Forward Visions on the European Research Area

ERA Open Advice

Deliverable 5.3

Authors

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The cartoons and graphics of ERA key aspects and policy bundles have been designed by Joe Ravetz.

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What kind of advice can be found in this report?

<table>
<tr><td>Level 1
Advice</td><td colspan="5">High-level
strategic priorities of ERA,
i.e. ERA Dimensions or
Key recommendations</td></tr>
<tr><td>Level 2
Advice</td><td colspan="5">Key ERA Aspects
associated to each
ERA Dimension</td></tr>
<tr><td>Level 3
Advice</td><td colspan="5">Key ERA Actions
related to each
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<tr><td>ERA
Policy
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based on
Individual
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of R&I actors</td><td>ERA Advice
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a focus on
Excellent
Science</td><td>ERA Advice
with
a focus on
Industrial
leadership</td><td>ERA Advice
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a focus on
Societal
Challenges</td></tr>
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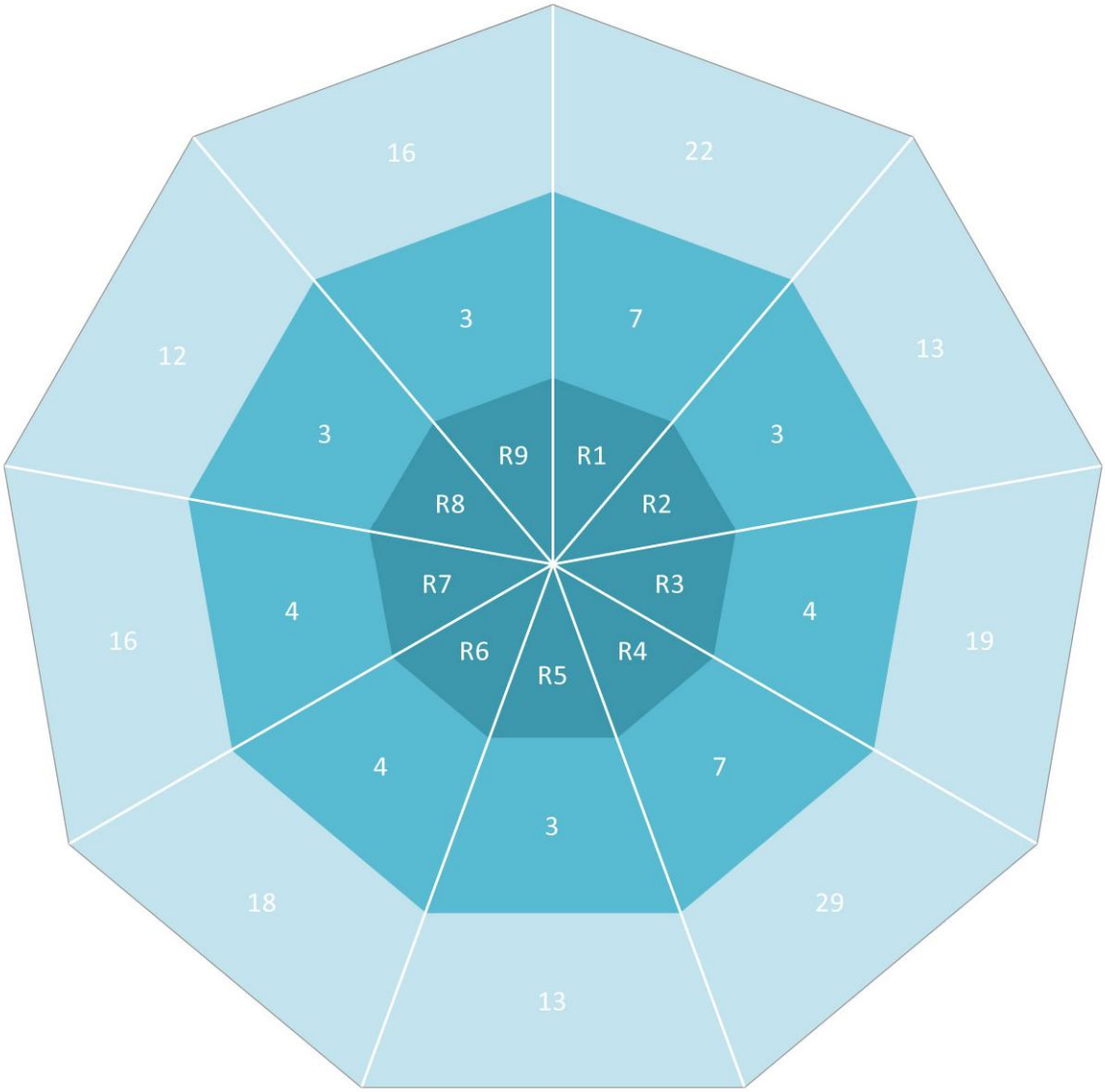
What are the key building blocks of this report?



ERA Dimensions (Key Recommendations)		Number of ERA Key Aspects	Number of ERA Key Actions
R1	Boosting research and innovation synergies	7	22
R2	Strengthening the global influence of ERA	3	13
R3	Promoting smart R&I evaluation	4	19
R4	Improving the governance of the EU R&I system	7	29
R5	Fostering relevant science-society engagement	3	13
R6	Developing attractive and impactful research careers	4	18
R7	Supporting knowledge co-creation and sharing	4	16
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Executive Summary

The VERA Strategic Debates come at a time when we seek a renewed momentum to support Europe's way out of the crisis and tackle grand challenges through an improved ERA. They offer a great opportunity to step back and raise a critical wake-up call on the very purpose, shape and ambition of ERA. In this report we have captured the essence of ERA stakeholders' views on rethinking ERA priorities and broadening the agenda. Overall, three key messages and a considerable number of policy issues have emerged: First, the existing ERA priorities are of great importance and should be further pursued. Second, however, there is a concern that the definition of those priorities is too narrow and not flexible enough and thus must be re-visited. Third, and even more important, the debate has led to the identification of new ERA dimensions that have not been captured in the ERA discourse so far, but which deserve more policy attention and integration into the evolving dimensions of the European R&I landscape.

1. Boosting research and innovation synergies
2. Strengthening the global influence of ERA
3. Promoting smart R&I evaluation
4. Improving the governance of the EU R&I system
5. Fostering relevant science-society engagement
6. Developing attractive and impactful research careers
7. Supporting knowledge co-creation and sharing
8. Achieving gender equality and social inclusion in R&I
9. Reinforcing ERA regional and local outreach

The ERA Open Advice report is based on two VERA Strategic Debates (SD) and three analytical approaches (see section 2).

- *VERA focus group methodology (SD1)*, which engaged 123 stakeholders in structured strategic debates on the future of ERA. The process itself is a major step forward in the creation of transparent, practical and solid bridges between the anticipating and recommending phases of the foresight process.
- *VERA symposium methodology (SD2)*, which used a multi-stakeholder setting to conduct a rating of policy actions inspired by VERA scenarios, a debate on today's relevance of future-based stakeholders' insights, and a fleshing-out of new ERA key actions.
- *Double-funnel policy advice approach*, which combined highly-participatory brainstorming-like activities with data processing based on clustering and content analysis.
- *Evidence-based policy advice approach,* that required literature review and an iterative process whereby every ERA aspect description, policy actions, critical issues, and recommendations were subject to an internal peer-review by five VERA team members at the Manchester Institute of Innovation Research.
- *ERA reflective policy advice approach*, that uses the ERA dimensions as a frame (ERA nonagon) to select nine ERA key actions, thus offering to the policymaker different alternatives (bundles) for a comprehensive policy action.

The ERA Open Advice report presents fully interconnected VERA policy recommendations at three levels:

- **ERA dimensions.** At the first level there are **9** policy recommendations linked to the nine ERA dimensions (ERA nonagon) resulting from the VERA Strategic Debates.
- **ERA key aspects.** The second level is based on a set of **38** recommendations or ERA key aspects, which are basically fleshing-out the 9 recommendations at level 1.
- **ERA key actions.** The third level consists of **158** recommendations or ERA key actions linked to the ERA key aspects. The actions are based on individual and collective reflections from stakeholders in SD1 (January-June 2014) and SD2 (October 2014), internal policy analysis and careful considerations to the final feedback obtained from the participants of the final VERA conference in Brussels (January 2015).

The nine ERA dimensions constitute the first level of ERA Open Advice. A full and contextualised description of ERA dimensions, ERA key aspects and ERA key actions is provided in the section 3. In the following paragraphs they are briefly introduced.

1. A major new dimension to be integrated into ERA strategies relates to the importance of boosting *research and innovation synergies* by promoting a more intense participation and interaction of stakeholders throughout the innovation process, particularly in terms of industry-academia cooperation.

2. The second most debated dimension was strengthening the *global influence of ERA*, which includes the development of a global variable geometry, a more systematic position of Europe vis-à-vis countries and regions outside Europe, and the growing role of global infrastructures.

3. Interestingly, the promotion of *smart R&I evaluation* attracted the attention of many stakeholders to the point that it became a dimension by itself, with stakeholders being very concerned about assuring transparent funding decisions and using evidence and reliable data to support European policies.

4. As regards the dimension on improving the *governance of the EU R&I system*, the discussion focused on R&I system coherence at EU level rather than on national R&I effectiveness, including the encouragement of more intense R&I actors' dialogue across Europe.

5. A much systematic and relevant *science-society engagement* has been strongly advocated as another new ERA dimension. This debate is very close to the EU initiatives on participation in the context of responsible research and innovation and includes a call for more science- and research-oriented education programmes at all levels.

6. In terms of developing *attractive and impactful research careers*, as one of the existing priorities, the debate basically maintained the importance of 'an open labour market for researchers', how-ever recognising the existing substantial differences remaining across Member States (MS) and highlighting the importance of cross-European and cross-sectoral mobility, whereby especially support for cross-sectoral mobility has been a recurrent feature in a number of dimensions.

7. The seventh dimension, though deeply connected to the first, is underpinning *knowledge co-creation and sharing*, which builds on the ERA priority on 'optimal circulation, access to and transfer of scientific knowledge'; however, a broader perspective was taken by including transdisciplinarity as a must-have component of the EU knowledge generation machinery (especially in the context of grand challenges).

8. The dimension on gender issues was expanded and rebranded into achieving *gender equality and social inclusion in R&I*. In an increasingly socio-economically complex Europe, stakeholders saw the need to include empathy to vulnerability and multiculturalism as key elements of a much needed agenda on diversity.

9. Finally, a ninth and new dimension focused on reinforcing *ERA regional and local out-reach* – with specific emphasis on regional cohesion, integration of region-specific and trans-regional challenges into the ERA agenda and greater permeability of EU funding instruments into less research-intensive regions.

All of these dimensions are further discussed in section 3 below.

Now, in order to develop a more pragmatic post-VERA standpoint, the authors applied a new reflective approach, which promotes additional and alternative combinations of ERA key actions (see section 4). Being aware of the need for more policymaker-friendly ways of digesting the 'ERA policy banquet' presented through ERA dimensions, key aspects and actions, the ERA Open Advice offers five 'policy bundles' in a menu-like style consisting of:

- "*entrées" or* **enabling actions**, which normally create the framing conditions for leading policy actions to fulfil their purpose in a more effective way;
- "*plats principaux" or* **leading actions**, which generally tend to provide the 'main course' for policy direction, thus creating a pathway that could be expanded with further supporting actions; and
- "*desserts" or* **supporting actions**, which offer additional conditions to make the previous policy actions sustainable.

The five policy bundles are grouped as follows:

- Two bundles on **policy menus *d'aujourd'hui*** by looking at the "ERA mirror" with a focus on today's policy implementation space (see section 4.1)
- Three bundles on **ERA policy *à la carte*,** which looked at ERA actions through Horizon 2020 lenses (see section 4.2).

In section 5 some conclusions reflect that well-structured collective thinking processes can be used to bring stakeholders' concerns and insights into the EU R&I policy debate. The amount and quality of outcomes resulting from the VERA Strategic Debates confirm that the scenario-based approach is a useful stepping stone for gathering future-oriented strategic intelligence, as well as for delivering policy advice of relevance for today's decision-making.

Reflecting on these outcomes, it is possible to conclude that the *current set of ERA priorities remains an '***open debate**', which is the first reason for calling this report ERA Open Advice. It is a challenging venture to try to position nine *ERA dimensions*, thirty-eight *ERA key aspects* and 158 *ERA key actions*, in a policy context where six ERA priorities have been "already agreed" and discussed at the various ERAC plenary meetings in charge of drafting the ERA Roadmap to be sent to the European Council in May 2015.

With great awareness of the challenge that this report faces in terms of informing, influencing or shaping the high-level ERA policy debates that will take place in the coming months and years, the extremely '**open approach**' (ERA nonagon) to the analysis of R&I stakeholders' insights reflects the *high levels of transparency and trackability of multi-level policy recommendations* utilised and presented in this report.

In addition, and with a more realistic expectations for the potential exploitation of the outcomes from the VERA Strategic Debates, the report provides some guidance on how the *ERA reflective policy advice* approach can be used to promote a more '**open agenda**' which, regardless of the "official" set of ERA priorities, can *integrate multiple ERA reflections and H2020 perspectives*, thus offering to the policymaker different alternatives for actions. The full list of specific ERA key actions (see Annexe 10) can also be used by EU, national and region policymakers to move forward in every new ERA dimension.

Another contribution, which goes beyond its methodological value, is the fact that the ERA Open Advice reports shows the way forward for those foresight practitioners who have not understood or realised yet that, if policymakers need "evidence-based" policy advice, then there needs to be an '**open process**' with a *solid bridge connecting the anticipating and recommending phases of the foresight process*.

Finally, and in the spirit of practicing what we "preach", the fifth element of the open advice was achieved with '**open access**' to the well-structured recommendations dataset that was used to prepare this report. Hopefully, the level of openness of the product and process outcomes of the VERA Strategic Debates will reinforce the uptake of participatory R&I governance in Europe.

1. Introduction

As stated in the VERA *description of work*, the 'ERA Strategies' WP5 aimed to underpin an adaptive, efficient, effective and well-resourced European Research Area (ERA) that fosters innovation and creativity and addresses upcoming socio-economic challenges by:

- engaging with key stakeholders to explore strategic responses on the critical issues for the ERA evolution.
- providing sound recommendations on research and innovation (R&I) policies and their governance and coordination across ERA.

In order to achieve an optimum of breadth and depth of strategic options for ERA policies, the VERA Strategic Debates involved two types of discussions on ERA future perspectives with key ERA stakeholders:

- *Strategic Debate 1*: Focused debate of strategic responses with specific ERA stakeholder groups that are affected by the changes described in the VERA scenarios.
- *Strategic Debate 2*: Joint discussion of strategic responses to ERA critical issues with stakeholders across the ERA's relevant domains and levels.

The insight created in both debates has formed the basis for sound and fully interconnected policy recommendations that are rooted in a solid knowledge of individual actors' strategies and forward-looking debates across actor groups. Interactive dialogue with the participants beyond the personal encounters has been established through several stakeholders' engagement processes where interaction between different groups such as mutual commenting has been strongly encouraged.

The ERA Open Advice report has three main objectives:

- To further position the ERA debate across Europe and within EU bodies, especially the European Commission. In particular, the report aims to provide timely 'food for thought' for the design and implementation of the ERA Roadmap at European, national and regional level.
- To provide a comprehensive account of the stakeholder engagement activities and their overall outcomes, in particular the provision of sound ERA Policy Recommendations with concrete proposals for action.
- To demonstrate the value of foresight as a proactive and systematic process capable of using the collective anticipatory intelligence of VERA Scenarios to feed stakeholders' discussions on ERA key aspects and associated ERA key actions shaping the future of the European R&I landscape.

It has been a long and stimulating journey, which is captured in the ERA Open Advice 'Roadmap' (see below). The main results were presented at the final VERA Conference in Brussels (January 2015) where most stakeholders recognised the need for a broader and more comprehensive ERA agenda.

As a result, this report is structured around five sections. After this short introduction (section 1), the methodology behind the ERA Open Advice is presented in section 2, which describes the stakeholder engagement strategy and the Strategic Debates processes. Section 3 provides a full account of the main outcomes, which are structured around multi-level recommendations. This section is divided into nine sub-sections covering each of the nine ERA dimensions that have been identified in the process. Each ERA dimension is a recommendation at the first level, and includes a number of ERA key aspects, which represent the recommendations at the second level and offer a 'how to' agenda for the ERA dimensions. Lastly, a third level section includes a total of 158 ERA key actions, which are highlighted in *italics*. Section 4 offers a new and more reflective approach to policy analysis, by presenting alternative combinations of these ERA key actions. Finally, section 5 concludes with a short summary of key results, which are divided into product and process outcomes; followed by a short description of reasons that explain why this reports is called ERA Open Advice.

The ERA Open Advice Roadmap

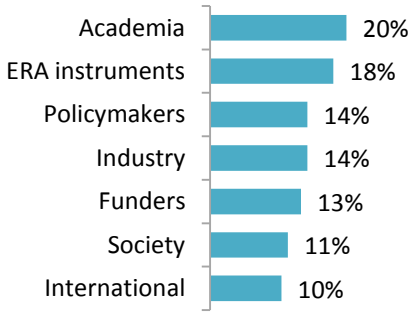
Milestone	Location	Target stakeholders	Date
Pilot	Paris	VERA team	November 2013
Focus Group 1	Vienna	Society actors	January 2014
Focus Group 2	Manchester	Academia actors	April 2014
Focus Group 3	Helsinki	Industry actors	April 2014
Focus Group 4	Berlin	Research funding actors	April 2014
Focus Group 5	Barcelona	Coordinators of ERA instruments	May 2014
Focus Group 6	Barcelona	Policymaking actors	May 2014
Focus Group 7	Brussels	International actors	June 2014
Symposium	Manchester	All R&I actors	October 2014
Conference	Brussels	All R&I actors	January 2015

2. Methodology

This ERA Open Advice report is the result of a **systematic two stages process: (1) a two step participatory process of defining recommendations, and a (2) reflective policy advice stage**. While the main outcomes (i.e. ERA-relevant recommendations and structured advice) are presented in sections 3 and 4 of this report, in this section we focus our attention on key methodological contributions of the process.

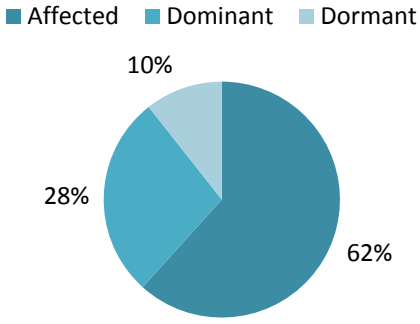
2.1. Participatory recommendation phase

This involved of two processes: **Strategic Debate 1** (SD1) and **Strategic Debate 2** (SD2). The debates engaged a total of **123 R&I stakeholders** from **28 countries**, including 93 R&I actors and 30 VERA team members and 93 organisations (see also Annexes 01 and 02).

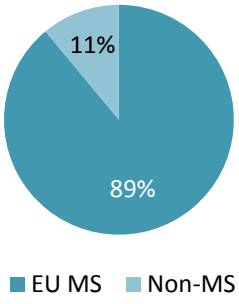


The stakeholder engagement was based on five criteria:

- **R&I system relevance**, which drew on the salience model used in the VERA Communication Strategy (Haegeman et al., 2012), to mobilise **affected actors (62%)** with legitimacy and limited power to modify ERA priorities – represented mainly by selected *society* and *academia* actors; **dominant actors (28%)** with significant power and legitimacy to set, amend or veto ERA priorities – represented by *policymakers*, *research funders*, *coordinators of ERA instruments*, as well as influential *academia* and *industry* actors; and **dormant actors (10%)** with latent or potential future legitimacy in the shaping of ERA agendas – represented by *international* and some *society* actors. Depending on the ERA priority or area of attention, some stakeholders may fall into different categories, but their overall distribution is represented in the figure on the right.

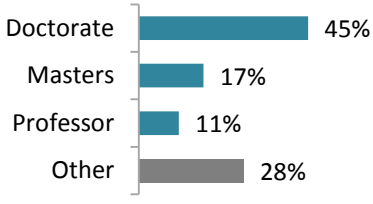


- **Geographical relevance**, which was obviously focused on EU MS (89%) and complemented with selected international actors (11%). Both SD1 and SD2 mobilised participants from **19 MS** (AT, BE, BG, CZ, DE, DK, ES, FI, FR, GR, HU, IT, LV, MT, NL, PL, PT, RO, UK), and **9 non-MS** from Europe (NO, RS, RU, UA), Latin America (BR, CL, DO), Asia (TW) and Africa (BJ), including EC, OECD, UNESCO and UNIDO representatives.



- **Gender balance**, which was achieved with a ratio of **63:37** (men:women) in SD1 and an improved **58:42** ratio in SD2.

- **Academic level**, which was used to keep the level of discussions high, thus the selection of participants involved a good mix of doctorate (45%), masters (17%), professor (11%) and other (28%) levels.



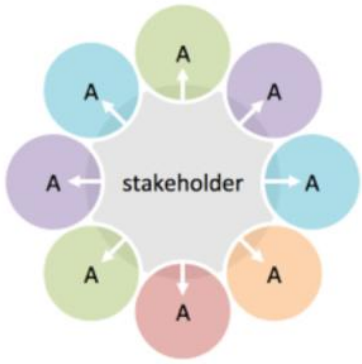
- **VERA internal cohesion**, which was reached by engaging 29 representatives from the VERA Consortium including UNIMAN (6), Fraunhofer ISI (6), VTT (4), Twente (3), IPTS (3), IFRIS (3), AIT (2), UEFISCDI (1), INGENIO (1) and one member of the VERA Advisory Board (1).

Both SD1 and SD2 were organised by The University of Manchester in partnership with nine VERA partners in the context of the VERA Work Package on 'ERA Strategies' (see Annexes 03, 04, 05, 06, 07).

2.1.1. *Strategic Debate 1 (SD1): VERA Focus Groups*

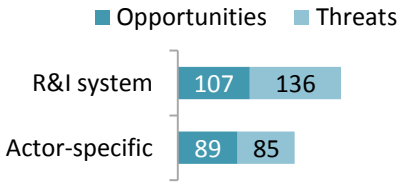
The aim of SD1 was to elicit opportunities, threats, strategies, priorities and actions from the stakeholders. It consisted of one **pilot workshop** followed by **seven Focus Groups (FG)** involving society, academia, industry, research funders, coordinators of ERA instruments, policymakers and international actors. A total of **103 participants** were mobilised in SD1; including 76 R&I actors and 27 VERA team members. Previous project results supported the FG, especially the four VERA scenarios or visions, which were presented in the FG to stimulate discussions about the European R&I system by 2030 (see Annexe 08 and Teufel et al, 2013).

Using SD1 to trigger individual stakeholders' reflections on policy actions for ERA

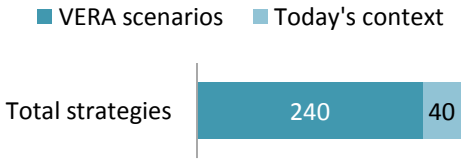


The FG methodology consisted of five activities encouraging strategic debates on:

- **Critical issues.** This involved a structured brainstorming on opportunities and threats inspired by VERA scenarios, resulting in **417 issues**, 243 at R&I system level and 174 actor-specific. The issues were prioritised by the FG participants in terms of their importance and uncertainty, leading to a set of **184 critical issues** at R&I system level.

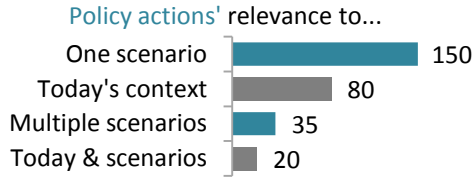


- **Stakeholders' strategies.** This required a brainstorming on responses to **actor-specific issues** in linked to VERA scenarios and today's context. Some **280 strategies** were generated and used for the **ERA Strategy Map** report.



- **ERA priorities.** The background material for this activity was the ERA Progress Report 2013 (EC, 2013a), thus participants were briefed on 5 ERA priorities divided into 15 aspects (see Annexe 09). Stakeholders were asked to vote on the importance of existing priorities and brainstorm on new priorities or aspects. A total of **114 ERA aspects or aspirations** were generated and prioritised by the stakeholders based on their ERA relevance. This was followed by an internal clustering and content analysis activity, which resulted in **38 ERA key aspects**. The final set of key aspects was debated internally by the VERA team and grouped into **9 ERA dimensions** and later into **9 policy recommendations** (section 3).

- **Policy actions.** This involved a brainstorming on possible policy responses to **critical issues at R&I system level**. A total of **285 policy actions** were generated with some 100 of relevance for ERA today. Further analysis of all actions led to a final set of**158 ERA key actions** (see Annexe 10).



- **ERA relevance of stakeholders' strategies and suggested policy actions.** This activity required a collective mapping of stakeholder's strategies and suggested policy actions against the enhanced list of ERA priorities and related aspects. R&I stakeholders were also invited to openly debate and include new policy issues and actions that deserve immediate or future attention.

2.1.2. Strategic Debate 2 (SD2): VERA Symposium

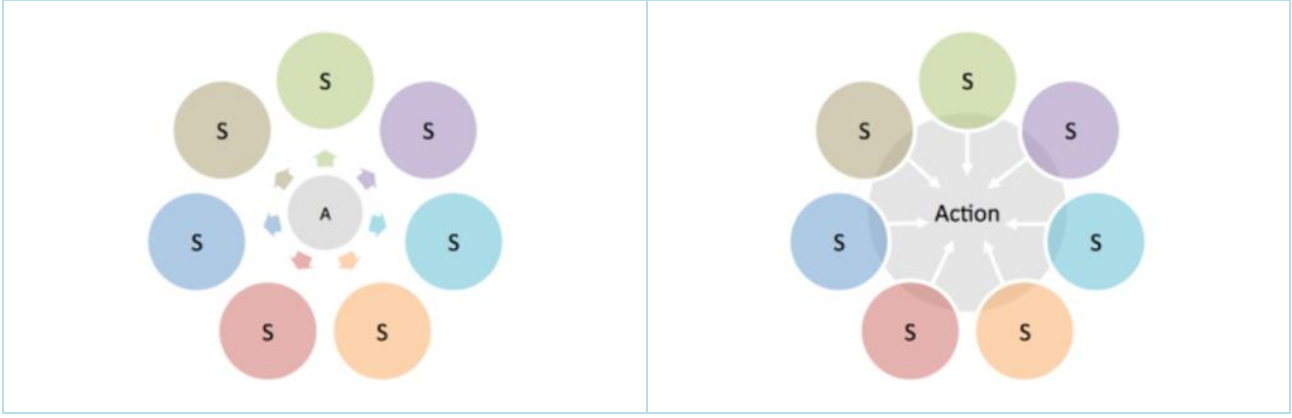
The aim of SD2 was to collectively develop policy recommendations for today's context. It required the organisation of a two-day **symposium** involving Society, Academia, Industry, R&I funders, Coordinators of ERA actions, R&I Policymakers and R&I International actors. A total of **44 participants** were mobilised in SD2; including 31 R&I actors 13 VERA team members. The background material for the symposium included 7 research briefs capturing each of the FG results, i.e. individual actors' reflections on opportunities, threats, strategies and policy actions associated to the four VERA scenarios (see Annexe 08).

