaged? How will the relevant actors be mapped? • What kind of contract can reasonably be established with those engaged? • How does the engagement process lead to a shared set of questions or set of future visions? • How can you include actors' interventions as part of your research? • How will you record the engagement outputs, which may consist of a variety of (even contested) perspectives? • What methods will you use to analyse these data?	• Engaging with the extended peer community	• Extended peer community • Matters of concern • Matters of care
III. The futuring phase: mobilising knowledge with citizen engagement	• How can citizen interventions be part of research in science for policy? • How will citizens be selected and how many should participate? • What kind of 'contract' can reasonably be established with those engaged? • How will the engagement outputs– which may consist of a variety of (probably contested) perspectives – be recorded? • What methods should be used to analyse these data? • How ill engagement outputs be used in the research process?	• Using co-creative methods to discuss plausible futures • Documenting citizens' interventions	• Matters of concern • Matters of care • The co-creation turn • Publics • Deliberation
IV. The reporting phase: highlighting citizens' perspectives	• How has your research question changed through the engagement process? • How will you include citizens' matters of concern and framing of issues? • How will you follow up with citizens? • How might citizen interventions shift the way in which the policy issues are framed? • How will citizen perspectives be represented in the report? • How can citizens' concerns be taken into account in the policy recommendations?	• Representing the matters of concern to the extended peer community • Ensuring the social robustness of a policy	• Coding • Social robustness

ANNEX 2: Engagement Methods

Action research

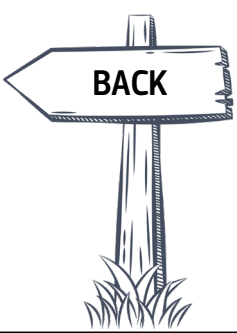
In action research, academics are called upon to actively engage with the issue(s) they are addressing in their research. In his seminal article 'Action research and minority problems' (1946), Lewin wrote that:

> *The research needed for social practice can best be characterized as research for social management, or social engineering. It is a type of action-research, a comparative research on the conditions and effects of various forms of social action, and research leading to social action. ...*
> *This by no means implies that the research needed is in any respect less scientific or 'lower' than what would be required for pure science in the field of social events.*
>
> (p. 35)

Action research puts social transformation at the centre of the act of conducting research.

Consensus conference

A consensus conference is a deliberative meeting whose aims are to (1) inform the public on a particular issue, (2) give participants an opportunity to actively express their opinions on the given topic and (3) create a space in which diverse participants may find common positions. The issues treated are often contentious and complex. This approach was developed in the 1960s in order to address questions and concerns related to biomedical technologies, and continues to be used today (Guston, 1999).



Material deliberation

Material deliberation uses objects to elicit 'emotions, perspectives and realisations' to include alternative forms of knowledge within discussions on policy issues (Davies et al., 2012; Selin, et al., 2017). Material deliberation allows an emphasis on the non-language-based aspects of engagement in order to allow other forms of knowledge to enter discussions and debates. This approach allows researchers and policymakers to validate, value, and include material and affective knowledge, which are usually excluded from traditional public deliberations.

Objects can prompt participants' interventions in various ways that are relevant to the researcher(s). For example, props and games can include certain demographics (e.g. children) in discussions from which other methods would exclude them.
In the same vein, material co-creation is about prototyping different affections, perspectives and problem-solving strategies through material formats of engagement.

Participatory scenario building

Participatory scenario building helps to investigate alternative futures. Using this method, the researcher can outline potential challenges, changes, new actors, risks and opportunities. The participatory approach enables multidisciplinary cooperation and therefore creates a shared vision and commonly acceptable results. It involves the following steps:

1. **Scoping.** Identifying the overall assumptions and problems that need to be addressed and defining the focus of the scenario work; gathering adequate background information; identifying the key factors, drivers and barriers that will shape the future of the area or topic in focus at macro and micro levels.
2. **Analysis of key factors**. Ranking the driving forces on the basis of their significance and degree of uncertainty.
3. **Scenario generation**. Building predetermined or probable scenarios.
4. **Scenario transfer**. Communicating, improving and using scenarios by linking them back to the original decision focus; turning scenarios into strategy.

Social lab

Social labs offer spaces for doing social experiments in a practical context where experts and stakeholders join together to initiate actions focused on tackling challenges without being constrained by predetermined project plans or lists of deliverables, and – most importantly in this context – without knowing exactly how to proceed (Hassan, 2014). In this way, social labs provide precisely the ability to experiment proactively with circularity, as both the properties of the RRI approach taken and the practical solution sought in the experiment emerge during the experiment.