The methodology consisted of two main activities focused on the policy actions generated in the FG:

- **Backcasting-like prioritisation of policy actions.** From the 285 policy actions generated in the FG the VERA team selected **185 policy actions** that, during the FG discussions, were mentioned in either one or multiple scenarios. The main task was to bring some of these actions 'back to the present' by rating their relevance for today's context. The policy actions were also linked to the nine ERA dimensions and distributed among SD2 participants who were asked to individually assess them using 0 to 3 scores, where *zero* meant the *action had no chance of being implemented today* as it was too scenario-dependent, while *three* meant the *action was implementable*. As a result, a total of **42 policy actions** were deemed relevant for today's R&I context by more than 50% of SD2 participants.

- **Collective reflections on policy actions of relevance for today.** This activity was organised in a rather interactive setting where different stakeholders were sitting around a table with the 42 policy actions to debate. Participants were given two complementary tasks: first, to debate on the importance of the 42 actions for ERA today, which after a clustering led to a final set of **31 policy actions**; and second, to collectively 'retro-reflect' and flesh-out prioritised actions (see diagrams below). The fleshing-out required participants to discuss on their relevance to the 9 ERA dimensions resulting from SD1.

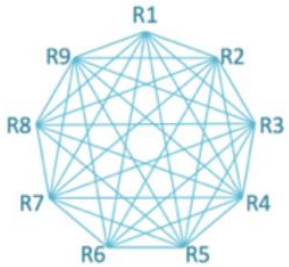
Using SD2 to trigger collective stakeholders' reflections on policy actions for ERA



2.2. ERA reflective policy advice phase

This phase was conducted by the Manchester VERA team who developed a new **polygonal-bundling approach** to policy advice. The *polygonal* approach offered a frame (ERA nonagon) based on the nine ERA dimensions, while the *bundling* term implies identifying mutually reinforcing recommendations, i.e. making a **policy mix**. The bundling approach also makes possible to consider stakeholders' attributes, such as *preferences* (non-neutral positioning), *reflections* (based on knowledge and experience) and *perceptions* (worldviews). The policy bundles presented in section 4.1 are based on **reflections** (individual and collective) whereas those in section 4.2 are based on **perceptions** (i.e. H2020 pillars).

ERA dimensions



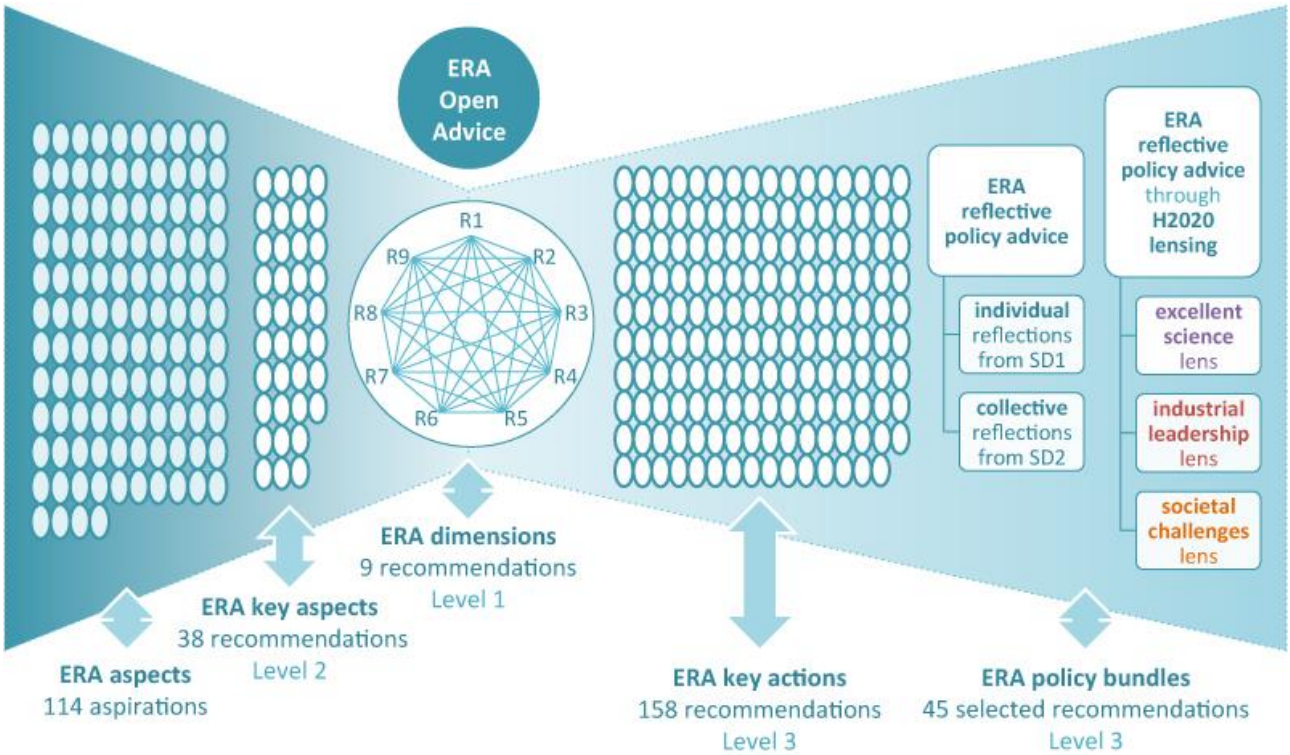
The five policy bundles presented in section 4 can be grouped as follows:

- **Two on the policy menus *d'aujourd'hui* by looking at the ERA mirror.** The name of these bundles is explained by the fact that they present different types of reflections on today actions. On the one hand, SD1 promoted **individual reflections** from our seven types of stakeholders, which led to **100 policy actions** for ERA today. The Manchester VERA team used these reflections to build a policy bundle of relevance for the 9 ERA dimensions (see section 4.1.1). On the other hand, SD2 supported **collective reflections** on today's relevance of jointly prioritised ERA policy actions. A selection from the actions that were rated as highly relevant for ERA today was further analysed and used to build a second policy bundle (see section 4.1.2).

- **Three on ERA policy *à la carte* through Horizon 2020 lensing.** This activity focused on **55 policy actions**, some 35 actions associated to multiple scenarios and 20 actions linked to today's context and at least one VERA scenario (see section 2.1.1). The selection was done taking into account that actions related to several contexts might be relevant for forward-looking policy advice. The actions were analysed through H2020 lenses and three bundles were built using the EU's *perception* on the overarching H2020 pillars: **excellent science**, **industrial leadership** and tackling **societal challenges** (see sections 4.2.1, 4.2.2 and 4.2.3).

At all stages, the analyses were supported with **literature review** in order to identify suggested ERA policy actions that have been already implemented.

Overall, the core methodology of our **ERA Open Advice** can be summarised in the figure below. This double funnel visualisation helps to understand the sections of this report. Section 3 includes **9 recommendations** at level 1 (ERA dimensions), **38 recommendations** at level 2 (ERA key aspects) and some **158 recommendations** at level 3 (ERA key actions).Finally, section 4 reuses **45 recommendations at level 3** to build **5 ERA policy bundles**.



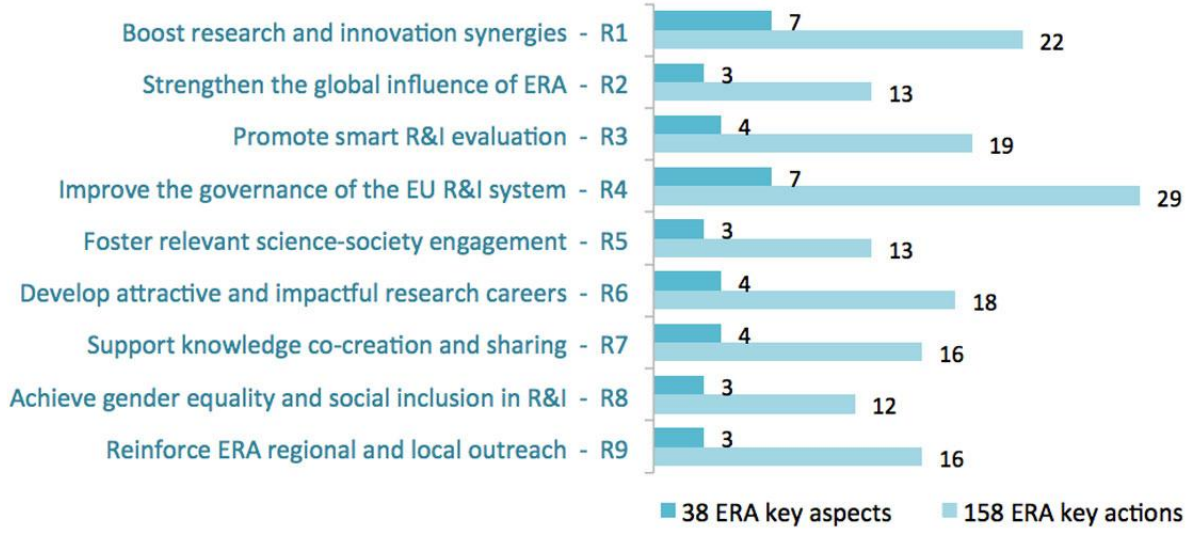
3. Participatory recommendations

This section uses a multi-level policy recommendation approach to present the main results of the VERA ERA Strategies work package (WP5) led by The University of Manchester in the VERA project.

The VERA policy recommendations are fully interconnected and structured around 3 levels:

- **ERA dimensions.** At the first level there are **9** policy recommendations linked to the nine ERA dimensions resulting from VERA Strategic Debates, which engaged 123 R&I stakeholders from 28 countries (see section 2).
- **ERA key aspects.** The second level is based on a set of **38** recommendations or ERA key aspects, which are basically fleshing-out the 9 recommendations at level 1. These aspects were collectively generated, debated and refined by R&I stakeholders who took part in the VERA focus groups and the symposium.
- **ERA key actions.** The third level consists of **158** recommendations or ERA key actions linked to the ERA key aspects. The actions are based on individual and collective reflections from stakeholders, documentary and content analysis, and internal reflections of the VERA teams, which took into account the feedback from the participants of the final VERA conference in Brussels (January 2015).

To help the reader better navigate through this section, the following structure has been used: **policy issue** – presenting a short description of a problem for policy consideration; **policy recommendation** – introducing a high level policy response to a policy issue; **policy background and critical issues** – describing the contextual landscape around the policy issue as well as key opportunities and threats, thus making the case for policy interventions; and **how to** – fleshing-out the main recommendation with two additional levels, where level 2 recommendations (ERA key aspects)are included as sub-sections and level 3 recommendations (ERA key actions)highlighted in *italics* and listed in the Annexe 10. All sections were analysed by the Manchester team through an iterative process of ERA aspect description, related actions articulation, connection of critical issues with the policy issue, argumentation and internal peer review. Finally, the figure below shows the total number of *ERA key aspects* and *ERA key actions* associated to each of the nine policy recommendations discussed in this section.



3.1. Boost research and innovation synergies

1st policy issue

Many R&I stakeholders see the ERA's predominant focus on research as problematic. This does not mean a turn towards exclusively impact-oriented research, or a curtailing of curiosity driven endeavours. It means instead a stronger recognition that ERA is not only about research, but about the conditions for turning that research into meaningful innovation. The Europe 2020 strategy recognises, from its conception, the potential of innovation for boosting economic growth: in this sense the innovation paradigm has been profoundly embedded in the EU political discourse. However, despite the broadly accepted relation between research and innovation, a full and systematic exploitation of their synergies is not an integral part of the ERA concept and is yet to be achieved.

1st policy recommendation (R1)

Boost research and innovation synergies by (1) broadening ERA into a European Research and Innovation Area; (2) implementing more effective innovation funding instruments; (3) shortening the transition from invention to innovation; (4) using IP supporting strategies for innovation; (5) boosting industry-academia R&I cooperation; (6) embracing open innovation strategies; and (7) stimulating entrepreneurship.

Policy background and critical issues

The most important issue in the discussion of the future of ERA, across all VERA focus groups, was the need to better enable, create and exploit synergies between research and innovation. While ERA and Horizon 2020 (EC, 2013b) are increasingly linked, R&I stakeholders still demand a better integration between research and innovation since ERA is still seen as too much focused on research. During the economic crisis, between 2007 and 2014, the EU has reduced R&D investments by approximately 15% (EC, 2014a), while well documented examples suggest that increasing R&D investment could help to cope with the effects of economic decline in some countries (EC, 2014b). However, reversing the trend of less R&D spending, let alone achieving the MS target of 3% R&D (GDP) by 2020 requires a more active mobilisation and involvement of industry. Likewise, tackling societal challenges will only be effective with joint efforts of public and private research.

Several opportunities and threats for European research and innovation futures have been identified by R&I stakeholders, as regards a stronger focus on innovation in ERA. On the one hand, by encouraging businesses to contribute to R&I agenda-setting, the EU is likely to improve the European innovation system's performance, and promoting research that matches the interest of industry could advance Europe's leadership in some technology-intensive areas. ERA thus could create synergies with Horizon 2020 and the €80bn earmarked for R&I. On the other hand, excessive focus on applied research could lead to a considerable reduction of basic research, potentially undermining the innovation system's capacity in the long term. The following section presents seven specific actions, based on the analysis of the VERA focus groups' results, aimed at helping us better respond to challenges associated with boosting research and innovation synergies.

How to boost research and innovation synergies?

3.1.1. Broadening ERA into a European Research and Innovation Area

To broaden strategies for a European Research and Innovation Area(ERIA) combines a variety of R&I support instruments in the pursuit of EU goals, e.g. excellent science, industrial leadership and tackling societal challenges.

All stakeholders, especially academia, industry and policy actors, called for *more innovation in Horizon 2020, but not to the detriment to stable – and even increased – funds for basic research* with a strong demand for better synergies between the two.

Stakeholders in the VERA discussions saw the Innovation Union flagship initiative as already enabling public-private partnerships and promoting appropriate conditions for firms and institutions to grow and innovate. But the overall view of R&I stakeholders was that reinforcing this growth perspective requires a *wider vision of innovation, which includes organizational and social aspects,* i.e. not focusing exclusively on technological approaches. Such a broader perspective may be achieved by improving the links between ERA and the Innovation Union, thus *going beyond mere analyses of EC instruments towards systematic analyses of national R&I systems co-existence*; policy making and research funding organisations should bring the idea of a European Research and Innovation Area to the forefront of this debate. R&I stakeholders also discussed the benefits of focusing innovation on societal needs. An example of such efforts is the Digital ERA flagship – Open Innovation Strategy and Policy Group[1] – which conceives innovation as a cooperative effort, whereby government, industry, academia and civil society participants interact to formulate and address societal demands and stimulate competitiveness by means of digital innovations. Another demand-side strategy that the EC should

[1] See http://ec.europa.eu/digital-agenda/en/open-innovation-strategy-and-policy-group

further explore and promote is the *use of public and joint procurement to accelerate innovation.* This may involve the development of more flexible regulations that focus on targets rather than specifying processes, thus supporting initiatives that genuinely incorporate innovation rather than staying within the status quo.

Go beyond mere analyses of EC instruments, and move towards systematic analyses of national research and innovation systems co-existence

Advice from research funding actors

3.1.2. Implementing more effective innovation funding instruments

To implement more effective innovation funding instruments involves improving existing funding mechanisms as well as devising new ones that go beyond mere capital outlay.

The EC has supported the launching of new business products, services or processes through such initiatives such as InnovFin [2] (a finance instrument 'for Innovators' within Horizon 2020 that provides access to €24 billion of R&I funding to SMEs and large firms), COSME (access to finance through loans and equity facility), and various efforts to promote European Venture Capital investors.[3] However, R&I stakeholders, in particular policy and industry actors, recognised the need to improve or create new financial instruments that are better capable of stimulating R&D and supporting the innovation process in firms and networks of firms, e.g. by *promoting venture funding and advisory services for projects and companies dealing with complex innovations in unproven markets,* especially in areas linked to grand societal challenges. Instruments such as *tax incentives* (e.g. making it more attractive to support part-time MSc and PhD studies and placements) could encourage SMEs to invest in new R&I capacities, while *new 'insurance schemes'* may be capable of safeguarding R&I investments. SMEs, in particular, widely report finding it difficult to fund innovation (EC, 2014c), especially when it comes to develop ideas and projects with no clear or immediate economic impact; the EU should be able *to take on some of the financial risks* (e.g. sponsoring high risk research or challenge-oriented innovations) and provide *back-up guarantees* (e.g. facilitating so-called "subordinated loans" as a way of reducing investment uncertainties).

Promote financial instruments that provide venture funding and advisory services for projects and companies dealing with complex innovations in unproven markets, especially in areas linked to societal challenges

Advice from industry actors

3.1.3. Shortening the transition from invention to innovation

To shorten the period of transition from invention to innovation means speeding up the move of new ideas (which may deal with products, services, business and organisational models, social practices or governance instruments) from first creation, through design and demonstration, to commercialisation or implementation.

A strong message from R&I stakeholders was the need to optimise the research-to-innovation process. This should involve relevant and timely stimuli across all stages of the innovation. For example, *at their earlier stages R&I projects may benefit from common spaces for innovators, sponsors and beneficiaries to interact*. However, the non-linearity of R&I processes will often demand additional efforts to improve the linkages of early-stage projects with innovation brokers/enablers. Horizon 2020 has already introduced a Fast Track to Innovation (FTI) tool, to fund close-to-market activities and promote innovation through multidisciplinary and cross-sectoral perspectives. Similarly, access to market has also been supported by the Competitiveness & Innovation Programme (CIP) and its successor COSME (2.3bn €), in a comprehensive attempt to enhance SMEs' competitiveness through access to finance, access to markets, supporting

[2] See http://www.eib.org/products/blending/innovfin/
[3] See http://europa.eu/rapid/press-release_IP-13-1135_en.htm

entrepreneurship, and improving business conditions[4]. However, despite FTI and COSME efforts, industry actors believe much more can be done, and proposed *a more systematic use of horizon scanning to identify emerging innovation opportunities and support their piloting, implementation and scaling-up across MS*. Shortening the time for the commercialisation of innovation also matters for addressing grand challenges such as climate change and ageing problems. Finally, R&I stakeholders called for *instruments supporting disruptive and transformative solutions, and not only incremental innovations.* Such endeavours may sometimes require the *development of new regulatory frameworks,* aiming to stimulate innovation by more focus on the solutions needed rather than the kind of processes to achieve them.

Make systematic use of horizon scanning to identify emerging innovation opportunities worldwide and support their piloting, implementation and scaling-up across MS

Advice from industry actors

3.1.4. Using IP supporting strategies for innovation

To use Intellectual Property (IP) supporting strategies for innovation enables SMEs and large companies to better exploit the potential of their innovations, by protecting their ideas and investments, and by demonstrating their value to clients and investors.

It is generally known that uncertainties about IP rights can actually restrict the entry of firms into new markets, and in some cases commercialising products and services in foreign countries requires a profound understanding of these countries' regulations. Accordingly, COSME implemented IPR helpdesks in different countries like China, ASEAN and Mercosur, to reduce this barrier to firms' international expansion.[5] The EU is also in the process of developing uniform patent protection instruments aimed at reducing the administrative burden of IPR (EU, 2012), and supporting the full implementation of the European Single Market (EC, 2012a). VERA stakeholders recognise the importance of ongoing IPR initiatives, but stress that IPR rules and practices must be consistent with European R&I agenda formulation and implementation. In that sense, research funding actors proposed to *counterbalance the private sector ownership of IPR with new strategies that allow all R&I stakeholders to have an easier access (including shared IPR ownership) to the outcomes of publicly funded research projects.*

Counterbalance the private sector ownership of IPR with new strategies that allow the public to share the IPR resulting from EU funded R&I

Advice from research funding actors

3.1.5. Boosting industry-academia R&I cooperation

To boost industry-academia R&I cooperation requires the development and promotion of effective communication mechanisms to recognise common needs and explore strategic complementarities.

The European Union is already supporting such cooperation through a variety of instruments at many levels. For instance, the EIT Knowledge Innovation Communities (KICs) bring together higher education, research and industry, encouraging innovations to address major issues (e.g. climate change) and at the same time aiming to develop new skills and entrepreneurial talent. Despite this, and many other initiatives, sustainable partnerships between industry and academia still face many challenges: these often require additional efforts to act as bridges between research and industry from, for example, the Technology Transfer Offices Circle.[6] In the VERA focus groups, industry stakeholders placed considerable emphasis on the need to further exploit business-university R&I

[4] See http://europa.eu/rapid/press-release_IP-13-1135_en.htm

[5] See https://www.iprhelpdesk.eu/services

[6] See https://ec.europa.eu/jrc/en/tto-circle

cooperation opportunities. They suggested, for example, that *harmonising incentives policies* could contribute to reinforce this cooperation. They also noted the scope for *increasing and improving labour exchange programmes and shared mission-oriented R&I platforms.* It was pointed out that the intensification of industry-academia knowledge exchange would benefit the universities' innovation-driven research processes as well as the industries' value chain. Overall, R&I stakeholders believe that the problems are less to do with a lack of instruments, but of a lack of understanding of common needs.

Develop new legislation (e.g. harmonising incentives policies) that supports and reinforces the linkages between research and industry

Advice from industry actors

3.1.6. Embracing open innovation strategies

To embrace open innovation strategies requires the recognition that such boundaryless and end-user-driven processes often lead to significant R&I ecosystem transformations through new practices, outcomes and players.

The EU has acknowledged that Open Innovation is a key ingredient of the future European R&I policy whereby government, industry, academia and society stakeholders share the driving seat in both opportunity- and problem-oriented missions. One critical issue associated to the take up and sustainability of open innovation strategies is the need for long-term trust between partners in both formal and informal networks, to enhance their sharing of resources and ability to create 'multi-win' partnerships.

To address this issue, the EU has launched the European Innovation Partnerships (EIPs); these are challenge-driven and focused on areas and sectors with great modernisation potential, such as active and healthy ageing, agricultural sustainability and productivity, smart cities and communities, water and raw materials.[7] VERA stakeholders recognised that the successful management of such multi-stakeholder partnerships requires *multi-disciplinary skills and perspectives*; these skills are liable to be especially needed, but in short supply, in contexts where the key players are increasingly SMEs and start-ups rather than large corporations and public agencies. For this reason, the EU and MS should work together to *create framework conditions (e.g. brokering multi-disciplinary skills and perspectives)* to better enable open innovation across Europe.

Some stakeholders see the danger of the ERA development being driven exclusively by big programmes, bundling joint activities that are geared either towards industrial leadership or grand challenges. Thus, one very concrete suggestion is the need to *guarantee a place for small scale innovation activity within ERA, such as open innovation micro initiatives that, driven by citizens, could focused on local problems and be integrated in daily life, e.g. "internet of things solutions*". To ensure this, a sound application of subsidiarity is called for. If ERA is about allowing scale, global leadership and tackling challenge, it must at the same time provide for these sort of bottom-up activities.

Promote small-scale innovation projects that are driven by citizens, focused on local problems, facilitated by technology and integrated in daily life, e.g. 'internet of things' solutions

Advice from society actors

3.1.7. Stimulating entrepreneurship

To stimulate entrepreneurship involves encouraging, developing and strengthening individuals' capacities to turn their creative ideas into successful businesses and innovations.