Six features of social labs are (Timmermans, et al., 2020):

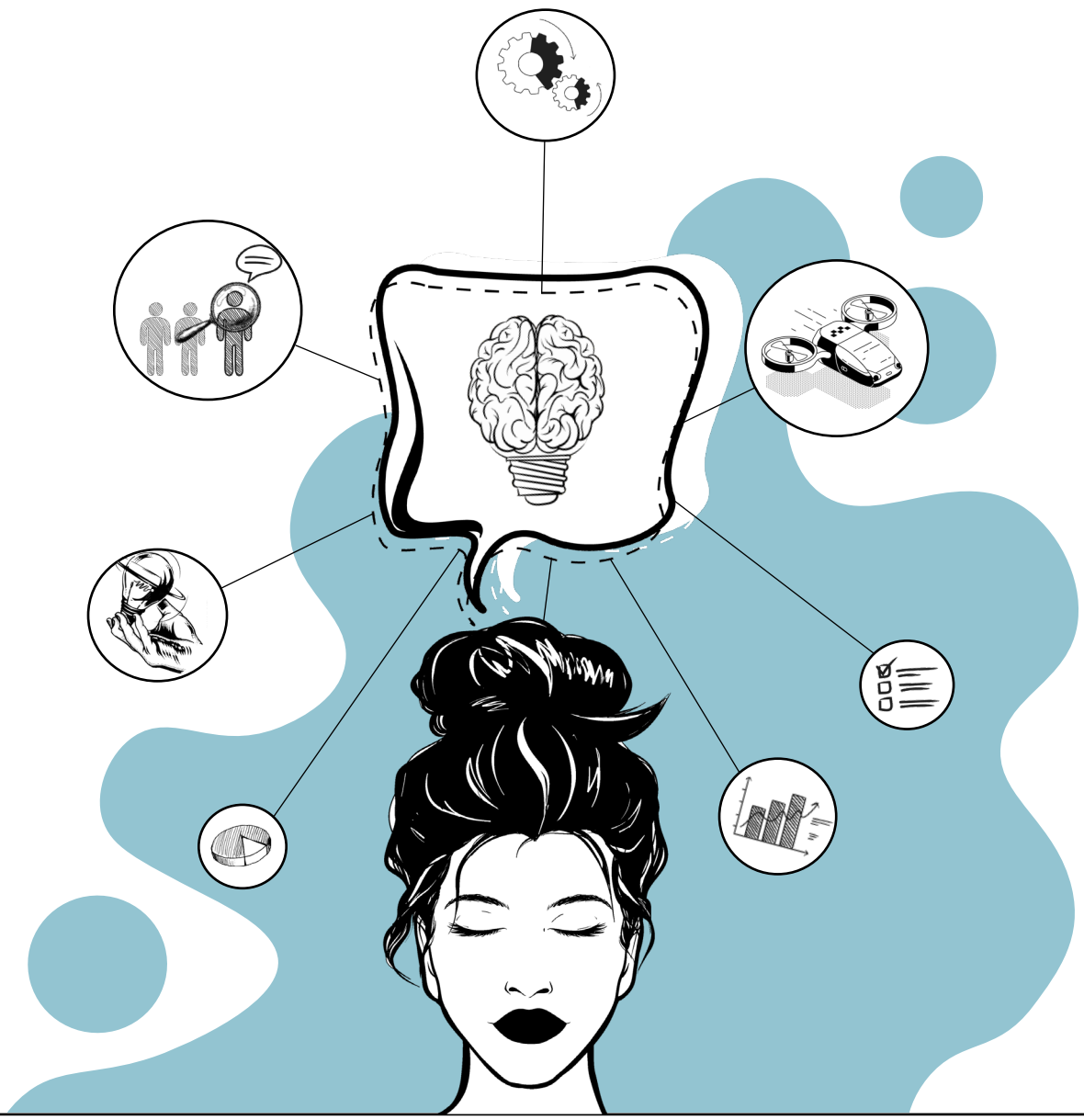
1. they offer a space for experimentation;
2. they foster solutions to complex problems that are embedded in the real world;
3. they include the active participation of a wide range of societal stakeholders such as policymakers, businesses, government and civil society;
4. they are multidisciplinary and interdisciplinary;
5. they support solutions and prototypes on a systemic level;
6. they have an iterative, agile approach.

The RRI social lab is a social, experimental and systemic methodology that aims to bring participants into the fold of research and innovation for policymaking. The JRC social labs within the NewHoRRIzon project allowed the investigation of complex social challenges in an inclusive framework with the participation of a variety of stakeholders throughout the research and innovation process.