The EC, through the DG for Internal Market, Industry, Entrepreneurship and SMEs, has

[7] See http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=eip

promoted a wide range of initiatives aimed to foster economic growth. For instance, during the last years the Entrepreneurship Action Plan (EAP) [8] and the COSME [9] programme have supported 'business creation and growth' education and training for young people, women and other groups, as well as facilitated access to finance and eased the administrative and regulatory burden with clearer and simpler rules. Although VERA stakeholders acknowledged the importance of this sort of initiative, they believe that much more could be done to encourage entrepreneurship. For instance, the EC could *promote dissemination and training programmes that feature successful close-to-market support for SMEs and businesses at local, regional, national and EU levels.* In the same vein, *MS should also share their best practices on promoting entrepreneurship and implementing universities third-mission strategies.* They also noted that some *synergies between the EAP and Research and Innovation Action (RIA) activities in Horizon 2020 may be achieved by providing entrepreneurship advice and training to initiatives aimed at exploring the feasibility of innovations.* Similarly, *new RIA and Coordination and Support Actions could be launched to advance and disseminate knowledge on best practices for, and success stories of, for example, RIA-based spin-outs.* In this respect, r*einforcing the entrepreneurial perspective among researchers was found essential to facilitate the creation of knowledge-intensive and technology-based start-ups and spin-offs.* Industry representatives also made the case that it was necessary to *develop new instruments that strengthen and interconnect business incubator agencies across MS.*

Promote dissemination and training programmes that feature successful close-to-market support for SMEs and businesses at local, regional, national and EU levels

Advice from coordinators of ERA instruments

[8] See http://ec.europa.eu/enterprise/policies/sme/entrepreneurship-2020/index_en.htm (archived 2/2/2015)

[9] See http://ec.europa.eu/enterprise/initiatives/cosme/index_en.htm (archived 2/2/2015)

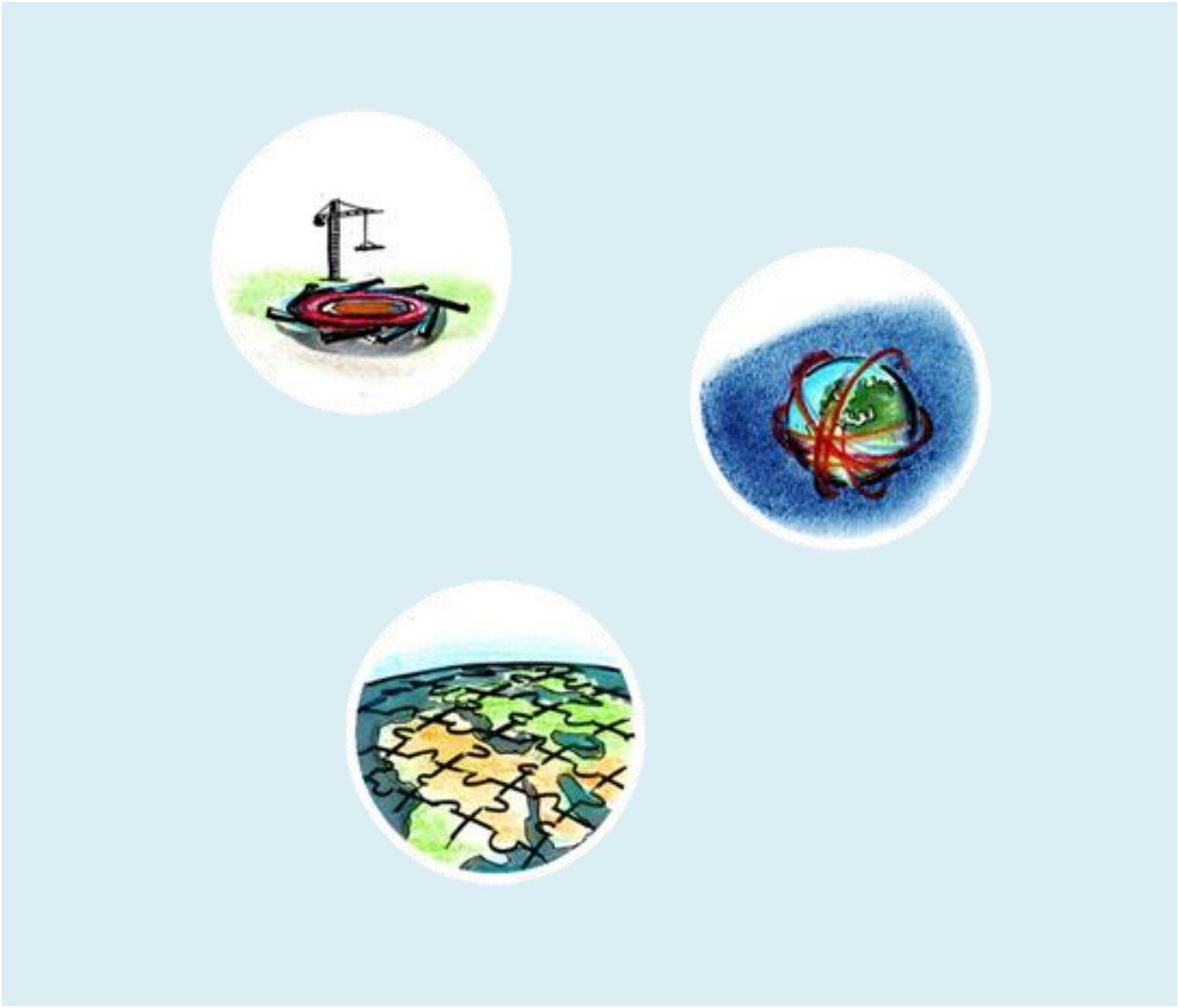
3.2. Strengthen the global influence of ERA

2nd policy issue

R&I stakeholders conclude that European R&I policies are still too focused on promoting cooperation among Member States as opposed to adopting a more global approach based on a strong common EU R&I position. Although the European Commission already considers the global dimension to be a cross-cutting aspect alongside other ERA priorities - and one which is important for addressing big challenges, such as climate change and energy issues - some lack of coordination with global R&I collaboration is still observed. This does not allow Europe to fully seize the opportunities offered by challenge-oriented research, such as shared priorities, and shared inclusiveness targets, strategies for resource efficiency and alignment of expertise.

2nd policy recommendation (R2)

Strengthen the global influence of ERA by (1) enhancing ERA coordination for global cooperation; (2) intensifying dialogues with emerging and developing economies; and (3) optimising funding of, and access to, research infrastructures.

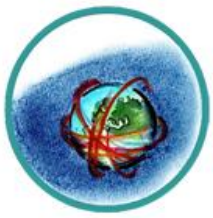


Policy background and critical issues

The VERA project has unveiled how much weight R&I stakeholders place on efforts to enhance the global and international dimensions of ERA. In this discussion, the conception of research cooperation has gradually expanded from the initial ERA internal harmonization rationales, towards a much more open-door perspective. They expect important R&I cooperation developments over the next decade, especially involving Europe-developing economies interaction. The European Commission has also recognised this process and has accordingly introduced the global dimension as a horizontal aspect that affects all ERA strategic priorities (EC, 2013c, 2014d). In the opinion of R&I discussants, one of the key factor for an ERA to benefit more from its global dimension is for European MS to adopt shared positions on global problems; this seems to be a challenge in its own right. One point of agreement during the debate was that an increased participation of third countries in Joint Programming would increase the visibility of EU R&I endeavours worldwide although admitting that the potential of such participation has not been realised yet (EC, 2013c). R&I stakeholders also recognise that focusing on long-term grand challenges can help improve the basis for transnational research cooperation (and for building pan-European alliances). The orientation to these global challenges in Horizon 2020 in principle invites non-EU actors to cooperate in R&I cooperation on a wider scale; but it is yet not clear if the participation of these actors will be significantly enhanced. In addition, stakeholders stressed the point that a more global ERA brings advantages to EU firms: they will be able to better involve international research partners as a part of their global value chains, and to help introduce innovation in non European markets. This aspect was found particularly important for less internationalised MS. Finally, another debated issue has to do with the enhanced role of R&I infrastructures - not only to improve the efficiency of R&I, but also to promote effective cooperation within and beyond Europe. The point is not so much about investment in new infrastructures, but the access to, and operation of, existing ones. While the basic idea is in line with the ESRFI agenda, all stakeholders demand a more global orientation.

How to strengthen the global influence of ERA?

3.2.1. Enhancing ERA coordination for global cooperation



To enhance ERA coordination for global cooperation entails the definition and consolidation of a shared EU R&I position whereby the European Union speaks to the world with an unambiguous voice.

The grand global challenges and geopolitical turbulences that the world confronts increase the need for new global cooperation strategies. R&I international cooperation is indeed deemed one major aspect that can contribute to realise the Europe 2020 goals (EC, 2013c). However, the asymmetries in R&I capacities, the different national interests vis-a-vis different areas of the globe, and the variety of MS' internationalisation strategies seem to be hindering the definition of a EU strategy and global shared position for R&I cooperation. To enable cooperation with appropriate players from outside the EU - whereby 'appropriateness' is defined by their contribution to solve joint challenges, by the complementarities in knowledge and skills, by the regional proximity or the combination of those aspects – the R&I stakeholders proposed reinforcing the R&I joint funding opportunities. More specifically, the stakeholders called for an explicit internationalisation strategy that distinguishes between *(1) mechanisms, e.g. ERA-type approaches, enlarged Joint Programming Initiatives (JPIs) or other ways of opening up of national programmes (to enable co-funding of international partners on a reciprocal basis);* and *(2) rationales, e.g. promoting international cooperation as an end in itself, enabling researchers to cooperate with the most appropriate partners for their research programme, or facilitating cooperation to achieve*

a certain research outcome more effectively and to achieve efficiency gains. A systematic and open approach to cooperation that considers these mechanisms and rationales may help the EU to reap the benefits of the global dimension for ERA through a global variable geometry. In addition, the stakeholders pointed out that r*ethinking transcontinental cooperation networks* would underpin pan-European collaboration. These networks could include local and lay knowledge for a better understanding of social and crosscutting global problems. Finally, they call for a more efficient use of *financial instruments and incentives to make global R&I collaboration easier for European SMEs, and to attract other SMEs to Europe.*

Rethink pan-European cooperation networks by including local and lay knowledge and by adopting flexible and open forms that facilitate a better understanding of social and crosscutting global problems

Advice from coordinators of ERA instruments

3.2.2. Intensifying dialogues with emerging and developing economies

To intensify dialogue with emerging and developing economies will include the putting into place of actions promoting technology transfer to and connections with their business and academic institutions, and exporting new forms of R&I participatory governance.

R&I stakeholders largely agree that emerging economies are crucial for tackling global challenges, many of which also impact heavily upon them. Collaboration with these countries is needed to realise fruitful joint knowledge generation and bidirectional knowledge transfer. Furthermore, substantial improvements may also be achieved by *supporting the modernisation of their industrial practices, especially those recognised as harmful or unsustainable*. An enabling R&I strategy in less advanced countries may actually contribute to the *creation of knowledge hubs,* and to *realising the potential of their best researchers.* Some specific actions could include, for example, *setting up new university branches in these countries,* and *promoting more visiting professors and other researchers.* Finally, the VERA stakeholders noted that *developing specific plans to integrate R&I with international aid programmes* would also help to reinforce the dialogue with these countries, and help strengthen Europe's position as a strategic global partner.

Support research and innovation activities in less advanced countries so as to contribute to the creation of knowledge hubs and realisation of the potential of their best researchers

Advice from research funding actors

3.2.3. Optimising research infrastructures funding and access

To optimise funding of, and access to, research infrastructures implies a coherent integration of the operational objectives of large R&I facilities with the inherently long-term perspectives that such strategic resources demand.

The sustainability of European research infrastructures is seen crucial for addressing scientific challenges and promoting R&I excellence across Europe and globally. In fact, Horizon 2020, with its distinct orientation towards grand challenges, has sought to reinvigorate the EU transnational investment plans as a necessary step for solving large-scale problems.[10] In this regard, the ESFRI's systematic elaboration of RI roadmaps is perhaps the EU activity that best symbolises the potential of European cooperation and integration for solving EU and world-scale issues. R&I stakeholders agreed that *putting world-class research facilities to the service and benefit of the whole international community* would encourage global cooperation and project a stronger image of the EU. In this respect, the *development of new e-RIs* can be decisive to boost the EU's global visibility. The access to R&I infrastructures basically needs to be based on the *development of easy,*

[10] See http://ec.europa.eu/programmes/horizon2020/en/area/research-infrastructures

transparent, and open procedures at global and intersectoral level. The stakeholders also believe that the financial stability, operability and access of RIs can be better ensured through the coordinated and cooperative support of MS. This cooperation may be launched, for example, through the *definition of strategies that encourage the public-private sharing of their operational and maintenance costs.*

Define strategies to encourage the public-private sharing of operational and maintenance costs of research infrastructures

Advice from research funding actors

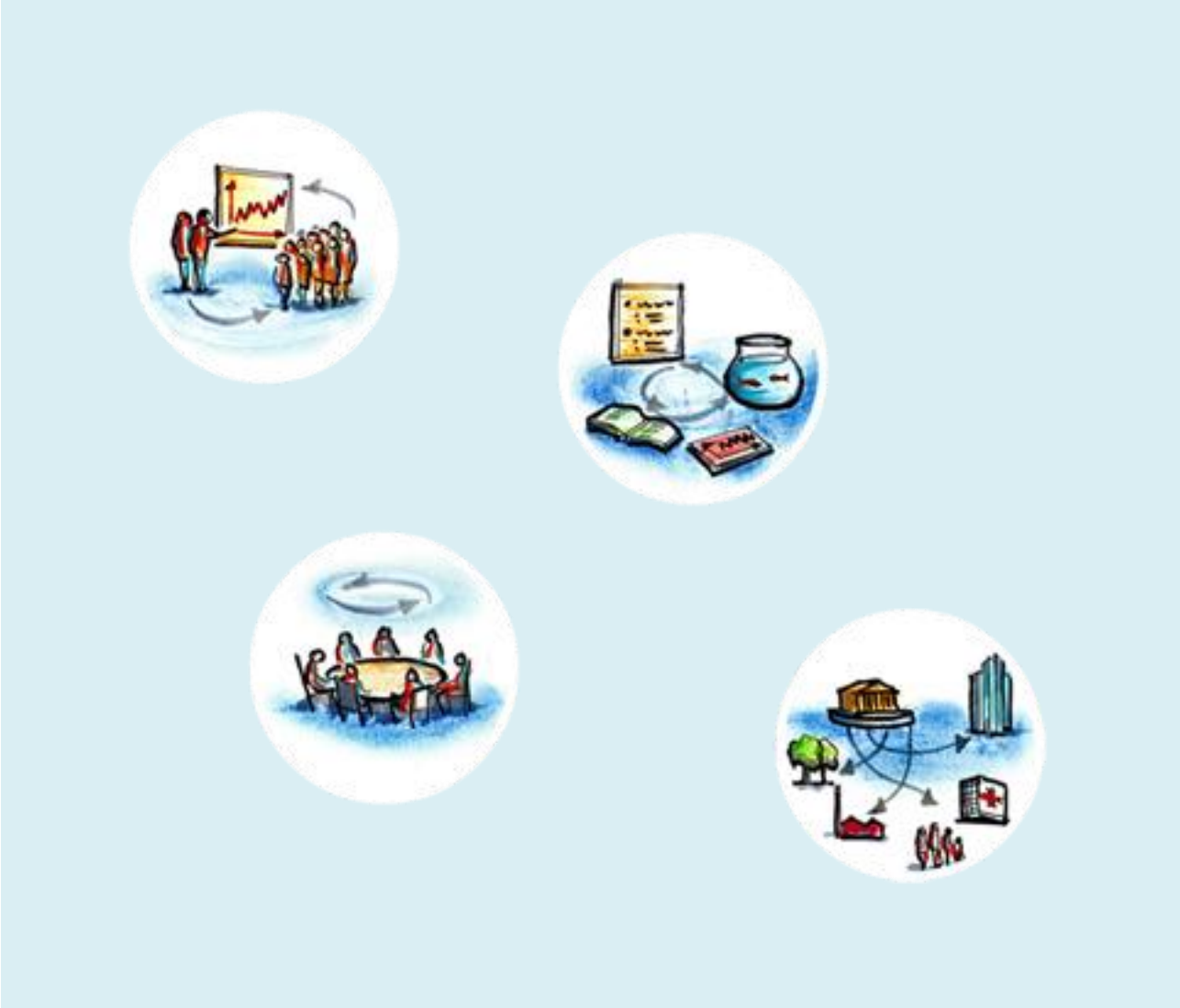
3.3. Promote smart R&I evaluation

3rd policy issue

R&I stakeholders have emphasised that one size does not fit all when it comes to R&I evaluation. The long-standing ambition for designing and conducting reliable, transparent and standardised evaluation processes for 'traditional science' (both basic and applied), now confronts the emergence of 'citizen-science' and crowd-sourced research. These developments bring new challenges to the evaluation of R&I rationales, processes and outcomes. Furthermore, citizen science initiatives tend to target a variety of individual and collective social benefits and challenges, which require more flexible indicators, metrics and methods for both ex ante and ex post evaluation.

3rd policy recommendation (R3)

Promote smart R&I evaluation by (1) reinforcing the role of evidence and transparency in R&I policies; (2) assessing R&I impacts more flexibly and comprehensively; (3) promoting peer review in evaluation of excellence and relevance; and (4) evaluating and monitoring citizen-science initiatives more sensitively.



Policy background and critical issues

Evaluating the appropriateness, efficiency and effectiveness of EU R&I actions constitutes a major EC concern. Through the promotion of a 'smart-regulation' frame the EU aims to systematically evaluate the effectiveness of policies and agreements, before and after their implementation. The process is supported by public consultations and surveys that inform and influence the policy action. Although common guidelines are applied, the evaluation of R&I activities across EC Directorates is fully decentralised. In the case of EU level R&I activities, evaluations are primarily based on impact assessments of framework programmes.

Horizon 2020 funding criteria are excellence, impact and implementation efficiency (EU, 2013). These criteria have notably attracted the attention of VERA stakeholders. In particular, they have shown a special interest in promoting the ex post impact evaluation at the project level in addition to programme level. This was linked to the need for more international and multidisciplinary peer review evaluation, a need that has been recognised in analyses at the EU level (ESF, 2011) and in recommendations to improve the national R&I systems performance (EC, 2013a, 2014d). Thus, VERA discussions reinforced an important debate at EU level as to the role of sound ex ante evaluation as both a driver for excellent and impactful research and sound ex post evaluation as a tool for learning and accountability also at project level. Furthermore, a stronger role of society actors and national bodies (e.g. ministries with R&D competences) in *ex post* evaluation of EU funded R&I was also advised. To do so, stakeholders suggested to develop and apply new indicators (e.g. societal progress metrics) and instruments (e.g. digital participatory tools) to measure the real impacts of research, together with new ways of monitoring citizens' engagement and contribution to R&I.

To better respond to these and other critical issues on *promoting a smart R&I evaluation*, the following section presents four specific actions.

How to promote smart R&I evaluation?

3.3.1. Reinforcing the role of evidence and transparency in R&I policies

To reinforce the role of evidence and transparency in R&I policies requires a mutually supportive process – one whereby data and results are provided by R&I performing actors, sound methods are applied by evaluators and more transparency on the use of such evidence is provided by R&I policymakers.

EU policymakers should take new actions to promote evaluation, not only in terms of the regular evaluation of Horizon 2020 instruments, but much more broadly. Coordinators of ERA actions expect the EU to *push for more evidence-based decision-making, underpinned by EU-wide evaluation and monitoring standards; where reliable, standardised and comparable data support national and EU legislation and priority-setting, with conscious and explicit use of evaluations*. Research funding actors also paid special attention to the need for *more evidence-based R&I data (and results of in-depth studies) as basic inputs for the R&I policy formulation process* (see discussion on open access in section 3.7.3). However, it was argued that, "in return", R&I practitioners would also expect *more transparency in the use of such evidence by policymakers e.g. through explicit references or even acknowledgements to specific R&I data, outcomes or both in policy documents.* This mutually reinforcing process could help to reduce mismatches in the supply and demand of R&I policy inputs and outputs; both R&I performers and policymakers would be engaged in a virtuous circle, a policy learning loop beneficial to both. Another interesting aspect brought forward by the representatives of academia referred to the need to *evaluate data sharing when assessing research performance.* In this respect, *new criteria and procedures should be defined to track*

how 'evidence' (produced by R&I performing actors) has been used by R&I policymakers for both policy formulation and implementation.

Include evidence and transparency as key criteria in the evaluation of both policy formulation and R&I performance

Advice from academia actors

3.3.2. Assessing R&I impacts more flexibly and comprehensively

To assess R&I impacts requires a more flexible definition of 'impact', since the social, economic and scientific contributions are liable to vary depending on the type of funding instruments, topics, methods and objectives linked to R&I activities.

Within the context of the principles and standards normally used to carry out R&I evaluation, the benefits of using impact-oriented criteria and evaluation methods dominated the VERA debate. This is in line with the view held by the majority of VERA stakeholders that funds should be allocated more strategically towards *projects with a clear impact - considered not only from the economic point of view but also from the perspective of social and environmental benefits*. In this regard, some stakeholders suggested that *research evaluation could be opened to other areas and DGs with R&I competences.* Especially society representatives called for impact evaluation, underlining the importance of channelling funding to activities focused on citizens' problems. A very concrete suggestion was the *inclusion of citizens in ex-post evaluations of those R&I projects where social and economic impacts were explicitly expected,* e.g. JPIs addressing societal challenges. Other stakeholders, including research funders and international actors, emphasized the need to better *anticipate and articulate the potential impact of research projects through ex-ante approaches – by requesting impact assessments, proofs of concept or strategies for pilot applications* – instead of being predominantly based on the past performance of the grant applicants. This points to the need for a renewed evaluation community, and improved evaluation practice, across Europe. Not necessarily more evaluation, but better, more transparent evaluation is required, with shared and open results and a discourse on how to best use evaluation results.

Involve citizens and societal groups in ex-post evaluations of R&I activities with expected social and economic impacts

Advice from society actors

3.3.3. Promoting peer review in excellence and relevance evaluation

To promote excellence and relevance demands a 3broadened understanding and use of peer review evaluation.

Overall, despite the generally accepted need for more relevant research, there was a strong expression, especially from industry stakeholders, of the importance of maintaining excellence as a major criterion in evaluation of R&I funding. The majority of discussants actually suggested that *fostering interdisciplinary and international evaluation practices* would assure a more coherent and fit-for-purpose evaluation system that is based on excellence and relevance. Evaluation of excellence*, implemented through peer review or self-evaluation,* was seen as a key aspect of pan-European efforts to enhance international R&I competitiveness, and as a driver for the modernisation of the R&I system (see discussion on governance issues in section 3.4). They also observed that s*hifting from objective-based to performance-based criteria on the evaluation of R&I institutions and programmes* would also contribute to this modernisation. However, in line with the drive towards more societal and economic impact, coordinators of ERA actions and networks went one step further and asked for *a stronger additional focus on relevance in peer review evaluations*. To make peer review assessments more accessible, R&I stakeholders see the need for *clearer evaluation targets and the removal of language and cultural barriers in peer review committees,* as well as *broader uses of ex-ante assessments that take into account scientific, technological and social implications.*

Furthermore, in a context where the 'Science with and for Society' and 'Responsible Research and Innovation (RRI)' approaches are on the rise, R&I stakeholders expect *citizens to play a supportive role in peer review 'committees'*. For example, several stakeholders (including society and academia actors, as well as coordinators of ERA actions and networks) saw *citizens as legitimate 'peers' for the assessment of new societal relevance criteria in ex ante, accompanying and ex post evaluations.* The key issue is to start rolling out *new methods and criteria that capture societal impact and the contribution that research organisations and research activities have made*. Surely, this is a highly ambitious and challenging task because many of those often qualitative methods have only been demonstrated in a few cases, because of the time delay of societal impact (as opposed to immediate input or output additionality and the like) and because of the difficulty to isolate and quantify contributions of specific organisations and activities.

Foster interdisciplinary and international evaluation practices to assure a more coherent and fit-for-purpose evaluation system that is based on excellence and relevance

Advice from research funding actors

3.3.4. Evaluating and monitoring citizen-science initiatives more responsibly

To evaluate and monitor citizen-science initiatives requires more responsible, tailored and participatory approaches.

VERA stakeholders, in particular society actors and coordinators of ERA actions and networks, have called for a more systematic embedding of social and citizens' values in R&I projects and programmes. The inclusion of current stakeholder perspectives, beliefs and actions in R&I proposals was suggested as an important criteria for *ex ante* evaluations. This would then allow the monitoring of changes (e.g. levels of engagement, expectations and mutual learning) and the potential use of such information in *ex post* evaluations. Another suggestion was related to the need to develop new *processes* (context-dependent) and *indicators* (topic/discipline-specific) to assess broader societal benefits. With the regards to the 'new' processes, citizen-science evaluations may need to be seen more as a 'service' aimed at supporting R&I initiatives by sharing good practices and identifying areas for practical improvements. As for the 'new' indicators, representativeness, inclusivity and transparency were considered as important criteria in the evaluation of effectiveness and relevance of citizen participation in science.

Define proper metrics and indicators, based on representativeness, inclusivity and transparency, to measure R&I societal impact and evaluate the effectiveness and relevance of citizen participation in science

Advice from coordinators of ERA instruments

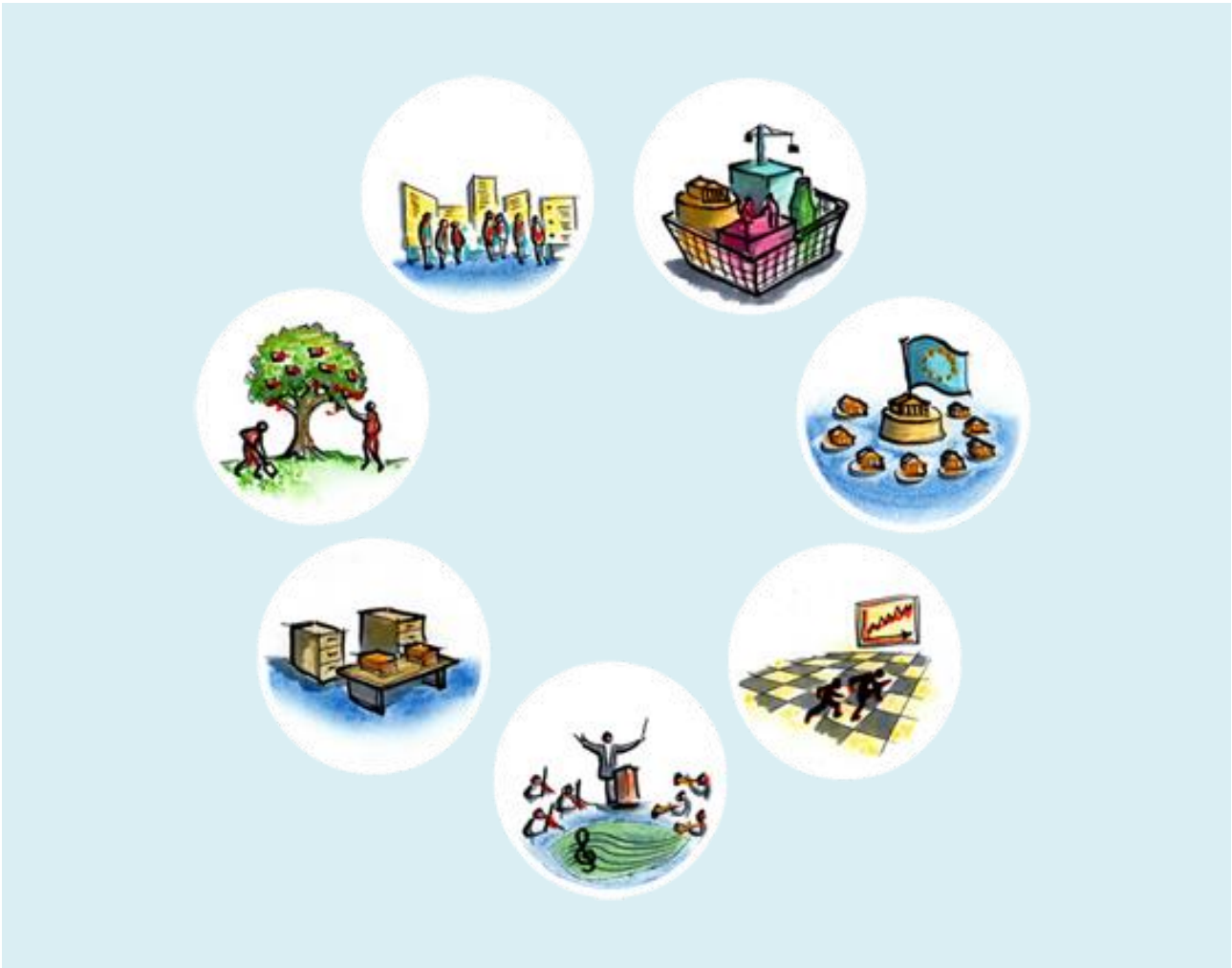
3.4. Improve the governance of the EU R&I system

4th policy issue

The delineation and definition of R&I macro strategies is a complex and controversial task, not least because it requires discussions and negotiation with multiple actors at different levels. Although it is widely accepted that sharing common challenges can contribute to fostering connections between actors, and represents a notable 'smarter together' paradigm, R&I stakeholders have also noted that it may lead to an eventual excessive coordination in the practice. An excessive top-down approach has actually negative side effects in R&I governance, e.g. weakening the R&I system coherence, failing to capture the actual context dynamics, or overlooking the real necessities of some local and regional actors.

4th policy recommendation (R4)

Improve the governance of the EU R&I system by (1) exploring synergies between R&I and other policies and funding programmes at EU level; (2) improving the coordination of national R&I strategies; (3) raising European competitiveness through R&I; (4) supporting R&I stakeholder dialogues; (5) reducing and simplifying EU R&I bureaucracy; (6) sustaining R&I funding; and (7) setting EU R&I agendas collaboratively



Policy background and critical issues

The VERA discussions have shown that the issue of research systems governance and making those systems more effective is of high importance for R&I stakeholders. However, the aspects put forward as regards the governance and set up of national research systems in Europe go beyond those aspects that are currently at the centre of the debate on better governance and effective systems in Europe. The discussions had a very 'European' approach to the debate on national systems, focusing very much on funding programme synergies and synchronisation of national activities across EU for addressing grand challenges. A cornerstone of the ERA agenda is to increase the effectiveness of national research systems in Europe, which includes improvement in policy making and implementation, growth in research investment and increased competition. While each country will find its own governance model for a more effective system, the ERA agenda suggest a range of funding governance principles such as appropriate peer review, balance of core and competitive funding, linking institutional funding to past research performance. Each MS is asked to provide a roadmap towards a more effective system the implementation of which is monitored by the EU. In fact, although the ERA agenda, with its coordination and learning ambitions, aims at gradually reducing national research agendas disparities, differences between EU countries still remain (EC, 2014a), and naturally will remain. During the last years, some monitoring tools (e.g. ERA progress reports, ERA consultations or ERA survey) have been put in place to assess the quality and efficacy of national reforms, supported by the ERA Monitoring Mechanism (EMM). The term 'ERA compliance' has been even introduced with the intention of evaluating EU countries and organizations' commitment with ERA, and to complement ongoing peer reviews. Yet it is obvious that MS are making efforts for ERA completion (Ibid, p.8). This EU guiding-monitoring role is an important element of R&I governance that may contribute to reduce fragmentation and complies with the EC principles of openness, accountability and effectiveness (EC, 2001). In this respect, R&I stakeholders find that focusing on common challenges in a flexible and dynamic way could help Europe to reduce internal disparities and foster solid alliances between regions and sectors. However, they have added a word of caution as to the probability of a potential system breakdown, as the combination of a too intense competition and a highly wired R&I system could lead to a 'domino effect' if some major players fail. Finally, they have also identified a threat for governance in terms of timing divergences, as the time horizon of grand challenges differs greatly from those of countries' political legislatures.

How to improve the governance of the EU R&I?

3.4.1. Exploring synergies between R&I and other funding programmes at EU level

To explore synergies between R&I and other funding programmes at the EU level requires horizontal cooperation between DGs in order to increase the relevance of R&I measures for other programmes, to align their procedures, and to create synergies.

The importance of connecting different funding programmes across the EU policy portfolio was pointed out by many R&I stakeholders. It was deemed an ambitious task that requires *understanding how the European R&I system evolves and envisaging the impact of changes on potential EU programmes complementarities.* For instance, if we think in terms of research and innovation convergence, there are many points of connection. Horizon 2020 integrates research and innovation funding and pays special attention to the capacity of firms to tackle societal challenges, e.g. in its SME

Instrument,[11] thus also constituting a reinforcing element to address the Enterprise and Industry Directorate's objectives. The European Structural and Investment Funds form another example of including research and innovation funding lines, as they are key drivers for regional development and cohesion. In this regard, the R&I stakeholders consider that connecting the ERDF funding programme with Horizon 2020, i.e. *integrating regional policy with R&I funding initiatives,* would contribute to improving the R&I capabilities of less developed regions. More *synergies are also possible between the ERA objective for strengthening research careers, and those ESF activities focused on EU education programmes*[12]. The stakeholders observed, however, that taking advantage of such complementarities implies *implementing more standardised funding and evaluation rules and new forms of coordination at EU level*.

Integrate the European regional policy with R&I initiatives oriented to societal challenges, e.g. connecting the ERDF funding programme with Horizon 2020

Advice from industry actors

3.4.2. Improving the coordination of national R&I strategies

To improve the coordination of national R&I strategies implies the implementation of actions that better take into account the different interests of Member States within ERA, thus pursuing a better integration of their national research and innovation systems.

VERA discussants agreed that central objectives of ERA are to coordinate R&I national systems in Europe and to reduce divergence between national R&I programmes. However, they also stressed the importance of avoiding seeing coordination as an end in itself rather than a means to clearly stated purposes and benefits. ERA coordination tools are seen effective, for example, not only to stimulate MS' coordination but also to align research and innovation efforts towards societal problems, as in the updated ERA NET. In their opinion, more flexible national R&I systems would create the best conditions for European innovation to prosper. In general, the R&I stakeholders recognise the capacity of ERA instruments to bring together and synchronise MS actions, e.g. Art.185 and JPIs were found particularly useful for implementing Strategic Research agendas that can take nationally defined interests into account while allowing for synergies and coordination of efforts. In this regard, the new Policy Support Facility [13] instrument on Horizon 2020 will also provide advice and facilitate MS harmonisation. The discussants also suggested that synergies may be obtained by *taking into account current European Commission priorities, as established in EU research funding programmes, when defining national R&I agendas and budgets*, since national policy makers are best placed to understand how EU and national priorities align. The *use of strategic intelligence instruments like foresight and other forward-looking activities* was also recommended to help put together national priorities, and to analyse and agree on coordinated actions in the long term.

Encourage Member States' policy makers to take into account current EU priorities when defining their national R&I agendas, since they will have the local knowledge required to establish how national and EU concerns actually align

Advice from coordinators of ERA instruments

3.4.3. Raising European competitiveness through R&I

To raise European competitiveness through research and innovation is a renewed request for considering and promoting R&I strategies that enable a re-launched 'smart growth'.

[11] See http://ec.europa.eu/programmes/horizon2020/en/h2020-section/sme-instrument

[12] See http://ec.europa.eu/esf/home.jsp?langId=en

[13] See http://ec.europa.eu/programmes/horizon2020/en/h2020-section/spreading-excellence-and-widening-participation

European growth was actually a theme very much addressed during the VERA debate. Most of R&I stakeholders agreed that a real R&I commitment of the private sector is needed to increase EU competitiveness and to achieve the Europe 2020 target of 3% R&D investment. However, evidence shows that the European largest private companies have improved their R&D investments only slightly during the crisis (EC, 2014e). The investment in R&D is found crucial, especially if we consider that meeting the goal of 3% is estimated by the EU as liable to generate 3.7 million jobs and increase GDP by €795 billion in 2025 (EC, 2013d). The VERA stakeholders proposed a range of R&I oriented recommendations to encourage EU competitiveness. First, there should be efforts to *promote the participation of companies in sectors of high transnational competition, while facilitating, in other strategic areas, the participation of R&I firms in global partnerships*. Second, it was considered important to *implement more effective instruments and incentives that could make cross-border research collaboration easier for SMEs and attract foreign companies*. Third, the *use of roadmaps and other technological intelligence instruments* should be promoted to realise the potential of EU industries. Fourth, *stronger mission-oriented R&I policies are needed to support sustainable growth of European technological capacities, especially with regard to start-ups and SMEs*. Finally, the discussants suggested a *strategic participation of public funding in private research initiatives, e.g. by investing in excellent RTDI private institutes*.

Create instruments and incentives to facilitate cross-border research in SMEs & attract foreign companies

Advice from funders and policy actors

3.4.4. Supporting R&I stakeholders' dialogues

To support R&I stakeholder dialogues entails a more coordinated communication between all relevant actors through a variety of channels, e.g. discussion groups or participatory advice processes, thus contributing to reinforce policy actions.

VERA discussants agreed on the benefits of promoting R&I actors' interaction in the course of policy advising processes. The discussion may be seen from the perspective of improved support of stakeholders' communication and interaction. VERA participants believe that, although the attention to R&I actors' interaction has increased in the last years, e.g. through the Stakeholders Platform, more efforts are necessary to revitalise their dialogues both at the local and international level. They suggested that *a more effective policy for R&I actors' communication and interaction* could help to connect research institutions and link up R&I programmes more strongly. It would also reinforce the present momentum for ERA cooperation, which is helping to connect entities that were still strictly separated, vertically and horizontally, a few years ago. As for industry stakeholders and society representatives, they claimed for a *more active dialogue between and with stakeholders during national and regional R&I agenda-setting processes*. On the other hand, the representatives of ERA instruments noted that further changes are still needed in some ERA tools to *permit key stakeholders and society representatives to be heard, to interact, and eventually take over the driving seats,* thus leaving to ministries the exclusive role of providing financial support. Finally, VERA discussants found necessary to *develop interfaces for fostering science-policy dialogue and mutual collaboration, which would permit more scientists to be involved in projects selection, feedback, and capacity building.*

Develop interfaces that facilitate a better science-policy mutual understanding as well as the involvement of more scientists in projects selection and capacity building

Advice from coordinators of ERA instruments

3.4.5. Reducing and simplifying EU R&I bureaucracy

To reduce and simplify EU R&I bureaucracy would allow scientific outcomes to be to put at the service of society earlier, and help make the most of research and innovation endeavours.

The reduction of bureaucracy, especially in relation with the procedures associated to

research funding applications and their subsequent administration, has been discussed ever since the EU Framework Programme started in the 1980s, and it was again a strong feature in the VERA debates on improving governance of R&I support. In this respect, some initiatives have been put forward yet, e.g. the EC has included the objectives of cutting red tape and clearing desks of backlogs as priorities in the 2015 work programme. [14] Industry representatives were particularly concerned about the need to *make EC regulations more flexible and better aligned with business activity.* Other important aspects considered during the debate were the need of *simplifying R&I reporting systems and auditing processes,* as well as *eliminating bureaucratic burdens from enterprises setting-up processes.*

Simplify the bureaucratic burden of entrepreneurship processes

Advice from industry actors

3.4.6. Sustaining research and innovation funding

To sustain research and innovation funding is based on the importance of exploring new and stable modalities of financing so as to ensure the continuity of R&I activity in the long term.

R&I stakeholders suggested that the slow-down in economic growth, and the EU countries' financial difficulties, means that we need new forms of research funding. A well debated issue was the need for broadening the funding base much more radically - and in a sustainable manner. It will be necessary, for example, to contemplate a mobilisation of crowd funding in research policy, in the light of scarce resources in future. *Philanthropy and crowd-funding* could be actually adequate ways of complementing some public R&I support, especially when R&I is promoting social innovation and is following more transparent agendas. A *mix of goal oriented (application-driven) and knowledge oriented (curiosity-driven) funding* was also suggested to guarantee the sustainability of fundamental research. The stakeholders believe that *public funding of research should not be limited to dedicated research programmes: it should be supported, as long as the research results feed into other policy areas, by other appropriate funds, e.g. structural funds*. In addition, they called for *new mechanisms capable of 'returning' some of the benefits of science-driven innovations back into science funding,* e.g. successful spin-outs co-sponsoring PhD or MPhil research in areas related to their innovations. But research stability also requires *mutually agreed public-private funding quotas.* The EC has already ample experience in implementing tools for putting together private and public capital, e.g. ETPs, JTIs, or PPPs. Although VERA discussants found these instruments quite efficient up to date, new modalities were called for in the future. The recently launched Investment Plan for Europe (EC and EIB contribute with 21bn €) is an example of the aim to achieve public-private multiplicative action, since it aims to unlock and attract 315bn€ from non-EC private and public investors before 2018 (EC, 2014a).

Develop mechanisms to facilitate and enhance research crowd-funding initiatives

Advice from coordinators of ERA instruments, academia, industry and policy actors

3.4.7. Setting R&I agendas collaboratively

To set research and innovation agendas collaboratively implies that the processes of defining are reinforced by hearing the voice of multiple actors thus capturing the R&I real needs and the actual achievements more clearly.

The need for more intense participation of stakeholders in research agenda setting actually constituted one of the strongest messages of the VERA debate. This recommendation relates to the dimension of 'fostering relevant science-society engagement', but it embraces a wider spectrum of R&I actors, and it is principally focused on agenda definition issues. Numerous initiatives in this direction have certainly been initiated by the EC during the last years, but these are partial. The R&I stakeholders felt that *some*

[14] See http://ec.europa.eu/priorities/work-programme/docs/ec_workprogramme_infographic2.pdf

actors remain unrepresented in the agenda definition, though their participation is necessary to avoid policies being disconnected from real societal and local priorities as a result of short-term political expediency. Notwithstanding the fact that bringing the EU closer to citizens through the Parliament is a constituent element of EU governance, *more direct involvement, especially of local actors*, was strongly recommended. *Their participation could be promoted through future-oriented and multi-stakeholder participatory processes, e.g. facilitating the bottom-up definition of common long-term challenges.* The discussants pointed out, however, that *decisions on participation need to be based on transparent and rational criteria that can balance breadth of inclusion with maintaining and even upgrading the effectiveness of the decision making and agenda setting process*. The scope of participation in priority setting processes is linked with the thematic coverage of funding, so *participation rules and procedures must ensure the avoidance of overly narrow or lopsided foci, or the capture of funding arenas by strong interest groups*. Furthermore, *promoting open calls in R&I funding* was seen useful for allowing stakeholders to put forward less explored and sometimes more impactful areas of research. Another possibility could be *to set up advice-bodies for identifying long-term research issues and proposing investment in fields that industry or other private actors will not target.*

Organize advice-bodies for identifying new long-term research issues and high risk challenges, e.g. proposing investments in fields that industry will not target

Advice from policy actors

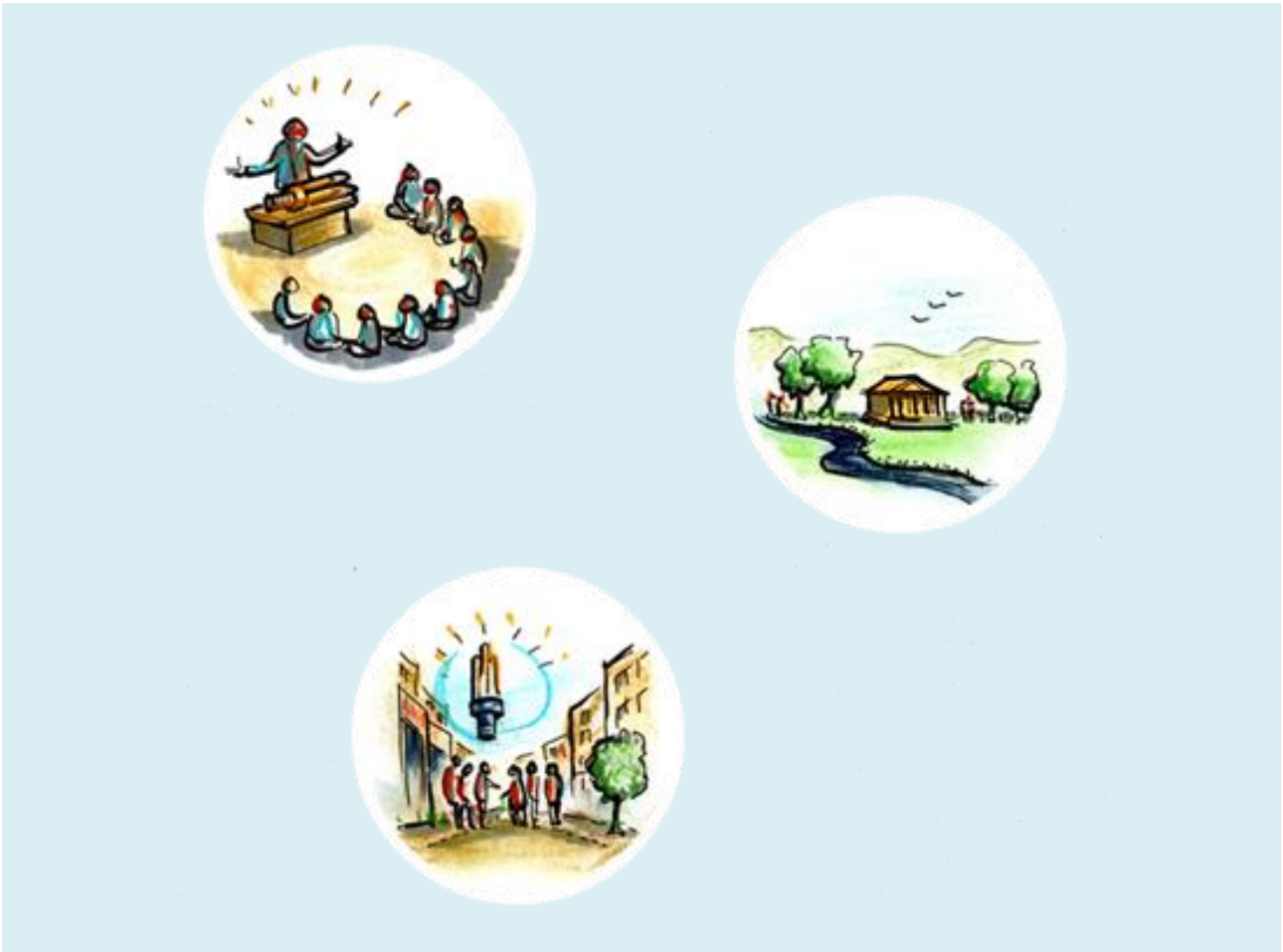
3.5. Foster relevant science-society engagement

5th policy issue

R&I stakeholders recognise that the relation of society with scientific progress has changed in an increasingly interconnected world. In some areas citizens are becoming a major stakeholder by actively contributing to R&I policy formulation and agenda setting. It may happen, however, that an irrelevant or irresponsible public participation in R&I could lead to a significant deviation from science fundamentals and a move towards purely local, shorter-term perspectives with a risk of populism from specific society groups. Therefore, the management of citizen-science practices and outcomes also brings new challenges (e.g. tensions and scepticism amongst citizens and researchers) that require resources, competences, terminologies and trustful environments capable of translating societal contributions into meaningful viewpoints and perspectives feeding into science. Furthermore, the engagement of highly diverse EU citizens in science may require new ethical principles too.

5th policy recommendation (R5)

Foster relevant science-society engagement by (1) encouraging 'sustainable' responsible research and innovation (RRI); (2) engaging society in science and R&I policy decisions; and (3) elaborating R&I oriented education and social awareness strategies.



Policy background and critical issues

Fostering science-society engagement was considered an important ERA dimension and attracted significant attention in the VERA focus groups. Most discussants associated this dimension with the third mission of universities, thus putting emphasis in the role of academic institutions in fostering engagement with society; however recommendations were made by and for all stakeholders. The science-society link has been embedded into EU R&I policies for several years already. Policy attention became prominent with the creation of the 'Science and Society' theme in the Sixth Framework Programme (FP6), continued as 'Science in Society' in FP7 and strengthened in Horizon 2020 under the 'Science with and for Society' programme (SWAFS) with the emergence of Responsible Research and Innovation (RRI) initiatives. This evolution indicates a shift from considering society as a mere *recipient community* through science education to a *co-producer and user community*. In other words, society actors play a more important role in 'R&I agenda shaping' – by positioning specific concerns and aspirations – and 'R&I agenda setting' – by working independently or in cooperation with other stakeholders (researchers, policy makers, businesses) to address specific societal challenges. Several opportunities and threats have been identified by R&I stakeholders in this area. On the one hand, as society actors gain influence we could see the emergence of Public-Private-People-Partnerships (PPPP) driven by societal needs and legitimised/strengthened with citizens' trust and engagement. With adequate institutional support, citizens can also play key roles in big data gathering and analysis. On the other hand, the inclusion of citizens also requires new ways of managing controversial and ethical issues (e.g. data privacy and confidentiality, genetic engineering, personalised medicine, interspecies research, etc.). To better respond to these and other critical issues from *fostering relevant science-society engagement*, the following section presents three specific actions based on the analysis of the VERA focus groups results.

How to foster science-society engagement?

3.5.1. Encouraging 'sustainable' responsible research and innovation (RRI)

To encourage sustainable RRI requires open governance of both the process and outcomes of R&I so as to promote trustworthy and legitimate responses to societal aspirations and fears.

Reflecting on R&I stakeholders' demands and comparing them to the RRI debates at EU level,[15] an obvious suggestion is the integration of sustainable RRI governance in the completion of ERA. This would not mean superimposing a single model of RRI on all activities across Europe. R&I stakeholders called for *an 'open governance' framework with common principles and platforms (institutions and networks) as well as mechanisms and tools (communication channels and interfaces) capable of supporting truly participatory processes*.[16] These common platforms and tools could play a key role in handling the big and often fuzzy data resulting from citizen participation in science. In addition, they could be used to crowd-source the separation of real societal signals and expectations from the noise and hypes of specific circumstances. It was also suggested that the development and institutionalisation of 'open governance' mechanisms and principles for RRI,

[15] The Rome Declaration (2014) calls on EU Institutions, EU MS and their R&I Funding and Performing Organisations, business and civil society to make RRI a central objective across all relevant policies and activities, including ERA and the Innovation Union.

[16] A range of EU funded projects work towards a better understanding of RRI, with one particular project, RESAGORA, working towards establishing a governance framework for RRI to support RRI processes across Europe. See www.res-agora.eu/

taking into account the heterogeneity of norms, values and preferences across Europe, would lead to more trustworthy and legitimate responses to societal challenges. Finally, R&I stakeholders see the emergence of open RRI governance settings as the way forward in the *development of new and self-sustaining Multi-Stakeholder Consortia* for R&I.

Increase the legitimacy of R&I processes and outcomes by including transparency, endorsement and multi-stakeholder participation as key features of sustainable RRI

Advice from society actors

3.5.2. Engaging society in science and R&I policy decisions

To engage society in science and R&I policy decisions requires shared leadership and ownership of the R&I agenda setting process.

Policymakers, research funders and coordinators of ERA actions were the loudest voices demanding more effective participation of society in the definition of priorities and grand challenges. This goes beyond the mere strengthening of science-society dialogues as it involves *the creation of effective mechanisms that allow citizens to position and debate their own research questions*. In other words, citizens would be able to *co-define R&I agendas, participate in capacity building activities linked to these agendas, and contribute to the generation and analysis of relevant societal insights*. An effective citizen science would *draw on well-defined research problems, promote training, and create interfaces that facilitate citizens' access to data. One suggestion was to promote the professionalization of 'science communication' to increase citizens' engagement in these processes.* Another suggestion was to intensify the trend to *demand for citizen engagement in R&I proposals submitted under H2020 or national programmes*.[17] More funds would thus be allocated to projects which explicitly engage with society when defining their objectives and when actually performing the research. This would not only increase public engagement in R&I debates about those responses, but also involve more social partners in the *crowd-funding and bottom-up prioritisation* of challenge-driven agendas.

Foster an effective citizen-science that is based on well-defined research problems, promotes training and expertise of the crowd, and creates interfaces that facilitate citizens' access to data

Advice from society actors

3.5.3. Elaborating R&I oriented education and social awareness strategies

To elaborate R&I-oriented education and social awareness strategies requires better synergies and coordination among and between on the one hand, education institutions (including primary, secondary and tertiary) and, on the other, other stakeholders of the R&I ecosystem at local, national and EU levels.