Speculative Futuring

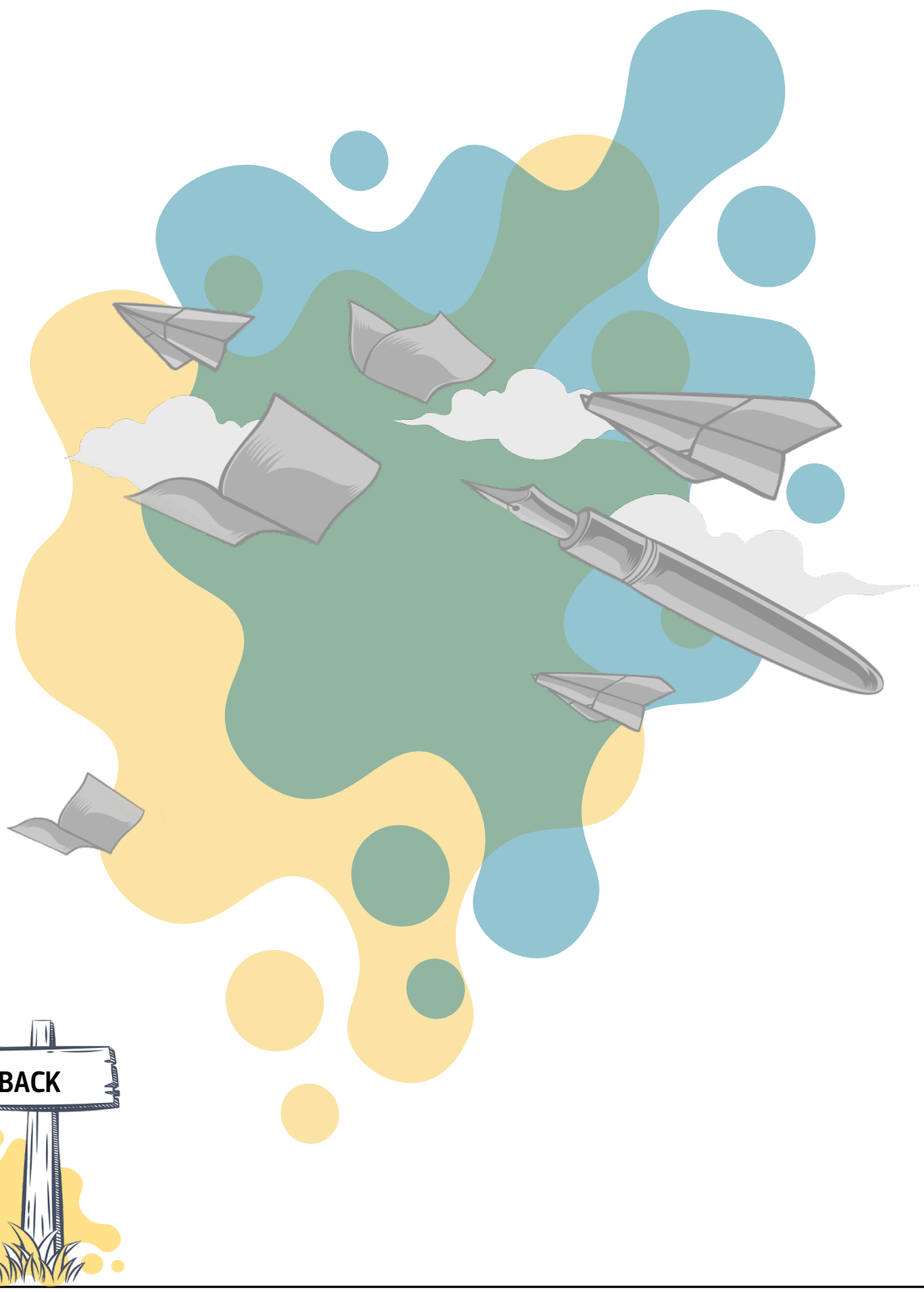
In general, speculative design aims to explore and criticise possible futures by creating speculative scenarios, which can be narrated using a variety of methods (SpeculativeEdu, 2019). Speculative futuring in particular emerges out of design but can also be conceived of as a social science along with critical design.

Speculative futuring can be a useful approach in order to immerse participants in an activity that allows them to envisage alternative future possibilities through creativity and speculation. Through 'futuring' activities, participants can shed light on other approaches to policy issues and their trade-offs. They can also help researchers and policymakers to identify how certain innovations and their development might affect a wider range of policy areas.



Abbreviations

CAV	connected and automated vehicle
EMM	Europe Media Monitor
EU	European Union
H2020	Horizon 2020
IHS	Institute for Advanced Studies
JRC	Joint Research Centre
RRI	responsible research and innovation



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