The call for more RRI and societal engagement in science has a clear educational aspect. R&I stakeholders stressed the importance of *restructuring education programmes so as to increase awareness about the need for more consciousness about grand challenges oriented and associated careers*. It may be supported by *education and communication platforms that enable citizens to access relevant scientific knowledge and share qualified opinions on the value of excellent science.* This would also *enlighten citizens about the opportunities (and limitations) involved in developing collective responses to grand challenges, as well as highlighting the benefits and satisfactions of pursuing scientific and engineering careers*. Citizens would recognise how traditional R&I

[17] In Horizon2020 the Coordination and Support Action called the Mobilisation and Mutual Learning Action Plan (MML), fosters multi-actor and public engagement in R&I. An example is the CASI project, which engages citizens in the development of a common framework for the assessment and management of sustainable innovations. See http://www.casi2020.eu

approaches may be insufficient to address certain challenges (such as 'Protecting freedom and security of Europe and its citizens'). This would reinforce the roles of multi-stakeholder participation and of 'transdisciplinary' approaches in R&I. In this respect, R&I stakeholders call for a *more interconnected education system, with better linkages between primary, secondary and tertiary education curricula to regain the trust of society in science and research*. They also noted that u*niversities' third mission should be re-orientated so as to value social impacts at least equally to economic and scientific impacts.* Thus citizen panels and similar institutions could collectively define social agendas to be shared with local authorities, businesses and higher education institutions. Finally, it was suggested that secondary education programmes *build collaborative R&I skills by promoting student mobility and exchange initiatives similar to the EC's Erasmus and Marie Skłodowska-Curie programmes.*

Reinforce and interconnect education policies at all levels to regain the trust of society in science and research data

Advice from academia actors

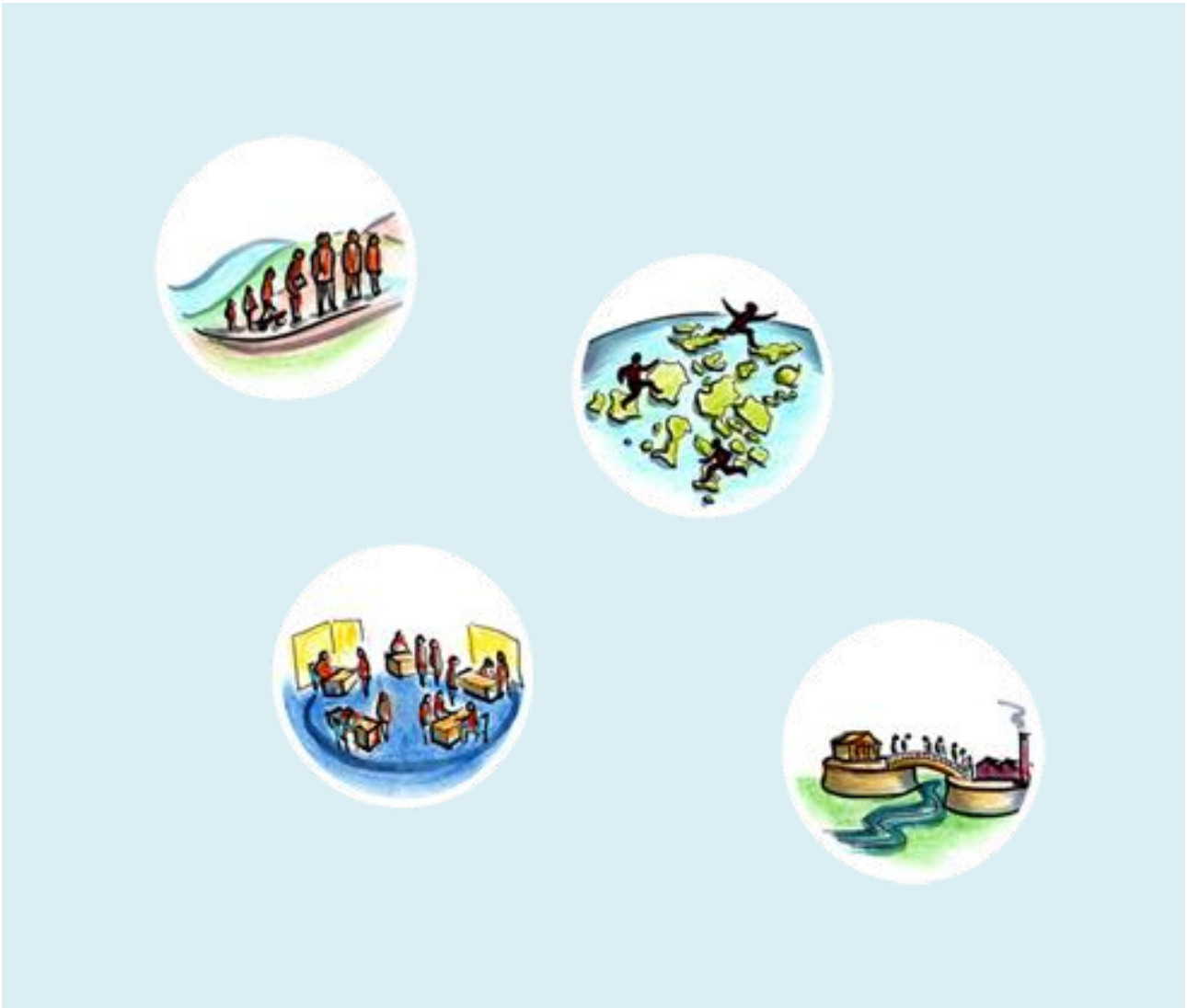
3.6. Develop attractive and impactful research careers

6th policy issue

R&I stakeholders believe that there are still substantial differences among EU countries in relation to research recruitment processes and career paths. This situation hampers the development of an entirely open space for EU researchers. Although various EU instruments have been implemented to facilitate mobility and to create more access to the research labour market, there is also an impression that these initiatives have not permeated broadly enough across Member States. Some concerns have also expressed concerning factors such as poor career prospects for young researchers and women, and an insufficiency of exchange programmes between academia and industry actors.

6th policy recommendation (R6)

Develop attractive and impactful research careers by (1) facilitating cross-border mobility of researchers; (2) enabling impactful exchange of researchers between academia and industry; (3) achieving an open and cohesive labour market; and (4) harmonising careers and training programmes.



Policy background and critical issues

VERA discussions on researcher career development were mostly oriented towards objectives and strategies to facilitate mobility. Mobility was addressed in different forms, including cross-border as well as cross-sector mobility. Important aspects noted during the debate included harmonising national practices and improving recruitment processes. Significant progress has been made at both European and national levels in removing or alleviating (some of) the obstacles for mobility, in improving doctoral training and in making research carers more attractive. Initiatives like the EURAXES network, the 'Scientific Visa Directive' (a Human Resources Strategy for Researchers based on the Charter and Code), and the Principles of Innovative Doctoral Training have all contributed to this progress. Marie Skłodowska-Curie actions have also set standards for research training, attractive employment conditions and open recruitment for all EU researchers. However, as stated in the ERA Progress Report 2014 (EC, 2014d), improvement has been uneven across Member States, as some countries still present weaknesses in their recruitment processes that make research careers less attractive and that hamper mobility, restrict gender equality and limit research performance. Adding to these, there are still legal and administrative barriers affecting recruitment of non-nationals/non-residents, although initiatives such as 'Money Follows Researcher' show how those barriers can be tackled. The mobility issue is also linked with factors such as poor career prospects for young researchers, inadequate gender equality practices, and insufficient mobility across academia and business. VERA stakeholders noted that, among other benefits, increasing researchers' mobility geographically and sectorally would contribute to achieve a more coherent integration of policies promoting research jobs among countries, more effective and impactful spill-over processes across Europe, and an eventual reinforcement of the identity of European citizenship.

How to develop attractive and impactful research careers?

3.6.1. Facilitating cross-border mobility of researchers

To facilitate cross-border mobility of researchers implies legal and administrative reforms that will make it easier for EU R&I personnel to undertake research work in other countries and to create good conditions for non-EU researchers to be adequately integrated in the EU R&I system.

Most strategies regarding mobility were proposed by the academic actors participating in the VERA discussions. They recommended, for example, the creation of *integrated 'packages' for researchers - designed from a long-term career projection perspective – that may include not only research grants, but also job contracts and mobility supporting schemes*. In addition, they broadly agreed that mobility strategies should *promote family friendly policies whereby any researcher expatriation plan incorporates solutions for covering an eventual partner's loss of salary or possible relocations, e.g. 'dual careers'*. In this regard, even though EURAXESS has some specific centres that provide personalised services to help researchers and families, more efforts were found necessary to support this sort of mobility barriers. VERA stakeholders also recommended *establishing a funding compensation system between countries to enable mobile researchers to stay in their host organisations, when justified, beyond the duration of the original project that funded the mobility in the first place*. Further, as mobility is often associated with pressure on work-life balance, they mentioned the importance of *identifying and promoting better models for organizing research work in a family-friendly manner*. Some discussants considered, for example, that *universities should be encouraged to provide free or economical services for child-care on their premises.*

Establish a funding compensation system between countries that ensures an extended (and justified) researcher's stay in a host institution when the project funding in that institution is over, thus facilitating further research

Advice from coordinators of ERA instruments

3.6.2. Enabling impactful exchange of researchers between academia and industry

To enable effective exchange of researchers between academia and industry implies putting into place actions to improve the institutional relationships between universities and businesses, thus strengthening researchers' careers.

The expansion of the career development to include mobility between academia and industry was a highly relevant issue brought to the VERA discussions, as it opens up the debate about careers more oriented to the bigger picture capable of connecting public and private research. In terms of policy, this aspect is connected with the dimension 'boost research and innovation synergies' and it shows how conditions of individual careers link back to broader systemic aspects of ERA. Therefore, VERA stakeholders' have called for a *re-thinking of career paths and practices that include capacity building in PhD education* so as to create a better understanding and awareness of industrial research opportunities and needs, a *change in university policies as regards the strengthening of industry engagement*, and the need for *financial support for the cross-sectoral mobility transition costs*. More specifically, VERA discussants found cooperation between academia and industry a strategic measure for *introducing a more practical problem-solving and close-to-market perspective into researchers' careers, increasing their orientation to innovation*. In this regard, industry actors acknowledged the importance of their participation in collaborative R&I initiatives, and had predisposition to create partnerships that include a broader and more open collaboration with students in real projects. These actions would then need *recognition and rewarding for researchers* participating in such mobility and knowledge exchange, e.g. through improvements in salaries or promotion prospects. Finally, VERA actors observed that open collaboration models would be even more relevant in the future as confronting societal challenges requires *joint efforts and critical mass in public-private partnerships, including some where private actors have the leading role in directing research agendas.*

Recognise and reward researchers' commitment to mobility and knowledge exchange with industry, e.g. through improvements in salaries or promotion prospects

Advice from coordinators of ERA instruments

3.6.3. Achieving an open and cohesive labour market

To achieve an open and cohesive labour market is associated with the necessity of providing more efficient mechanisms to dismantle and overcome bureaucratic and financial hurdles in R&I recruitment processes.

The majority of VERA stakeholders' insights on R&I labour market issues referred to the improvement of researcher recruitment processes. To some extent, this reflects the general perception that competition for talent is increasing in Europe and globally. Thus, public organisations within the EU should offer more attractive research careers in terms of *stability and security, including longer term contracts, portability of grants, and the roll out of tenure track.* VERA discussants agreed that *identifying and disseminating 'good academic practices' regarding recruiting and mobility in research careers* would help increase attractiveness. This would be supported by more transparent and standardised mechanisms that make use of *comparative benchmarking and monitoring indicators*. Some VERA stakeholders also recommended that the *procedures are supervised by auditing bodies*, to guarantee the quality of recruitment. The *inclusion of international members in recruiting panels* would often improve these processes, and some participants even suggested delegating the R&I

recruitment process entirely to specialised agencies. In any case, this sort of strategy should encompass researchers at all stages, i.e. doctoral researchers, post-docs, senior researchers, professors, as well as administrators and research managers. Finally, VERA discussants suggested that more efforts should be made to *ensure that most EU academic jobs are advertised internationally*, e.g. by encouraging a more active use of EURAXESS.

Create and promote more transparent mechanisms in research recruitment, e.g. using comparative benchmarking and monitoring indicators

Advice from coordinators of ERA instruments and funding actors

3.6.4. Harmonising careers and training programmes

To harmonise careers and training programmes implies reducing differences in research education schemes between EU countries.

VERA stakeholders found the modification of education strategies a precondition for any growth-oriented policy action. In particular, they would support actions aiming to transform rigid and exclusive models of higher education into more flexible schemes - ones that include, for example, *more possibilities for shifting between career paths, and a wider offer of disciplines, including less conventional and transdisciplinary studies*. Given the vast diversity of the conditions existing in different countries regarding research career paths, VERA discussants also believe that the establishment of a *European Researcher Career programme* might be an important target to pursue. This could be complemented by *more efficient training programmes for researchers at the EU level*. Academic actors further noted that *promotion criteria need to be revisited and better harmonised*. Some stakeholders argued that academic careers should not be only driven by highly-ranked publishing criteria, which are prioritising academic activity away from engagement and impact. In contrast, *the assessment and promotion of researchers in academia should gradually shift towards taking more account of impact and relevance of research alongside quality as traditionally understood*. This becomes especially pertinent in contexts where research is oriented towards solving societal challenges, and where publicly funded researchers need to combine their knowledge with that of practitioners to contribute to the development of local (or even wide-scale) solutions.

Transform rigid and exclusive models of higher education into more flexible schemes - ones that include, for example, more possibilities for shifting between career paths, and a wider offer of disciplines, including less conventional and transdisciplinary studies

Advice from society actors

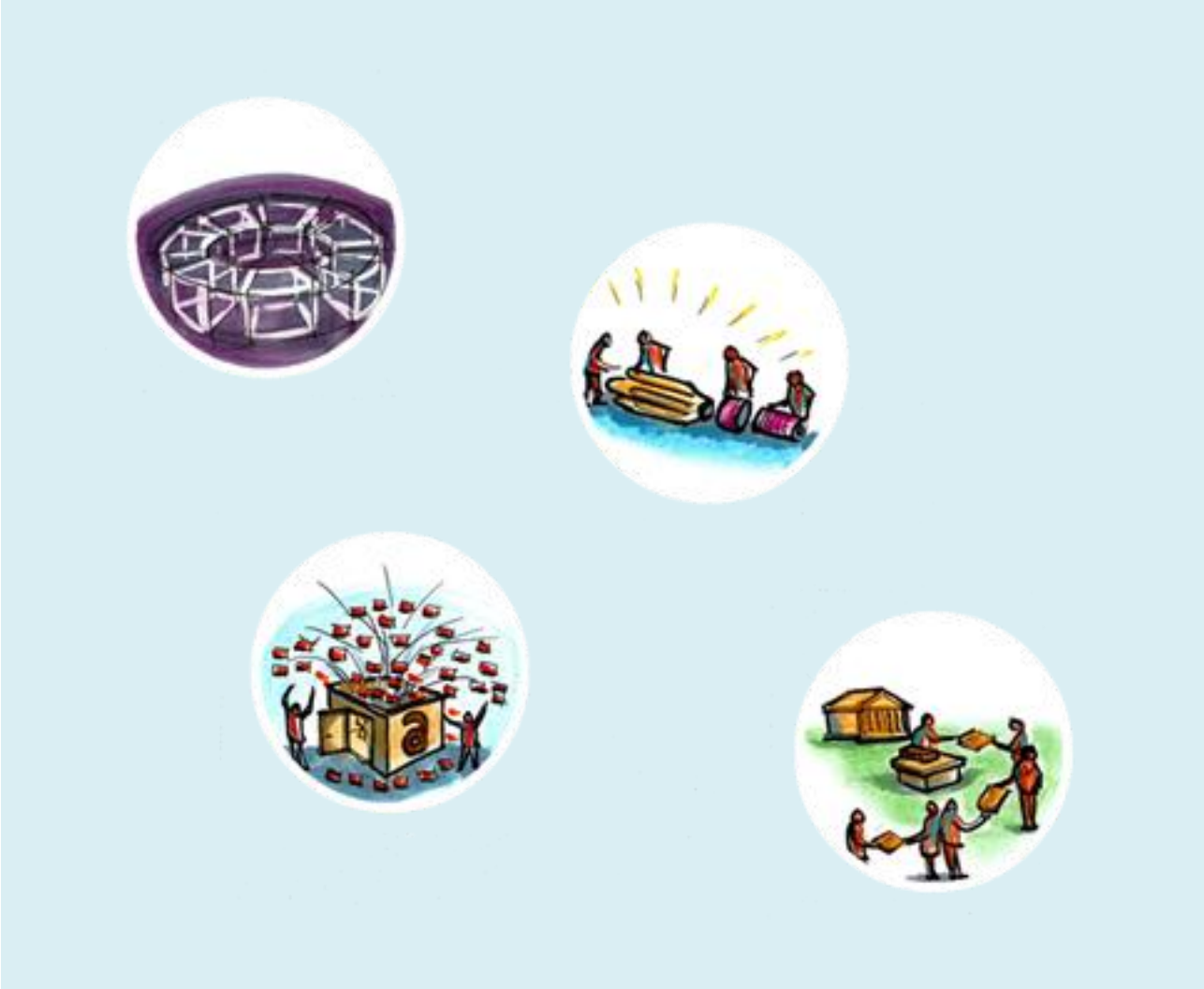
3.7. Support knowledge co-creation and sharing

7th policy issue

R&I stakeholders believe that more can be done to develop a sustainable and cross-sectoral collaboration culture within and across MS. The risks of duplication of efforts, at a time when access to national R&I resources is increasingly limited and/or competitive, strengthen the case for a more effectively supported and shared European 'knowledge pool'. While the rationales and benefits of common knowledge generation (albeit one that incorporates a variety of perspectives) can be recognised, there are still many challenges when it comes to its practical and cost-effective implementation across Europe. This is hardly surprising given over 20 EU languages, 28 national R&I systems, an unspecified number of regional R&I systems and cooperation cultures, and great heterogeneity in R&D intensity across the EU.

7th policy recommendation (R7)

Support knowledge co-creation and sharing by (1) developing a knowledge co-creation ecosystem; (2) fostering knowledge sharing and transfer; (3) adopting broader open access practices and policies; and (4) standardising and utilising digital research platforms.



Policy background and critical issues

The dimension is aligned with the ERA priority on 'optimal circulation, access to and transfer of scientific knowledge, including via digital ERA'. An ERA implementation expert group (EC, 2013c) recently emphasised the importance of knowledge sharing in the official ERA agenda. During the VERA focus groups, the R&I stakeholders, especially academic and industry actors, also discussed this aspect. This was alongside other themes already captured in the ERA debate, i.e. digital research platforms and open access. However, one emerging theme concerning this dimension was the growing role of the European knowledge co-creation ecosystem. This aspect was mainly discussed in relation with the need of establishing better conditions and frames for multidisciplinary research, thus making possible to tackle societal challenges from different perspectives. In this respect, the contribution of social sciences and humanities (SSH) research to position social and historic understanding of societal challenges in the heart of the problem-solving knowledge co-creation was found essential in most VERA discussions. It was actually agreed that including a variety of disciplines in societal challenges research may also contribute to reduce the fragmentation of the EU R&I system. VERA actors also noted that more efforts are needed to increase the effectiveness of conventional and emerging knowledge sharing channels (including digital research services). This was referring to the necessity of developing a cross-sectoral collaboration culture within and across MS. To support this, it would be particularly important to improve digital skills among research, policy and society actors.

How to support knowledge co-creation and sharing?

3.7.1. Developing a knowledge co-creation ecosystem

To develop a knowledge co-creation ecosystem implies achieving a better alignment of R&I actors and disciplines, to reduce EU fragmentation and thus to strengthen the capacity to tackle grand challenges.

Knowledge co-creation is at the base of an increasingly dynamic ERA ecosystem, where research funders, performers and users are mutually benefiting from constant interactions. This was recognised by an EC Expert Group on 'A Knowledge Intensive Future for Europe' which suggested that "*if Europe is to become the most globally competitive knowledge society, there is a critical need to ensure that public and private investments in knowledge generation are complemented by appropriate and effective investments in knowledge diffusion and absorption*" (EC, 2009).

However, the VERA stakeholders considered knowledge co-creation to deserve a more prominent recognition in the ERA development and thus its own agenda in terms of policies and incentives. Co-creation may be fostered, for example, by *setting up multidisciplinary communities and structures where researchers can jointly develop their own research initiatives*.

The VERA actors also observed that the nature of societal challenges, which requires the thriving of multidisciplinary and bottom-up approaches, calls for *strengthening the role of SSH* research in these communities. Most stakeholders actually agreed that broadening *the spectrum of disciplines that directly participate in grand challenges research* would reduce EU fragmentation, add flexibility to the knowledge co-creation system, and contribute to reduce international brain drain processes.

With regard to education policies, as key enabler elements of knowledge co-creation, VERA discussants proposed *embedding into schools and universities those traditional disciplines that promote and enable generation of knowledge from multiple perspectives and critical reflection on contemporary issues*, e.g. Ethics and Philosophy.

Set up multidisciplinary communities where researchers can develop bottom-up initiatives, thus complementing those directions marked by grand challenges

Advice from industry and academia actors

3.7.2. Fostering knowledge sharing and transfer

To foster knowledge sharing and transfer implies that we develop more effective exchange approaches, using a wider range of transfer mechanisms like mobility and institutional cooperation.

Knowledge transfer (KT) issues have been at the forefront of ERA debates since 2007 ERA Green Paper (EC, 2007), with several Expert Groups and ERA Progress Reports (EC, 2008, 2012b) recognising the importance of KT mechanisms such as capacity building activities, licensing of Intellectual Property, and creation of spin-off companies, among others. VERA stakeholders endorsed those mechanisms, and recognised the need *to increase the effectiveness of conventional knowledge sharing channels such as scientific and professional publications, workshops and conferences, e.g. through improved digital research services*. Further, stakeholders encouraged R&I *funders to take into consideration how the results of their funded projects could benefit broader stakeholder groups*. They believe that the dissemination of research findings across Europe and the cross-fertilization of knowledge may actually contribute to identify synergies and avoid duplication of research. In the same vein, the stakeholders noted that the *involvement of industries in the design of innovation-oriented university curricula would contribute to disseminate their best practices*, thus fostering knowledge exchange between industry and academia. Finally, the coordinators of ERA actions and the industry discussants highlighted the need for knowledge exchange initiatives aimed at *training agencies, e.g. Knowledge and Technology Transfer Offices, to improve cross-country cooperation* (taking into account country-specific and cultural differences).

Train knowledge transfer agencies to improve cross-country cooperation, e.g. by enabling them to take into account country-specific and cultural differences

Advice from coordinators of ERA instruments and industry actors

3.7.3. Adopting broader open access practices and policies

To adopt broader open access practices and policies requires new conceptions of how scientific and research results are shared, especially seeing data dissemination across a wider variety of economic actors as important for improving the economic and societal impact of research.

VERA actors appear to have signed up to the open access paradigm. Their position is fundamentally based on the premise that outcomes of publicly funded research should be fully and freely available for the benefit of the R&I system. Therefore, they encouraged *an open, timely and long-term access to qualitative and quantitative research findings and to the processes that facilitate the results*. However, coordinators of ERA actions and networks and industry actors also ask for *enforcing existing data protection rules,* to ensure that broader open access policies will not give rise to a violation of personal and institutional data privacy. Another matter of concern raised in the discussions referred to the quality of *data supporting research, which should be systematically accessible* so as to guarantee the quality of publications, facilitate more informed opinions on that research, and preserve its integrity and reliability. Finally, some R&I stakeholders stressed the need for a *more collaborative approach to open access within universities* to make access to data from within and outside the University easier, e.g. by fostering dialogue and debate among librarians, researchers and university leaders.

Encourage and facilitate open, timely and long-term access to qualitative and quantitative research data and findings, as well as to the research processes that facilitate the results

Advice from society actors

3.7.4. Standardising and utilising digital research platforms

To standardise and utilise digital research platforms is a supporting action that should facilitate the creation of new spaces for dialogues among R&I actors, thus promoting knowledge co-creation and sharing.

Enable digital platforms to better support the identification of, and dialogue with, potential R&I partners across Europe

Advice from academia actors

Although the possibilities of a 'digital era' were mentioned in the 2007 ERA Green Paper (EC, 2007), it was only in the 2012 EC Communication on 'A reinforced European Research Area partnership for excellence and growth' (EC, 2012c) when the Digital ERA was positioned as a key enabler of the ERA priority on 'open circulation, access to and transfer of scientific knowledge'. In line with that communication, VERA academia and policy actors acknowledged the need for more effective coordinating policies concerning access to e-infrastructures and digital research services within and between Member States. For e-infrastructures to become useful channels for transferring knowledge across sectors and countries, however, *greater awareness and more intensive training of industry, policy and society actors about the use of digital technologies* is needed. R&I actors would be enabled to *better utilise communication technologies in their joint initiatives, not least by being able to* more efficiently identify potential R&I partners across Europe. In this regard, the VERA stakeholders called for the *digital reinforcement and expansion of EC collaborative initiatives like Knowledge and Innovation Communities*. The academic actors also highlighted the importance of *improving the digital skills of researchers, students and teachers* as a stepping stone to further exchange and cooperation. A 'digital shift' should be encouraged in all the EU universities, in order to *foster digital catching-up processes that reduce IT gaps* between institutions. It was also noted that the *promotion of new social media instruments in academia may contribute to reinforce the European identity of researchers,* which could be not only efficient in terms of knowledge exchange, but also more powerful when it comes to defending the interests of the research community as a whole.

3.8. Achieve gender equality and social inclusion in R&I

8th policy issue

Many gender inequalities still persist in Europe, despite the policy attention given to this topic, at least at the EU level, in recent years. The pace of change is too slow, with many EU countries still lacking specific policies on gender and equity issues in R&I. In addition, R&I stakeholders have also the feeling that Europe is not taking advantage of its valuable diversity, and the equality debate has not extended sufficiently beyond gender issues, e.g. engaging vulnerable groups and considering the importance of multiculturalism.

8th policy recommendation (R8)

Achieve gender equality and social inclusion in R&I by (1) putting in place and implementing appropriate gender equality measures; (2) involving disable and vulnerable groups in R&I; and (3) including multicultural perspectives in R&I programmes.

Policy background and critical issues

The gender issue has been acknowledged as a major challenge in terms of human resources since the inception of the ERA in 2000. It has remained an ERA priority ever since, reflecting the importance of relevant measures and actions taken - but also signalling that a lot more still need to be accomplished. The 'Women, research and universities: excellence without gender bias' report (Maes et al., 2012) presents four challenges: the fact that many women abandon research activities (especially after PhD completion), the risk of potential bias in the recognition of qualifications in male-dominated fields, the existing financial gaps in salaries and research grants, and the absence of gender considerations in research design, implementation and organisation. The 2014 ERA Progress Report (EC, 2014d) also reveals that changes in the treatment of gender issues are not quick enough in MS, and calls for more integrated strategies that give rise to institutional improvements in the long term. Promoting gender equality and diversity in research was an important dimension for VERA participants, especially the societal actors. We have to note, however, that it attracted less attention in terms of strategies and recommendations. Although this may indicate a perception that enough policy attention is given to the issue already, it is only (or almost exclusively) at the EU level that various gender equality measures have been put in place. Another point to mention is that the debate was not confined to the R&I area. It is possible that gender awareness and efforts to take effective actions, at least at EU level, are well ahead of many other societal areas. More specifically, the participants addressed issues like gender differences in salaries and in top management positions, barriers for women researchers to continue their research after completing their PhDs, difficulties in achieving promotion in their careers, and problems to improve work-life balance. Some suggestions were also made to encourage countries and institutions to urgently adopt the ERA recommendations on gender equality and gender mainstreaming in research. This means more monitoring instruments to improve the implementation of, and compliance with, these recommendations. A second issue debated was the desirability of including vulnerable groups like the disabled and elderly in certain areas of research, thus avoiding that their capabilities and talent will be neglected or their needs misunderstood. Finally, VERA participants discussed a third issue related to the misrepresentation of some societal groups in decision-making and research activities, specially ethnic, religious and cultural minorities. The inclusion of these groups can also provide a link to the internationalisation agenda and help stakeholders become more aware of the implications of heterogeneity for societal challenges and economic opportunities.

How to achieve gender equality and social inclusion in research?

3.8.1. Putting in place and implementing appropriate gender equality measures

To put in place and implement appropriate gender equality measures requires acknowledging that gender issues need to be addressed not only because of inter-gender equity, but also for the sake of excellence, quality and relevance of research.

While gender equality is firmly embedded in the EU R&I strategy, the perception of many stakeholders was that this strategy has not been working well enough. Two reasons may explain this perception. One reason may actually be the fact that the ambitious gender equality goal in ERA is more advanced than similar moves in industry or in the public sector more generally (in many, not all, European countries). This is not to say that the issue cannot be pushed further, but the ERA principles confront, in many countries, deeply rooted institutional and cultural gender biases.

A second reason presented by the VERA stakeholders is that gender equality is frequently seen a human resources management problem, rather than *an issue with important implications for research and science excellence and relevance*. These were illustrated by with specific examples from medical science, e.g. lack of distinctions between male or female stem cells in labs, or the utilisation of exclusively male rats to understand the nature of human pain. Such issues have implications for the quality of research, with knowledge generation under these conditions failing to identify important phenomena and quite possibly producing results that are more easily taken up by, or more effective for, male users than their female counterparts. Given these two reasons, VERA discussants proposed three levels of policy actions: 1) *regulation, not only addressing R&I and employment aspects, but also other gender equality issues, including the improvement of rules for monitoring the impact of EU-funded measures*, 2) *education, raising awareness about gender and diversity problems, while avoiding the predominance of male-oriented models of work-life balance*, and 3) *evaluation, promoting a shift from schemes driven by exclusively gender objectives, to more effective and formally based assessment of R&I institutions, together with rewards for organisations that show a high commitment and performance on gender equality*.

The VERA discussions on gender equality concluded with two final observations. One of them highlighted *the relevance of gender equality for R&I industry strategies,* especially in SMEs. The final one was made by non-EU stakeholders, who called for *more gender equality and diversity efforts at the international level* too, as this could leverage change in other countries and even in other sectors of society.

Reinforce gender regulation for taking into account not only career and employment aspects, but also the implication that gender equality has on research and science excellence and relevance

Advice from coordinators of ERA instruments

3.8.2. Involving disable and vulnerable groups in R&I

To involve disabled and vulnerable groups in R&I implies the design of appropriate roles and the identification of R&I areas where under-represented groups may participate actively.

VERA stakeholders, especially societal actors, stressed the importance of not limiting equality efforts exclusively to gender issues, but also to ensure diversity in research by including other under-represented societal groups, e.g. elderly or disabled citizens. They strongly believe that *social inclusion should permeate horizontally through all new research initiatives*, not least in order to take advantage of the entire 'talent pool' in Europe. This requires a thorough *review of MS regulations and actions that affect these minorities, especially those concerning equality actions for R&I employment*. Discussants also recommended the promotion of *inclusive action from the initial stages of the research design,* and accommodating these groups in those roles and phases of the research process where their contribution is more valuable. Therefore, the creation of a *specific Horizon H2020 cross-cutting issue, based on the advantages of social inclusion* was suggested, in order to guarantee an early and utter participation of these groups in projects oriented to societal challenges. In addition, *better synergies between H2020 and the Employment and Social Innovation (EaSI) programme*[18] could help to increase the use of existing microfinance opportunities by vulnerable groups, e.g. young and disabled people.

Introduce a specific Horizon 2020 cross-cutting issue that build on the advantages of social inclusion to tackle societal challenges and to take advantage of the entire 'talent pool' in Europe, e.g. disabled, aged

Advice from research funding actors

[18] See http://ec.europa.eu/social/main.jsp?catId=1081

3.8.3. Including multicultural perspectives in R&I programmes

To include multicultural perspectives in R&I programmes envisions research as a means for enhancing respect for the identity and heritage of various ethnic, religious and minority groups.

VERA stakeholders have agreed that in an increasingly globalised world it is important that a *flexible and resilient R&I draws on the insights stemming from different cultures and societies*. For Europe needs to reach out to the world, especially when R&I efforts are oriented towards a stronger internationalisation agenda to deal with challenges of a global nature. Horizon 2020 has explicitly recognised the enormous complexity of the socio-economic landscape and the cultural challenges that Europe will have to face in coming years, and the EC has dedicated specific research funds - around 1.7% of H2020's total budget - in support of more inclusive and reflective societies.[19] The benefits of this research remain to be seen: VERA discussants were rather sceptical about its likely impact, and considered it to complement *broader Education policy actions* that should include more initiatives to *raise awareness, and inculcate values, of inclusiveness*.

Enhance Education programmes by including more initiatives to raise awareness, and inculcate values, of inclusiveness

Advice from academia actors

[19] See http://ec.europa.eu/programmes/horizon2020/en/h2020-section/europe-changing-world-inclusive-innovative-and-reflective-societies

3.9. Reinforce ERA regional outreach and inclusion

9th policy issue

There have been some concerns amongst R&I stakeholders about the effects that smart specialisation strategies may have in regions whose current capabilities and future needs are not yet well understood. It could mean, for instance, that regions with weak R&I systems, less skilled workforces and a lack of technology-intensive sectors may fall further behind and lose their real growth potential. Furthermore, there is a fear that an excessive focus on regional specialisation may limit the role of regions as active agents in the multi level governance landscape of ERA. R&I stakeholders also believe that regions are not at present sufficiently involved in the definition of challenge-oriented R&I agendas, nor in the design of horizontal and vertical cooperation schemes.

9th policy recommendation (R9)

Reinforce ERA regional and local outreach by (1) accelerating regional cohesion through R&I; (2) strengthening the role of regions in ERA; and (3) increasing interregional R&I cooperation.

Policy background and critical issues

One of the original defining aims of the European Research Area was to achieve '*greater European cohesion in research based on the best experiences of knowledge transfer at regional and local levels and on the role of the regions in the European research efforts*' (EC, 2000). However, the lack of regional cohesion in terms of R&I capacities has remained evident ever since, as reflected in the gaps in scientific knowledge generation and technological innovation. This calls for a genuine 'territorialisation' of research policies that take into account the regional socio-economic context (ibid.), which could be seen as an early signal towards the Smart Specialisation Strategy (S3) established in 2011. Several EC instruments have also implemented joint calls requesting more regional participation (e.g. ERA-NETs, JPIs, Article 185, etc.). However, an assessment of some of these instruments (EC, 2014f) noted that even when the involvement of regional authorities was encouraged in FP7, no clear increase was observed on the levels apparent in FP6 initiatives. VERA stakeholders had similar concerns about insufficient regional engagement, but they also recognised and endorsed ongoing EC efforts that are gaining momentum. One such effort is the new focus of the European Regional Development Fund (ERDF), which, on the one hand, allocates resources for R&I with a thematic concentration, and on the other hand, requires smart specialisation strategies as a precondition for funding allocation. Another example is the Stairway to Excellence project aimed to support the combination of European Structural and Investment Funds (ESIF) and H2020. Considering these developments, and the fact that the ESIF and the broader Cohesion Policy in the 2014-2020 period include 350 billion €, for regional development programmes, VERA stakeholders expect a more explicit and prominent role for regions in the governance and definition of future priorities at national and EU levels. In order to better respond to the need for *reinforcing ERA regional and local outreach*, the following section presents three specific actions based on the analysis of the VERA focus groups results.

How to reinforce ERA regional and local outreach?

3.9.1. Accelerating regional cohesion through R&I

To accelerate regional cohesion through R&I requires developing effective synergies between Horizon 2020, upstream/downstream ESIF (European Structural and Investment Funds) and other competitiveness-oriented instruments.

While European regions can in principle benefit from a wide range of financial instruments which directly or indirectly involve R&I, VERA stakeholders believe that many regional actors are unaware of the full potential of these instruments, and of their combination possibilities. For example, regarding the concerns about potential brain drain and unattended disciplines in less research performing countries,[20] Horizon 2020 launched the ERA Chairs, Teaming and Twinning actions.[21] In relation to the regional disparities between the so-called 'hot' and 'cold' R&I spots in Europe, VERA stakeholders *endorsed the EC policy of requesting a Smart Specialisation Strategy as a precondition for accessing European Structural and Investment Funds* (ESIF), as it supports less developed regions to catch up. This was seen as an opportunity to foster EU industrial leadership and increase excellence in R&I. ESIF is therefore expected to improve the regional R&I ecosystems, since the Cohesion Policy can be

[20] Horizon 2020 considers the following as low-research performing countries: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia and Slovenia.

[21] http://ec.europa.eu/programmes/horizon2020/en/h2020-section/spreading-excellence-and-widening-participation

used to build R&I capacities in regions[22] and engage them in Horizon 2020 through the Stairway to Excellence project. However, in order to maximize the synergies between these regional and EU investments in R&I capacities, VERA participants stressed the importance of *establishing the relevance of the 'grand challenges' agenda for the regions - so as to orient efforts to relevant areas and existing strengths*: does every EU region need a top research centre in nanoscience, for example? VERA participants, in particular industry stakeholders, called for *better involvement of business actors in the definition and implementation of competitiveness-oriented S3 agendas*. This is another action that could be supported with existing instruments, e.g. by *identifying and exploiting downstream synergies*[23] *between Horizon 2020 and ESIF*. Stakeholders called for *using existing instruments more intensively and intelligently to strengthen regional capabilities*, so that regions, through *a better utilisation of their existing regional R&I infrastructure and knowledge base, can* find their own roles in the national, European and even global landscape of R&I. The stakeholders actually agreed that *intensifying R&I regional efforts on those emerging areas where regions have strong capabilities would certainly contribute to promote European industrial leadership.* Finally, VERA discussants recommended that EU and regional authorities should *build foresight capabilities, in order to design and implement truly forward-looking roadmaps capable of unleashing the real and often hidden R&I potential of European regions.*

Build foresight capabilities in regions, in order to design and implement truly forward-looking roadmaps capable of unleashing their real and often hidden R&I potential

Advice from industry and policy actors

3.9.2. Strengthening the role of regions in ERA

To strengthen the role of regions in ERA requires reappraising the functions of regions in the national and EU R&I landscapes, by revisiting and updating earlier conceptions of ERA, followed by a systematic mapping of regional R&I capacities and needs.

The regional dimension has been mainly implicit in two of the five official ERA priorities, namely 'more effective national research systems' and 'optimal transnational cooperation and competition'. This was seen as insufficient: VERA stakeholders called for *a more strategic approach that includes both the 'territorialisation' and 'internationalisation' of regional R&I policies*. As regards 'territorialisation', policy actors and coordinators of ERA actions *recognised the importance of the S3 approach*, as noted above. But they also saw dangers arising if it does not *go in tandem with coherent 'internationalisation' strategies* that, based on variable geometry principles, avoid the eventual isolation and exclusion of regions with a lack of technology-intensive sectors, e.g. preventing brain drain processes. Thus, the *identification and consideration of the regional diversity of local problems and needs* was seen as crucial in order to grasp how national, European and global challenges are interpreted and experienced differently across regions (and in transregional spaces) with varying local circumstances and demands.

VERA stakeholders recommended that regions *be given more prominent positions in the definition of R&I priorities at national and EU levels*. A more *dedicated and pronounced strategy at European, national and regional levels* is needed to keep the regions a vital player within the ERA's *multi-level governance*. S3 is only one aspect of the regional role within ERA. Regions should have roles in: multi-level governance structures (e.g. JPIs); *defining and prioritising national and European societal challenges*; the development of *new instruments and indicators to monitor 'ERA regional progress'*; and so on. Finally, and more drastically, some policy actors launched the idea

[22] See https://ec.europa.eu/jrc/en/research-topic/smart-specialisation

[23] It refers to close-to-market initiatives, in contrast with upstream actions which focus on the origins of regional weaknesses and the upgrading of existing capacities and infrastructures.

of a Europe with a much more radical move towards *multi-level joint funding, whereby the relative importance of the national level would give way to an improved role of regions (and cities) with policy and funding capabilities*.

Promote new modes of multi-level joint funding, whereby the relative importance of the national level would give way to an improved role of regions (and cities) with policy and funding capabilities

Advice from coordinators of ERA instruments

3.9.3. Increasing interregional R&I cooperation

To increase interregional R&I cooperation requires the development of sustainable regional synergies based on the principles of complementarity and solidarity.

Interregional cooperation remains an important issue in R&I stakeholders' agenda. Policymakers and coordinators of ERA actions noted the need for further regional cooperation in pursuing regional cohesion - intensified by the growing disparities due to the persisting financial crises in some countries. This brings to the fore instruments oriented towards enhancing European territorial cooperation, e.g. INTERREG.[24] VERA stakeholders suggested that much more could be done. For example, building upon the comparable and up-to-date information on regions' smart specialisation strategies, two types of initiatives could be launched: *'R&I Complementarity Action'* (RICA) and *'R&I Solidarity Action'* (RISA). RICA could be *bottom-up and based on synergies between regional initiatives* combining ERA-NETs, Article 185 (Public-Public Partnerships) and Article 187 (Public-Private Partnerships) instruments; while RISA could be *both bottom-up and top-down* (e.g. making a specific number of 'solidarity actions' as an ex ante conditionality for high-research performing regions to apply for ESIF support) *and based on synergies between existing instruments* such as the INTERACT,[25] URBACT,[26] Teaming and Twinning actions. The EU will not necessarily need to develop new instruments as such, but should establish better *framing conditions and indicators, 'umbrella actions', that are aimed at maximising the impact of regional R&I cooperation*.

Develop strategies that combine 'complementarity' actions, based on synergies between existing regional and R&I programs, with 'solidarity' actions, which require solidarity initiatives as a prerequisite for high-performing regions to apply for Structural funds

Advice from academia actors

[24] See http://ec.europa.eu/regional_policy/en/policy/cooperation/european-territorial/

[25] See http://ec.europa.eu/regional_policy/index.cfm/en/atlas/programmes/2007-2013/crossborder/operational-programme-interact

[26] See http://ec.europa.eu/regional_policy/index.cfm/en/atlas/programmes/2014-2020/Territorial%20co-operation/2014tc16rfir003

4. ERA reflective policy advice

The previous section has introduced wide range of policy recommendations at different levels. While these offer a rich portfolio of policy options for policymakers, from a more pragmatic post-VERA standpoint, the authors recognised the need to develop a new policy mix or 'polygonal-bundling' approach (see section 2.2) capable of engaging stakeholders in an **ERA reflective policy advice** 'mode', which promotes additional and alternative combinations of the **158 ERA policy actions** resulting from the VERA Strategic Debates. In this vein, and being aware of the need for more policymaker-friendly ways of digesting the 'ERA policy banquet' presented in the Section 3, this section offers five 'reflective policy bundles' in a menu-like style consisting of:

- "*entrées" or* **enabling actions**, which normally create the framing conditions for leading policy actions to fulfil their purpose in a more effective way;
- "*plats principaux" or* **leading actions**, which generally tend to provide the 'main course' for policy direction, thus creating a pathway that could be expanded with further supporting actions; and
- "*desserts" or* **supporting actions**, which offer additional conditions to make the previous policy actions sustainable.

The five policy bundles are grouped as follows:

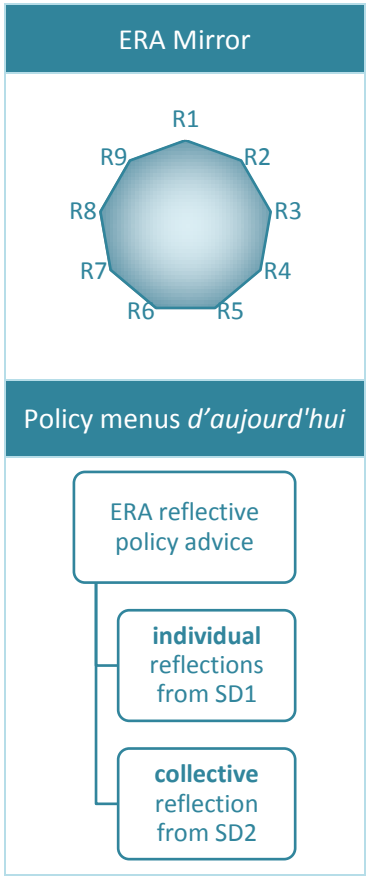
- Two bundles on **policy menus *d'aujourd'hui*** by looking at the "ERA mirror" with a focus on today's policy implementation space (see section 4.1)
- Three bundles on **ERA policy *à la carte*,** which looked at ERA actions through Horizon 2020 lenses (see section 4.2).

Both sections 4.1 and 4.2 include an introduction, which describes the process for the section of policy actions and the preparation of the menus. Finally, section 4.3 provides some reflections on 'ERA reflective policy advice'.

ERA reflections *d'aujourd'hui*

ERA policy *à la carte*

4.1. Policy menus *d'aujourd'hui* by looking at the ERA mirror



While VERA scenarios had a 2030 time horizon, participants in SD1 and SD2 were also encouraged to debate on today's relevance of ERA policy actions. The term 'ERA Mirror' is a metaphor based on the understanding of ERA as an evolving system where different stakeholders play interchangeable roles depending on the *context and goals* (e.g. **industry** may play an ERA **enabling** role *accelerating knowledge co-creation and sharing*, an ERA **leading** role in '*boosting research and innovation synergies*' and an ERA **supporting** role in '*promoting smart R&I evaluation*'). As such, when different types of stakeholders reflect individually or collectively about ERA, many different roles for ERA dimensions and ERA aspects would emerge in the formulation of ERA relevant policy advice.

Although the methodology chapter (see section 2) has already described the VERA Strategic Debates, this section provides additional information on the main differences between SD1 and SD2, which will help the reader understand why the Manchester VERA team decided to build policy bundles based on these very distinct reflective activities.

The first activity focused on **individual stakeholders' reflections on ERA**. Several brainstorming-like exercises were used to stimulate a process where 'diffuse-strategic-reflections' were gathered from seven types of stakeholders being individually confronted with four audio-visual stories[27]of the future of ERA. We use the term 'diffuse' to compare this process with the refraction of light through a prism, as the ERA visions contained in the four VERA scenarios triggered strategic 'reflections at many angles' resulting in **100 policy actions** for ERA today.[28]An internal process was organised (within The University of Manchester) where the *ERA nonagon* approach was applied to provide a set of 9 interconnected actions. The purpose of this exercise was to recognise synergistic combinations between the actions in order to produce a more logical recipe or "menu" of ERA *enabling*, *leading* and *supporting* actions. The resulting policy bundle (see section 4.1.1) combines two actions suggested by research funders, two from industry actors, two from policymakers, one from society actors, one from academia and one from coordinators of ERA networks.

The second activity dealt with **collective stakeholders' reflections on ERA**. The advice was produced in a process where 'retro-strategic-reflections' were encouraged by confronting multiple stakeholders with prioritised actions generated through 'diffuse-strategic-reflections' of individual stakeholders (see above). The process took place in a two-day VERA Symposium organised in Manchester on October 2014 and involved two main tasks: On the first day participants rated today's policy relevance of 185 actions related to VERA scenarios; and on the second day, the rating results were presented and a total of 42 actions were distributed to groups of multiple stakeholders who engaged in a collective clustering and fleshing-out processes leading to **31 policy actions** for ERA today.[29]This was followed by an internal process, which applied the *ERA nonagon* approach to the already prioritised actions in order to build another "menu" of *enabling*, *leading* and *supporting* ERA actions. The resulting policy bundle (see section 4.1.2) integrates six fleshed-out actions that were originally suggested (in SD1) by coordinators of ERA instruments, two actions by industry actors (one of which was also suggested by policymakers), and one action by research funders.

[27] FG participants were are also shown a video on the VERA Scenarios: http://www.eravisions.eu/scenarios
[28] Distribution of the 100 actions across the 9 ERA recommendations: R1=5, R2=11, R3=8, R4=12, R5=8, R6=24, R7=19, R8=10, R9=3.
[29] Distribution of the 31 actions across the 9 ERA recommendations: R1=5, R2=2, R3=2, R4=8, R5=3, R6=4, R7=5, R8=1, R9=1.

4.1.1. Policy advice based on brainstorming-like individual reflections on ERA

1st ERA policy bundle

This policy bundle or "actions menu" combines nine individual reflections from the VERA Focus Groups with 95 stakeholders engaged in brainstorming-like 'diffuse-strategic-reflections' on ERA.

For "*entrées*" the VERA approach helped to identify 5 enabling actions:

- Promote the utilisation of crowd-funding in order to ensure a more direct participation of societal actors in R&I projects (Linked to R5, see 3.5.2).
- Reinforce the entrepreneurial perspective among researchers so as to facilitate the creation of knowledge-intensive and technology-based start-ups and spin-offs (Linked toR7, see 3.1.7).
- Engage industries in the development of innovation-oriented university curricula, professorships, executive education and exchange programmes (Linked to R7, see 3.7.2).
- Identify and promote better models for organizing research work in a family-friendly manner, e.g. by encouraging (rewarding) universities and research centres to provide free or economical services for child-care on their premises (Linked to R6, see 3.6.1).
- Shift from schemes driven by exclusively gender objectives, to more effective and formally based assessment of institutions, including rewards for organizations that show a high commitment and performance on gender equality (Linked to R8, see 3.8.1).

The first enabling action calls for a proactive engagement of citizens in science and R&I policy by becoming real stakeholders and drivers of decisions. This requires effective education and communication campaigns on crowdfunding models (e.g. donation, rewards, equity, etc.) and their benefits. The other four actions are particularly relevant for academia and research organisations, though industry, policy and research funding actors play key enabling roles. The second action needs a change in promotion mechanisms whereby researchers and Academia' entrepreneurial activities are showcased and rewarded. The third is currently happening in some leading European universities but requires mainstreaming across MS through industry-sponsored initiatives such as multidisciplinary institutes and joint projects capable of breaking down academic silos, modernising the curricula and improving the skills of graduates, researchers and professors. Although, the fourth and fifth may be seen as challenging actions requiring new legislation on social welfare and employment policies (see also 'collective reflections' policy bundle below), the EC could influence change by introducing two extra criteria to the evaluation of H2020 and EaSI proposals to reward proposals coordinated by institutions that meet key gender equality and working conditions goals.

For "*plats principaux*", 2 leading actions:

- Formulate stronger mission-oriented R&I policies to support sustainable growth of European technological capacities, especially with regard to start-ups and SMEs (Linked to R4, 3.4.3).
- Promote a better involvement of business actors in the definition and implementation of smart specialisation agendas (Linked to R9, see 3.9.1).

The first leading action requires the definition of a more business-oriented perspective in public institutions when dealing with emerging technologies, e.g. defining adequate public procurement to invest in large demonstration programmes. The second action calls for a more active role of industry in shaping regional development agendas.

For "*desserts*", 2 further supporting actions:

- Define proper metrics and indicators - based on representativeness, inclusivity and transparency - to measure R&I societal impact and evaluate the effectiveness and relevance of citizen participation in science (Linked to R3, see 3.3.4).
- Develop easy, transparent, and open procedures to facilitate a more effective and intersectoral use of EU research infrastructures (Linked to R2, see 3.2.3).

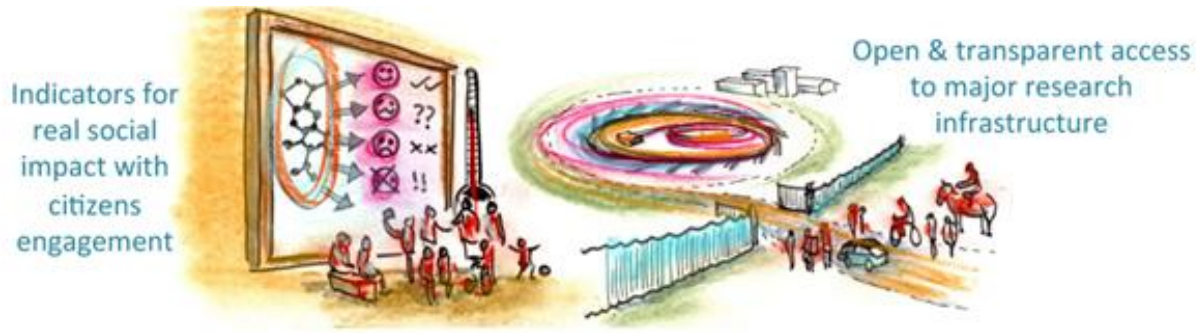
The first supporting action is necessary for the long-term success of most enabling actions since new indicators would need to measure both the impact of research results as well as the new R&I funding, qualifying and working conditions. The second action is aimed at boosting cross-country and multidisciplinary collaborations through the sharing of research infrastructures facilities.

Visualising the 1st ERA policy bundle

entrées

plats principaux

desserts



4.1.2. Policy advice based on backcasting-like collective reflections on ERA

2nd ERA policy bundle

This policy bundle or "actions menu" includes nine collective reflections from the VERA Symposium where 44 stakeholders engaged in backcasting-like 'retro-strategic-reflections' on ERA.

For "*entrées*" the VERA approach helped to identify 4 **enabling actions**:

- Encourage MS to share their best practices on promoting entrepreneurship and implementing universities third-mission strategies (Linked to R1, see 3.1.7).
- Foster academia-industry R&I joint initiatives in order to introduce a more practical problem-solving and close-to-market perspective into researchers' careers, increasing their orientation to innovation (Linked to R6, see 3.6.2).
- Promote the professionalization of science communication so as to increase citizens' engagement in R&I processes (Linked to R5, see 3.5.2).
- Reinforce gender regulation for taking into account not only career and employment aspects, but also the implication that gender equality has on research and science excellence and relevance (Linked to R8, see 3.8.1).

The first enabling action was seen crucial to stimulate entrepreneurship across Europe and the key point made by R&I stakeholders was that rather than new financial instruments MS needed simpler dissemination procedures for existing ones. The second action is also expected to boost entrepreneurship but as a result of more impactful exchange of researchers between academia and industry. The third action requires the creation of platforms to disseminate R&I practices (best and promising) at EU, national and local levels with a particular emphasis on the engagement of society actors in science policy decisions. Finally, the fourth action is an enabler that goes beyond R&I policy, as it requires coordinated responses and possibly new legislation on social welfare and employment policies at the EU and MS levels, thus suggesting a dedicated Joint Programming Initiative (JPI) on gender equality may be needed.

For "*plats principaux*", 3 **leading actions**:

- Maximize upstream synergies between R&I funding and structural funds in order to develop regional R&I capacities (Linked to R9, see 3.9.1).
- Rethink pan-European cooperation networks by including local and lay knowledge and by adopting flexible and open forms that facilitate a better understanding of social and crosscutting global problems (Linked to R2, see 3.2.1).
- Explore future reconfiguration pathways of the European R&I system, by looking at changes in the socio-economic landscape, envisioning its impact on R&I governance at national, regional, and local level, and analysing its implications on potential EU programmes complementarities (Linked to R7, see 3.4.1).

The first leading action is about better orchestrating global, EU and regional coordination of R&I funding efforts around societal challenges. The combination of the second and third action enable a systematic and forward-looking research on the future of European R&I system, which takes into account broader landscape developments (e.g. geopolitical tensions and Europe's economic power) as well as the evolving R&I dynamics within the ERA and individual MS.

For "*desserts*", 2 further **supporting actions**:

- Shift from objective-based to performance-based evaluation of R&I institutions and programmes (Linked to R3, see 3.3.3).
- Promote a more effective dissemination of research findings across Europe by encouraging research funders to take into consideration how the results of their funded projects could benefit broader stakeholder groups (Linked toR7, see 3.7.2).

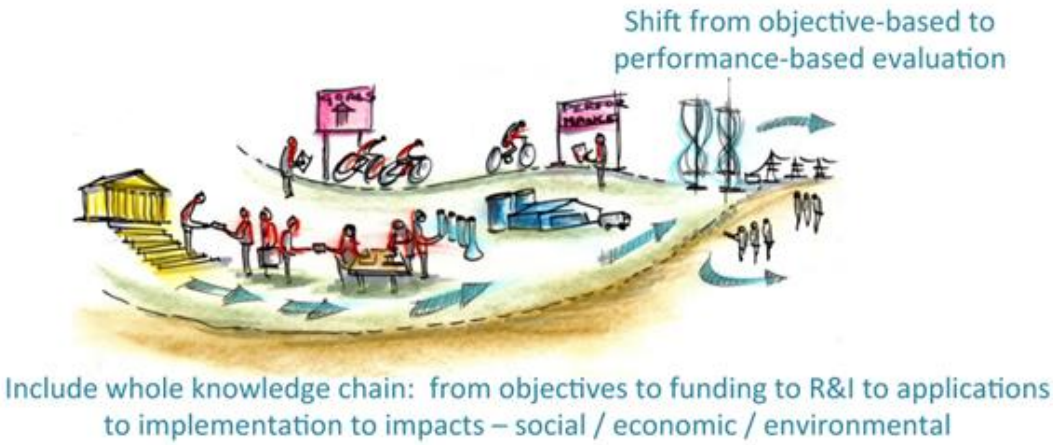
The first supporting action requires a commitment from all stakeholders involved in R&I activities to engage in the identification of unplanned outcomes as well as the overall effectiveness of activities in relation to such results. The second action requires different levels of open access schemes depending on the type of R&I activity and research field.

Visualising the 2nd ERA policy bundle

Entrées

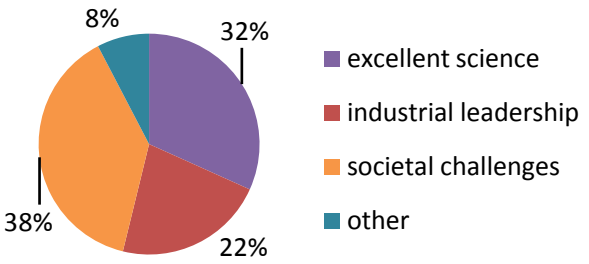
plats principaux

Desserts



4.2. ERA policy *à la carte* through Horizon 2020 lensing

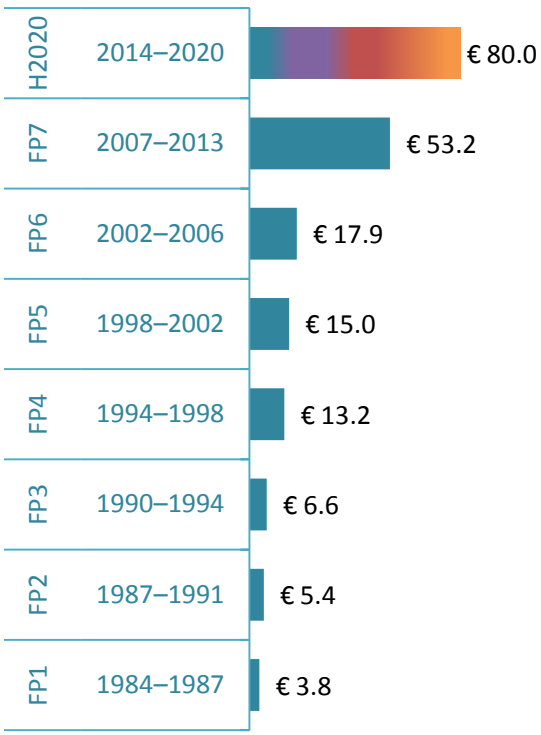
Horizon 2020 is the largest EU R&I effort since the creation of the Framework Programmes in 1984. With approximately €80 billion budget, which is expected to underpin additional private investments, the EU made particular emphasis on the role of *excellent science*, *industrial leadership* and *societal challenges* as drivers of economic growth and jobs in Europe.[30]



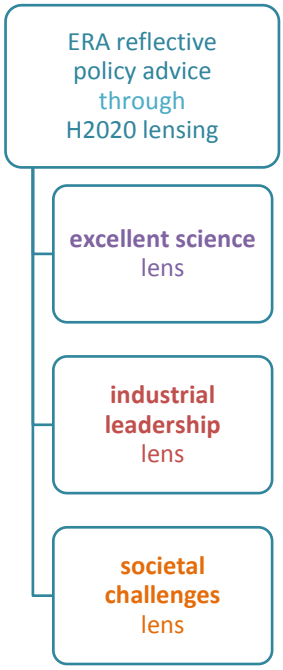
One overall aim of Horizon 2020 is to support the realisation and well-functioning of ERA (EC, 2013b). Given the importance of H2020 priorities for the European R&I landscape, an internal VERA process was designed to look at the VERA focus groups results from a H2020 perspective. This involves the following steps:

- Analysing VERA FG results so as to '**filter**' those policy actions that VERA stakeholders discussed in 'multiple' future settings as well as those linked to today's context and at least one VERA scenario (see section 2.1.1). The overall rationale was that policy actions that could be associated to multiple ERA futures should help to provide forward-looking policy advice for H2020. A total of **55 priority actions** emerged from this filtering.
- Organising two independent activities to apply the **H2020 lensing** to the 55 priority actions by tagging their relevance to H2020 pillars. The results were internally peer reviewed and **three sets of actions** were generated, one for each H2020 pillar.
- Applying the **ERA nonagon** approach to the sets of H2020-relevant actions, followed by the **bundling** approach to generate three coherent policy bundles (see sections 4.2.1, 4.2.2 and 4.2.3 below).

EU Framework Programmes budget in € bn

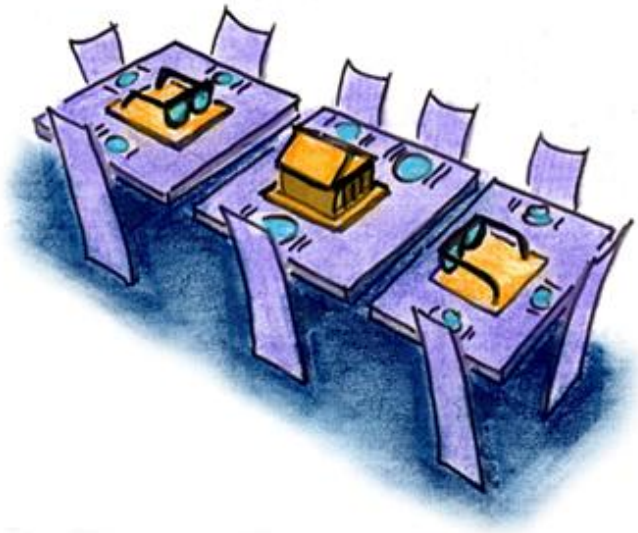


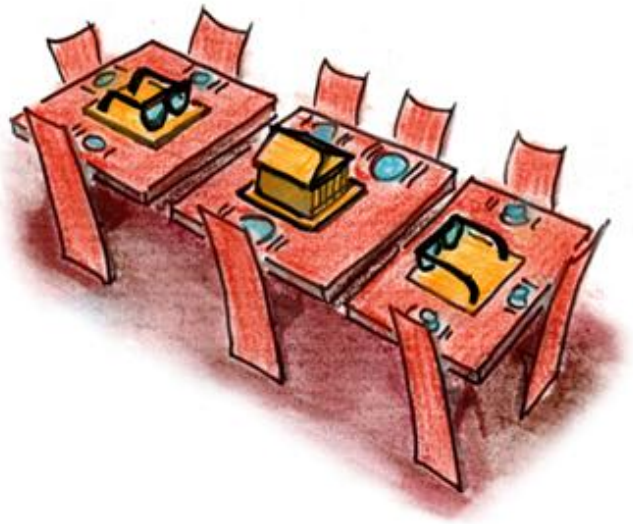
ERA policy advice through H2020 lensing

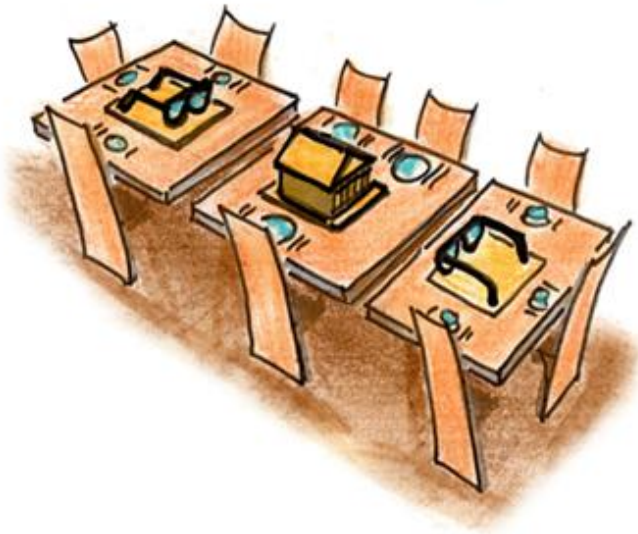


[30] See http://ec.europa.eu/programmes/horizon2020/en

ERA policy *à la carte*







4.2.1. Policy advice with emphasis on Excellent science

3rd ERA policy bundle

Excellent science is the first pillar of Horizon 2020 and consists of 4 priorities: (P1) research capacity building through cross-border and cross-sector knowledge exchange; (P2) competitive frontier science through attractive and flexible funding for leading researchers; (P3) collaborative research on advanced and paradigm-changing innovations; and (P4) state-of-the-art research infrastructures and facilities. H2020 supports these priorities with specific instruments (i.e. MSCA, ERC, FET, Research Infrastructures). In this section we present how selected VERA stakeholders' insights can be used to build a **policy bundle** or *"actions menu"* that promotes excellent science in Europe and, at the same time, addresses the nine recommendations (R1-R9) discussed in section 3. To help the reader better understand these actions, we have included references to relevant report sections in brackets.

For "*entrées*" the VERA approach helped to identify 5 **enabling actions**:

- Set up multidisciplinary communities and structures where researchers can develop bottom-up initiatives, thus complementing those directions marked by grand challenges (Linked to R7, see 3.7.1).
- Introduce a specific Horizon 2020 cross-cutting issue that build on the advantages of social inclusion to tackle societal challenges and to take advantage of the entire 'talent pool' in Europe, e.g. disabled, aged (Linked to R8, see 3.8.2).
- Take on some of the R&I financial risks, e.g. sponsoring high risk research, and provide back-up guarantees, e.g. facilitating 'subordinated loans' as a way of reducing investment uncertainties (Linked to R1, see 3.1.2).
- Promote the evaluation of R&I relevance in peer review, which should be supported by clearer assessment targets and by a broader ex-ante evaluation that takes into account scientific, technological and social implications (Linked to R3, see 3.3.3).
- Encourage MS to open up their national and regional research funding programmes at global level (Linked to R2, see 3.2.1).

These five enabling actions provide significant framing conditions for excellent science: The first two by improving knowledge exchange (P1) and helping to meet key ERA targets on diversity and gender mainstreaming in research (EC, 2014d); and the other three by enabling frontier science (P2) and collaborative research (P3) through more open, competitive and tailored evaluation and funding.

For "*plats principaux*", 2 **leading actions**:

- Promote a mix of goal oriented (application-driven) and knowledge oriented (curiosity-driven) funding to guarantee the sustainability of fundamental research (Linked to R4, see 3.4.6).
- Facilitate more attractive research careers in EU public organisations, in terms of stability and security, longer term contracts, portability of grants, and the roll out of tenure track (Linked to R6, 3.6.3).

The first leading action calls for more public investments in frontier science (P2) without neglecting areas of practical applications, while the second highlights the importance of creating favourable conditions to recruit the best researchers (P2) worldwide, thus also improving collaborative research (P3).

For "*desserts*", 2 further **supporting actions**:

- Orientate regional specialisation efforts towards a better utilisation of existing regional R&I infrastructure and knowledge base (Linked to R9, see 3.9.1).
- Elaborate education and communication platforms that enable citizens to access relevant scientific knowledge and share qualified opinions on the value of excellent science (Linked toR5, see 3.5.3).

Although benefiting but not necessarily depending on the leading ones, both supporting actions are fully aligned with H2020 efforts to develop world-class research infrastructures, including e-infrastructures (P4). The first could actually combine H2020 and ESIF instruments as far the regions specify the need for research infrastructures in their smart specialisation strategy, whereas the second could build on the success of the leading actions to elaborate education and communication programmes on new frontier knowledge (P2) and emerging technologies (P3), thus contributing to the sustainability of H2020 priorities.

Visualising the 3rd ERA policy bundle

entrées

plats principaux

desserts

4.2.2. *Policy advice with emphasis on Industrial leadership*

4th ERA policy bundle

Industrial Leadership is the second pillar of Horizon 2020 and requires: (P1) sustaining funding, especially 'risk finance', to allow businesses and ventures to develop at all stages of the innovation process and expand across the EU and the world; (P2) strengthening of the European industry and SME fabric; and (P3) orientating R&I efforts towards leadership in enabling and industrial technologies (LEIT). H2020 supports these priorities with specific instruments, e.g. InnovFin, SME instrument, etc. In this section we present how selected VERA stakeholders' insights can be used to build a **policy bundle** or *"actions menu"* that promotes industrial leadership while addressing the nine recommendations (R1-R9) discussed in section 3. To help the reader better understand these actions, we have included references to some relevant report sections in brackets.

For "*entrées*" the VERA approach helped to identify 4 **enabling actions**:

- Promote the evaluation of excellence, through peer review or self-evaluation, in order to enhance international R&I competitiveness, and as a driver for the modernisation of the R&I system (Linked to R3, see 3.3.3).
- Create financial instruments and incentives to make global R&I collaboration easier for European SMEs, and to attract other SMEs to Europe (Linked to R2, see 3.2.1).
- Improve the financial support for the researchers' cross-sectoral mobility transition costs (Linked to R6, see 3.6.2).
- Build greater awareness and more intensive training of industry, policy and society actors about the use of digital technologies, in order to realize the potential of e-infrastructures as channels for transferring knowledge across sectors and countries (Linked to R7, see 3.7.4).

The first enabling action would benefit industries with well-established excellence evaluation processes (P1 & P2), while the second and third actions would allow SME to access funding that underpin the innovation process, especially in the conception and diffusion phases, through the adaptation of ideas from different countries and sectors (P1). In particular the third action would also help to introduce industry problem-oriented perspective in researchers' skill set (P2). The fourth action would accelerate the uptake of leading information and communication technologies in industry (P3).

For "*plats principaux*", 3 **leading actions**:

- Promote the use of roadmaps and other technological intelligence tools to realise the potential of EU industries (Linked to R4, see 3.4.2).
- Support disruptive and transformative innovation by developing new regulatory frameworks that focus on solutions needed rather than on the processes to achieve them (Linked to R1, see 3.1.3).
- Intensify R&I regional efforts on those emerging areas where regions have strong capabilities (Linked to R9, see 3.9.1).

All three leading actions call for the strategic use of prospective and radical approaches to strengthen the European industrial and technological leadership (P3). However, the third action highlights the importance of building on areas where Europe has the potential for consolidating strengths (P2).

For "*desserts*", 2 further **supporting actions**:

- Create gender equality measures that recognise the relevance of equality for R&I industry strategies, especially in SMEs (Linked to R8, see 3.8.1).
- Develop platforms (institutions and networks) as well as mechanisms and tools (communication channels and interfaces) capable of supporting truly participatory RRI processes (Linked to R5, see 3.5.1).

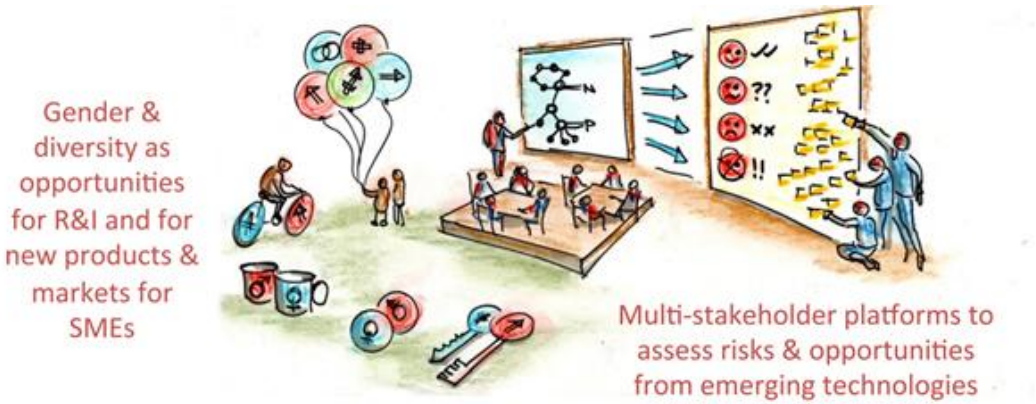
The first supporting action would increase industry and SME's capacities to build on women's talent to boost creativity and innovation (P2), whereas the second action draws attention to the need to include multi-stakeholder contestation of the industrial and technological pathways set in R&I agendas (P3). While this action may not speed up the uptake of new technologies its ethical and responsible orientation may lead to more sustainable funding and benefits in the long-term (P1).

Visualising the 4th ERA policy bundle

entrées

plats principaux

desserts



4.2.3. Policy advice with emphasis on Societal Challenges

5th ERA policy bundle

Societal Challenges (SC) represent the third pillar of Horizon 2020 and the EU commitment to develop a strong scientific and technological base in Europe to respond to society major needs, by: (P1) promoting bottom-up and multidisciplinary approaches in research; (P2) adopting a common EU voice in global fora based on long-term visions on major issues; (P3) promoting R&I collaborations alongside all SC; and (P4) exploring synergies between SC and emerging technologies to address them. In this section we present how selected VERA stakeholders' insights can be used to build a policy bundle or "actions menu" that facilitates a reinvigorated plan to tackle SC in Europe and, at the same time, addresses the nine recommendations (R1-R9) discussed in section 3. To help the reader better understand these actions, we have included references to some relevant report sections in brackets.

For "*entrées*" the VERA approach helped to identify 4 **enabling actions**:

- Promote future-oriented and multi-stakeholder participatory processes that facilitate the bottom-up definition of common long-term challenges and research agendas (Linked to R4, see 3.4.7).
- Enlighten citizens about the opportunities (and limitations) involved in developing collective responses to grand challenges, as well as highlighting the benefits and satisfactions of pursuing scientific and engineering careers (Linked to R5, see 3.5.3).
- Create favourable conditions in Europe for R&I to draw on the insights stemming from different cultures and societies (Linked to R8, see 3.8.3).
- Broaden the spectrum of disciplines that directly participate in grand challenges research, especially social sciences and humanities (Linked to R7, see 3.7.3).

The first enabling action would open up the process of identifying and prioritising future SC (P1) and create the conditions for more cohesive and shared European visions and R&I agendas on SC (P2). The next three actions can help to bring a wide range of perspectives into SC-oriented research (P1), and in particular, the last one could transform SSH research into an enabling bridge empowering multidisciplinary research (P3).

For "*plats principaux*", 3 **leading actions**:

- Make systematic use of horizon scanning to identify emerging innovation opportunities worldwide and support their piloting, implementation and scaling-up across MS (Linked to R1, see 3.1.3).
- Create mechanisms to better identify the regional diversity of local problems and needs, so as to grasp how national, European and global challenges are interpreted and experienced differently across regions and transregional spaces (Linked to R9, see 3.9.2).
- Promote international cooperation through more open mechanisms, e.g. by enlarging Joint Programming Initiatives to non-EU countries based on international variable geometry (Linked to R2, see 3.2.1).

The first leading action aims to assess emerging non-European social and technological innovations that are SC-relevant (P4). An effective and systematic mapping of such innovations could speed up their adaptability and transferability across Europe and increase the likelihood of further development in Europe (P2). The second and third actions call for the reinforcement of regional and global outreach in cooperation instruments like JPI through more intensive multi-actor interactions capable of supporting Strategic Research Agendas (P3).

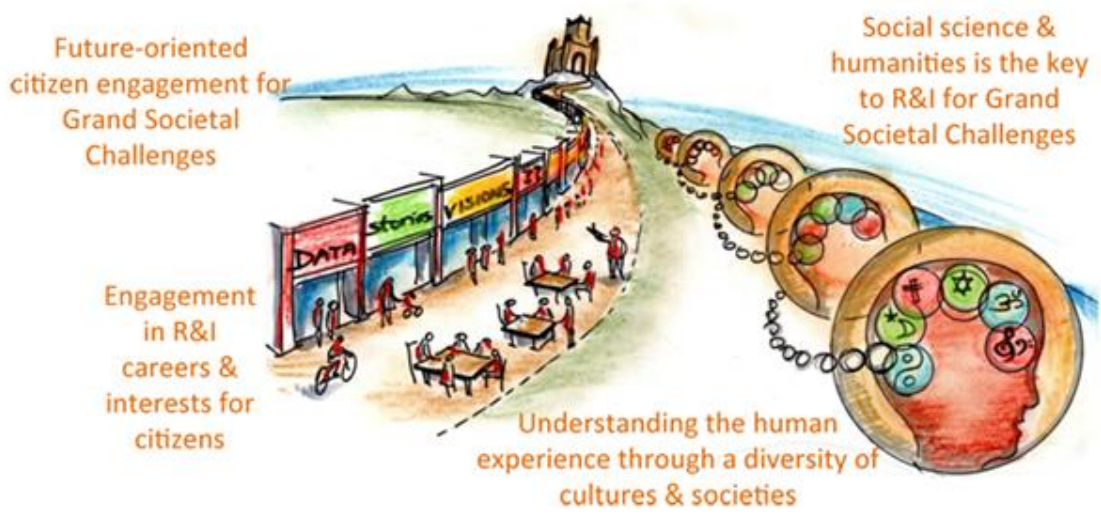
For "*desserts*", 2 further **supporting actions**:

- Open research evaluation to other areas and DGs with R&I competences (Linked to R3, see 3.3.2).
- Promote a gradual shifting in the promotion of researchers towards taking more account of impact and relevance of research alongside quality as traditionally understood (Linked to R6, see 3.6.4).

The first supporting action provides a bigger picture as to the implications that an explicit support to certain emerging technologies in non-EU countries (P4) may have on other EC policies, e.g. foreign affairs or international aid. The second action increases the social legitimacy and sustainability of R&I efforts, including JPI (P3), and helps to create a more responsible R&I ecosystem where researchers are genuinely encouraged to seek 'societal impacts' in addition to their 'citation impacts' (P1).

Visualising the 5th ERA policy bundle

entrées



plats principaux

desserts

4.3. Further reflections on ERA policy bundles

The ERA Open Advice report has been framed around 9 broad ERA dimensions and 38 ERA key aspects, which provide policy recommendations on different levels of action. These actions are the result of a multi-stakeholder elicitation process whereby multiple R&I actors' ideas have been integrated and reduced into a readable shared opinion.

In this report it is assumed that providing advice for the future of ERA is a complex problem that needs to be targeted through the combination of multiple actions. A second assumption refers to the fact that there is not a unique set of actions capable of reinforcing the development of ERA.

Systemic problems can actually be observed, in most occasions, through different and valid perspectives. We may consider, on the one hand, that these perspectives are neutral, as we present in bundles 1 and 2 of this section. The difference between 1 and 2 is only methodological (bundle 1 has been elaborated from individual reflections after stakeholders' group discussions in every SD1 workshop, and bundle 2 was collectively generated during stakeholders' group discussions in the SD2 symposium) and their sets of actions do not present differences in terms of policy objectives.

On the other hand, they may also reflect particular R&I perceptions to address the problem, e.g. bundles 3, 4 and 5 are targeting the same policy problem through different policy orientations, thus giving more emphasis to *excellent science*, *industrial leadership* or *societal challenges*. These approaches are consistent with the capacity of participatory intelligence processes for providing a large number of policy recommendations.

Furthermore, both approaches enable policymakers to choose between different alternatives for action. The reasons given above explain why any advice on complex and systemic problems, like the future of ERA, should be addressed with policy bundles.

Several benefits can be achieved by adopting a bundling approach. Firstly, policy bundling represents a holistic and integrated answer to complex problems, thus being useful for tackling key issues related to systemic weaknesses as it permits to take advantage of actions nuances by putting them in conjunction with other accompanying actions, i.e. synergies and complementarities can facilitate the realisation of individual actions' full potential. Secondly, the policy advice will not be seen as a collection of loose and insufficient actions (given the nature of the ERA focus, single actions are generally insufficient in terms of their capacity to impact on the ERA process in isolation). Thirdly, policy bundles increase the soundness and sustainability of the policy advice. Joint actions are actually more logically necessary than single actions. Fourthly, the policy bundles allow 'functional' distinctions, as it may be designed in terms of *enabling*, *leading* and *supporting* actions. Fifthly, a smart combination of policy actions may serve to counteract the collateral effects that could eventually come along with single actions.

The coexistence of different bundles depends on two factors. One factor relates to resources availability. Although each bundle addresses the policy problem (i.e. strengthening ERA) holistically by attending the nine ERA dimensions, a smart combination of various bundles may contribute to make the policy action stronger. However, implementing different bundles simultaneously requires a more exhaustive analysis by policymakers during the policies/programmes formulation stages, since this would demand a broader availability of resources. The second factor is based on the fact that every bundle tackles the policy problem differently. Therefore, implementing several bundles at the same time requires the analysis of compatibilities between actions within the same dimension as well as the potential interactions between their enabling, leading and supporting actions.

Reflections on the ERA Policy Bundling Approach

5. Conclusions

The ERA Open Advice report shows that well-structured collective thinking processes can be an appropriate means to bring stakeholders' concerns and insights into the EU R&I policy debate. The amount and quality of outcomes resulting from the VERA Strategic Debates demonstrate that the scenario-based approach is useful for gathering future-oriented strategic intelligence, as well as for delivering policy advice of relevance for today's decision-making. Ten key results have emerged in two forms: *product* and *process* outcomes.

Five **product** outcomes:

- **ERA dimensions** (policy recommendations at level 1). The nine dimensions emerged from seven strategic debates where ERA priorities and ERA key aspects were discussed by seven types of stakeholders, i.e. society, academia, industry, funders, policymakers, coordinators of ERA instruments and international actors.
- **ERA key aspects** (recommendations at level 2). These 38 aspects were used to flesh-out the policy recommendations at level 1 and constitute the main topics that VERA participants mapped and discussed in each ERA dimension. All in all, they show how to operationalise the ERA dimensions agenda around several themes and policy areas.
- **ERA key actions** (recommendations at level 3). These 158 actions have been used to fully-fledge the recommendations at level 1 and 2. While the VERA scenarios inspired some actions, the results of the strategic debate process helped to assess their relevance for today's context.
- **ERA critical issues**, which were drawn from a total of 243 opportunities and threats that the stakeholders identified at the European R&I system level. These critical issues where used to, on the one hand, further describe the policy issues and the background of each ERA dimension and, on the other hand, to better contextualise ERA key actions linkages to ERA key aspects. They also informed the ERA Strategy Map (Popper et al., 2015)
- **ERA policy bundles**, which combine a total of 45 ERA key actions into5 sets of policy menus. Two bundles based on stakeholders' individual and collective reflections on ERA and three bundles using H2020 lensing to create a portfolio of ERA key actions with an emphasis on excellent science, industrial leadership and societal challenges.

Five **process** outcomes:

- **VERA focus group methodology**, which has proven useful to engage 123 stakeholders in structured strategic debates on the future of ERA. The process itself is a major step forward in the creation of practical bridges between the anticipating and recommending phases of the foresight process.
- **VERA symposium methodology**, which was a challenging yet very valuable and worth fine-tuning process. The method used a multi-stakeholder setting to conduct a backcasting-like rating of policy actions inspired by VERA scenarios. Such debate on today's relevance of future-based stakeholders' insights, helped identify and flesh-out new ERA key actions.
- **Double-funnel policy advice approach**, which combined highly-participatory brainstorming activities with clustering and content analysis in a sequence that allowed to move from 114 ERA aspects to 38 ERA key aspects to 9 ERA dimensions (inward-funnel) to 158 ERA key actions (outward-funnel).
- **Evidence-based policy advice approach**, which required actions-based literature reviews and an iterative process where every ERA aspect description, related policy actions, link from critical issue to policy issue, argumentation, and multi-level recommendation was subject to an internal peer-review by five VERA team members at the Manchester Institute of Innovation Research (MIoIR).
- **ERA reflective policy advice approach**, that, on the one hand, uses the ERA dimensions as a frame (ERA nonagon) to select nine ERA key actions, and, on the other hand, combines stakeholders' reflections and perspectives in a sense making effort to develop bundles (policy mix) with mutually reinforcing sets of enabling, leading and supporting ERA actions.

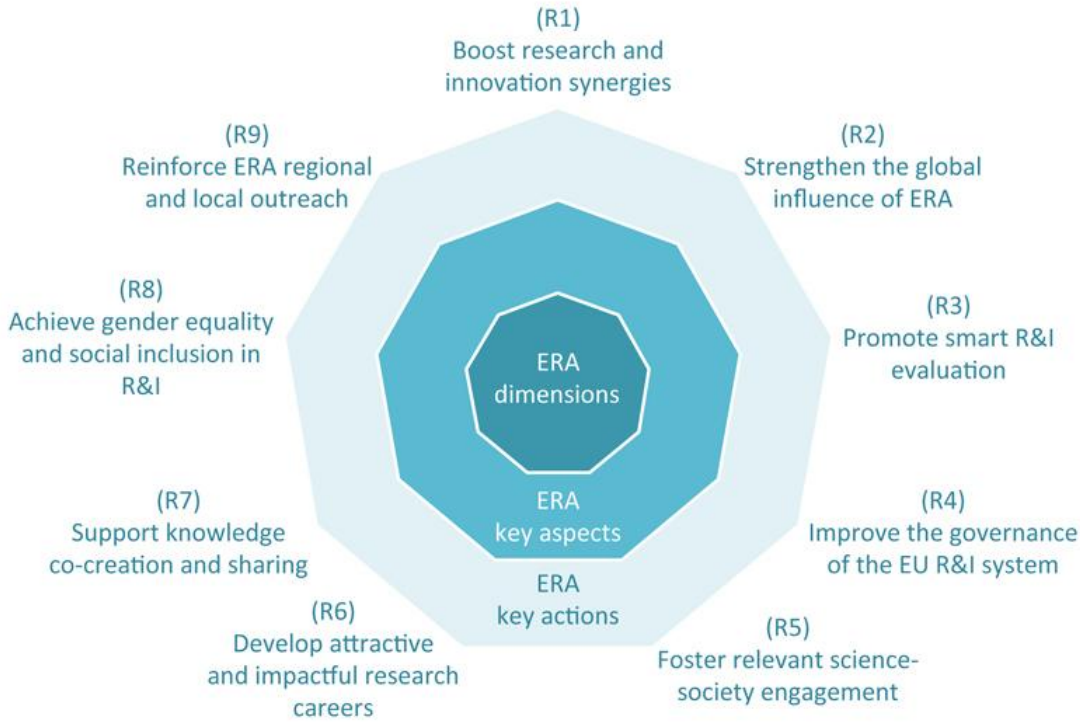
Reflecting on these outcomes, it is possible to conclude that the *current set of ERA priorities remains an '***open debate**', which is the first reason for calling this report ERA Open Advice. It is a challenging venture to try to position nine *ERA dimensions*, thirty-eight *ERA key aspects* and over a hundred *ERA key actions (see section 3)*, in a policy context where six ERA priorities have been "already agreed" and discussed at the various ERAC plenary meetings in charge of drafting the ERA Roadmap to be sent to the European Council in May 2015.

With great awareness of the challenge that this report faces in terms of informing, influencing or shaping the high-level ERA policy debates that will take place in the coming months and years, the authors decided to develop an extremely '**open approach**' (ERA nonagon) to the analysis of R&I stakeholders' insights, which is reflected in the *high levels of transparency and trackability of multi-level policy recommendations* presented in this report. In addition, and with a realistic expectation for the potential exploitation of the outcomes from the VERA Strategic Debates, the report provides some guidance on how the *ERA reflective policy advice* (see section 4) approach can be used to promote a more '**open agenda**' which, regardless of the "official" set of ERA priorities, can *integrate multiple ERA reflections and H2020 perspectives*, thus offering to the policymaker different alternatives for actions. The full list of specific ERA key actions in this report can also be used by EU, national and region policymakers to move forward in every new ERA dimension.

Another contribution that is linked to the five process outcomes mentioned above, but which goes beyond its methodological value, is the fact that the ERA Open Advice reports shows the way forward for those foresight practitioners who have not understood or realised yet that, if policymakers need "evidence-based" policy advice, then there needs to be an '**open process**' with a *solid bridge connecting the anticipating and recommending phases of the foresight process* (see section 2).

Lastly, and in the spirit of practicing what we "preach", the fifth element of the open advice was achieved with '**open access**' to the well-structured recommendations "dataset" that was used to prepare this report (see Annexe 10). Hopefully, the level of openness of the product and process outcomes of the VERA Strategic Debates will reinforce the uptake of participatory R&I governance in Europe.

The ERA nonagon



Let us conclude this report with some final reflections on the ERA dimensions. One clear message from the VERA Debates is the need to embed innovation in most aspects of ERA. Consolidating a functional and mutually reinforcing marriage between research and innovation at the European level was actually seen challenging but necessary. Even from sceptical perspectives, that put the current ERA principles under pressure, a more innovation-orientation is considered the only way to integrate public and private efforts in the pursuit of a truly European industrial and scientific leadership. However, the full realisation of this 'marriage' is problematic, e.g. in terms of achieving a right balance between applied and blue sky research. Although VERA stakeholders proposed distinct lines of action for **boosting research and innovation synergies**, it seems that the R&I linkage debate should remain open and further developed.

More specific actions have emerged in relation with **the global influence of ERA**. The adoption of a strong common EU R&I position was seen crucial to seize the opportunities offered by the societal challenges driven agenda. More emphasis, however, could have been expected on the role of research to join cultures and integrate different worldviews. In particular, joint research could help to better interpret the increasing geopolitical and social turbulences of Europe's neighbouring countries. Another interesting result of the VERA discussions showed that **promoting smart R&I evaluation** became a key aspect of the ERA debate. The main message on this new dimension can be summarized as evaluation as a means for improving policy, and *one size does not fit all*. The debate has recovered the long-standing ambition for designing and conducting reliable, transparent and standardised evaluation.

Another key message is the need to pay more attention to the emergence of 'citizen-science' evaluation. This debate reflects that there are still some concerns about the way involvement of citizens in research is articulated, as well as how many governance mechanisms and tools are yet needed to rationalise its practice. In turn, the **governance of the EU R&I system** has been endorsed as a 'smarter together' paradigm, although it was noted that there is a risk of over-coordination. A new dimension on **fostering relevant science-society engagement** recognises citizens as major shaper of R&I policy formulation and agenda setting. In particular, there is a strong feeling that the whole debate about citizen science and responsible research and innovation (RRI) needs to be strongly reflected in the pursuit of ERA. ERA, in other words, is not only about harmonising the structures, procedures and policies we have in Europe, but should represent a general broader leap forward in the way we organise research and its embeddedness in society. In this respect, it is interesting to note that the VERA debates paid more attention to this dimension than to increasing **research careers attractiveness**. This could be explained by the actual adequacy of existing careers-oriented policy initiatives, i.e. current policies seem to be accepted by most of stakeholders. Another reason may relate to certain saturation of the researchers' mobility discourse. In addition to people's mobility, VERA stakeholders showed great interest in effective knowledge circulation. In fact, **knowledge co-creation and sharing** could be seen as a 'default' ERA dimension, especially at a time when access to national R&I resources is increasingly limited and/or competitive. The current R&I context actually strengthens the case for a more effectively supported and shared European 'knowledge pool'. The generation of knowledge was also addressed in the debate on **gender issues**, as it reflected quite directly their implications on research excellence. Gender actions should be gradually oriented in this direction in order to gain momentum within EU R&I policy priorities. In addition, VERA stakeholders called for a more inclusive approach towards Europe's valuable diversity, by engaging vulnerable groups and cultural minorities in R&I.

Finally, it is important to highlight the intensity of the discussions that positioned the **regional dimension** into the ERA debate. The Smart Specialisation Strategy has probably been one of the most discussed and valued approaches strengthening ERA. However, and paradoxically, the regional dimension was between the ones that generated more suggestions for improvement. This mainly reflected the neglect of the regional dimension in recent years and the imperative need to give regions a central role in the current ERA debate.

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Annexes

Annexe 01: List of stakeholders engaged in the VERA Strategic Debates

Surname	Name	Country	Representative	Strategic Debate 1	Strategic Debate 2
Agrafioti	Ino	France	Academia	Focus Group	
Ahlqvist	Toni	Finland	WP5 team	Focus Group	
Alexandrova	Maria	Bulgaria	Industry	Focus Group	
Amanatidou	Effie	UK	WP5 team	Focus Group	Symposium
Azevedo	Catarina	Portugal	Industry	Focus Group	Symposium
Bade-Strøm	Tobias	Norway	Policymakers	Focus Group	
Badík	Roman	Czech rep.	ERA instruments	Focus Group	
Bärenreuter	Christoph	Austria	Research funders	Focus Group	Symposium
Bellavista	Joan	Spain	Policymakers	Focus Group	
Beltrami	Georgio	Italy	Policymakers	Focus Group	Symposium
Bin	Adriana	Brazil	International	Focus Group	
Bjornshauge	Lars	Denmark	Industry		Symposium
Bustos	Pablo	Chile	International	Focus Group	
Butkus	Eugenijus	Latvia	Research funders	Focus Group	
Candemir	Basak	UK	Policymakers	Focus Group	
Carl	Daniela	UK	Society	Focus Group	
Casingena Harper	Jennifer	Malta	Academia		Symposium
Chernyavskaya	Tatiana	UNIDO	International	Focus Group	
Cox	Debbie	UK	WP5 team	Focus Group	Symposium
Daimer	Stephanie	Germany	WP5 team	Focus Group	Symposium
de Chevingé	Suzanne	France	Society	Focus Group	
Dębkowska	Katarzyna	Poland	Academia		Symposium
Dettenhofer	Markus	Czech rep.	ERA instruments	Focus Group	
Doussineau	Mathieu	Spain	WP5 team	Focus Group	
Edler	Jakob	UK	WP5 team	Focus Group	Symposium
Ejdys	Joanna	Poland	Academia	Focus Group	
Ermida	Valdir	Brazil	International		Symposium
Fairclough	Isabela	UK	Academia	Focus Group	
Feldhoff	Silke	Germany	WP5 team	Focus Group	
Fernandez Zubieta	Ana	Spain	ERA instruments	Focus Group	
Ferrer	Jose Maria	Spain	Industry	Focus Group	
Franke	Jan	Germany	Policymakers	Focus Group	
Gamlen	Phil	UK	Academia	Focus Group	
Gheorgiu	Radu	Romania	WP5 team	Focus Group (Pilot)	
Giesecke	Susanne	Austria	WP5 team	Focus Group	Symposium
Gomez Valenzuela	Victor	Dominican Rep.	International		Symposium
Gøtke	Niels	Denmark	Research funders	Focus Group	
Griessler	Erich	Austria	Society	Focus Group	
Grimm	Andrea	Germany	Policymakers	Focus Group	
Guimaraes	Rui	Portugal	Academia	Focus Group	

Surname	Name	Country	Representative	Strategic Debate 1	Strategic Debate 2
Haegeman	Karel	Spain	WP5 team	Focus Group	Symposium
Hassinen	Saara	Finland	Industry	Focus Group	
Havas	Attila	Hungary	Academia		Symposium
Helgenberger	Sebastian	Austria	Society	Focus Group	
Hesping	Sandra	Germany	ERA instruments	Focus Group	Symposium
Iapadre	Lelio	Italy	ERA instruments	Focus Group	Symposium
Jorge	Miguel	Portugal	Academia		Symposium
Keet	Peter	Netherlands	Policymakers	Focus Group	
Kergroach	Sandrine	France	International		Symposium
Klotz	Elisabeth	Germany	WP5 team	Focus Group	
Kocińska	Ewa	Poland	Industry	Focus Group	
Köhler	Mechthild	Germany	Research funders	Focus Group	
Koivula	Minna	Finland	Industry	Focus Group	
Konttinen	Jari	Finland	Industry	Focus Group	
Kozłowski	Jan	Poland	Policymakers	Focus Group	
Kuhlman	Stephan	Netherlands	WP5 team	Focus Group (Pilot)	
Kurochkin	Gleb	Russia	International	Focus Group	
Kuster	Stephan	Germany	Research funders	Focus Group	
Labra	Romilio	Chile	International	Focus Group	
Laredo	Philippe	France	WP5 team	Focus Group (Pilot)	
Leijten	Jos	Netherlands	Industry		Symposium
Leinonen	Anna	Finland	WP5 team	Focus Group	
Leon	Gonzalo	Spain	Research funders	Focus Group	Symposium
Loikkanen	Torsti	Finland	WP5 team	Focus Group	Symposium
Lulewicz Sas	Agata	Poland	Academia		Symposium
Maes	Katrien	Belgium	Academia	Focus Group	
Mango	Carlo	Italy	Academia	Focus Group	
Marinelli	Elisabetta	Spain	WP5 team	Focus Group	
Martinez	Inazio	Spain	ERA instruments	Focus Group	
McCormick	Ian	UK	ERA instruments	Focus Group	
Merida Martin	Fernando	Spain	Policymakers	Focus Group	
Meyer	Susanne	Austria	ERA instruments	Focus Group	
Midtgaard	Thomas	Denmark	ERA instruments		Symposium
Mienert	Marion	Germany	Research funders	Focus Group	
Migueis	Ricardo	Portugal	ERA instruments	Focus Group	
Miles	Ian	UK	Academia		Symposium
Misiewicz	Malgorzata	Poland	Policymakers	Focus Group	Symposium
Molas	Jordi	Spain	WP5 team	Focus Group (Pilot)	Symposium
Moretti	Pier Francesco	Italy	ERA instruments	Focus Group	
Morgen	Henrik	Denmark	ERA instruments	Focus Group	
Mussi	Philippe	France	ERA instruments	Focus Group	
Mustonen	Riita	Finland	Academia	Focus Group	Symposium
Ormala	Erkki	Finland	Industry	Focus Group	

Surname	Name	Country	Representative	Strategic Debate 1	Strategic Debate 2
Ordonez Matamoros	Gonzalo	Netherlands	WP5 team	Focus Group (Pilot)	
Papaioannou	Skevos	Greece	Society	Focus Group	
Parys	Julia	Austria	WP5 team	Focus Group	
Pelkonen	Antti	Finland	WP5 team	Focus Group	
Petit	Maxime	Belgium	Academia		Symposium
Pinto	Vicente	Portugal	Policymakers	Focus Group	Symposium
Plater Zyberk	Anna	Poland	Research funders	Focus Group	
Plouin	Jacques	France	International	Focus Group	
Pollitzer	Elizabeth	UK	Society		Symposium
Popper	Monika	Poland	Industry		Symposium
Popper	Rafael	UK	WP5 team	Focus Group	Symposium
Radicev	Slobodan	Serbia	Academia	Focus Group	
Razzanelli	Matteo	Italy	ERA instruments		Symposium
Remøe	Svend Otto	Norway	Research funders	Focus Group	Symposium
Robison	Douglas	France	WP5 team	Focus Group (Pilot)	
Salles	Sergio	Brazil	International	Focus Group	
Sancho Reinoso	Alexis	Austria	Society	Focus Group	
Scapolo	Fabiana	Belgium	ERA instruments	Focus Group	
Schaich	Christian	Germany	Research funders	Focus Group	
Schelvis	Patrick	Netherlands	Policymakers	Focus Group	
Schoen	Antoine	France	WP5 team	Focus Group (Pilot)	
Simmons	Brooke	UK	Society	Focus Group	Symposium
Smith	John	Belgium	Academia	Focus Group	Symposium
Steenstra	Daniel	UK	Industry	Focus Group	
Stegmaier	Peter	Netherlands	WP5 team		Symposium
Taeyoung	Shin	Taiwan	WP5 team		Symposium
Tebar	Juan Antonio	Spain	ERA instruments	Focus Group	
Tenberg	Natalie	Germany	WP5 team	Focus Group	
Teufel	Benjamin	Germany	WP5 team	Focus Group (Pilot)	
Theis	Dietmar	Germany	Industry	Focus Group	Symposium
Toivonen	Leena	Finland	Academia	Focus Group	
Tzanakou	Charikleia	UK	Academia	Focus Group	
van Rij	Victor	Netherlands	Academia		Symposium
Velasco	Guillermo	UK	WP5 team	Focus Group	Symposium
Warnke	Philine	Germany	WP5 team	Focus Group	
Wenink	Jolien	Netherlands	ERA instruments	Focus Group	
Wilkens	Andre	Germany	Research funders	Focus Group	
Wolfmayr	Franz	Austria	Society	Focus Group	
Woodward	Alison	Belgium	Society	Focus Group	Symposium
Wu	Hsuan-Yi	Taiwan	International		Symposium

Annexe 02: List of stakeholders' organisations involved in SD1 and SD2

Organisations
Aalto University Business School
AINIA, Spain
Astroparticle Physics European Consortium (APPEC)
Austrian Institute of Technology (AIT)
Austrian Science Fund (FWF)
Bavaria's regional innovation and research agency BayFOR
Bicocca University of Milan
BOKU Centre for Global Change and Sustainability
British Consulate-General Istanbul
Center for Gender Studies and Diversity Research
Central European Institute of Technology (CEITEC)- Czech Republic
Centre for Industrial Technological Development (CDTI)
Centre for Technology Innovation of the Technical University of Madrid
Centre National de la Recherche Scientifique
Confederation of Finnish Industries
European Association of Service Providers for Persons with Disabilities
European Commission Directorate General Joint Research Centre (JRC)
European Forest Institute Regional Office for the Mediterranean (EFIMED)
European Industrial Research Management Association
European Universities Association
Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI), Romania
Falmouth University
Fondazione Cariplo, Italy
Foundation for Science and Technology (FCT)
Fraunhofer Institute for Systems and Innovation Research
Futures Diamond Ltd
German Aerospace Center
German Federal Ministry of Education and Research
German Research Foundation (DFG)
Hungarian Academy of Sciences
INGENIO
Innovations Factory Ltd
INOVA Group
INRIA
Institute for Advanced Studies, Austria
Institute for European Studies, Vrije Universiteit Brussel
Institute for Prospective Technological Studies (JRC-IPTS)
Institute of Agricultural Research of Chile (INIA)
Institute of Political Science of Louvain-Europe
Institute on Research, Innovation and Society (IFRIS)
InterAlign Organisation Ltd
Joint Research Centre-IPTS
Kemira Oy
League of European Research Universities
Malta Council for Science and Technology
Manchester Business School
Manchester Institute of Innovation Research (MIoIR)
Marie Curie Fellows Association

Mercator Centre Berlin
Ministry of Economic Affairs - Netherlands
Mission of Chile to the EU
Municipality of Espinho
National Science Centre- Poland
National Taiwan University
Netherlands house for Education and Research
NordForsk
Organisation for Economic Co-operation and Development (OECD)
Organisation for Health Research and Development, Netherlands- ZonMw
Permanent Representation of Italy to the EU
Permanent Representation of Poland to the EU
Poznan Science and Technology Park,
Regional Studies Association, UK
Research at the Austrian Ministry of Transport, Innovation and Technology (BMVIT)
Research Council of Norway
Royal Academy of Engineering, UK
Science and Technology Policy Institute of Taiwan (STEPI)
Science Europe
Siemens Research
Spanish Ministry for economy and Competitiveness (MINECO)
Spanish National Research Council (IESA-CSIC)
SPARC Europe
Strategic Centre for Science, Technology and Innovation in Health and Well-being (SalWe)
Tampere University
Technical Research Centre of Finland (VTT)
Technical University Munich
Technical University of Bialystok
United Nations Educational, Scientific and Cultural Organization (UNESCO)
United Nations Industrial Development Organization (UNIDO)
Universite de Marne la Vallee, IFRIS
University of Campinas
University of Central Lancashire
University of Crete
University of L'Aquila
University of Manchester
University of Natural Resources and Life Sciences, Austria
University of Novi Sad, Serbia
University of Oxford
University of Strathclyde
University of Technology, Poland
University of Twente
University of Warwick
Vilnius University
Zentrum fuer Soziale Innovation (ZSI)

Annexe 03: Agenda of the VERA Strategic Debate 1 (VERA Focus Groups)

Forward Visions on the European Research Area

The VERA Focus Groups

Strategies for European Research & Innovation Futures

Paris (Pilot) – Vienna – Manchester – Helsinki – Berlin – Barcelona (x2) – Brussels

Five tasks of the 7 Focus Groups Agenda and Pilot Workshop

T1	**Task 1: Scenario-specific opportunities and risks ('Impact/Bias analysis')** • *Opportunities and threats for their organisation* • *Opportunities and threats for their national RTDI system*

Short break + Refreshments

T2	**Task 2: Stakeholders strategies in the context of each scenario by 2030** • *New/emerging strategies of the actor* • *Re-emerging strategies of the actor* • *Discontinuing strategies of the actor* • *Continuing strategies of the actor*

Networking Lunch

T3	**Task 3: Stakeholders' assessment of ERA Objectives+ (for each ERA Priority Area)** • **Effectiveness in national research systems** • Transnational co-operation and competition • Open labour market for researchers • Knowledge circulation • Gender • + Additional objectives from Actors involved in ERA Instruments
T4	**Task 4a: Mapping stakeholders' strategies against ERA Objectives+**
T5	**Task 5: Tweet-café on Today's recommendations vis-à-vis ERA Objectives+**

Q&A + Conclusions

Annexe 04: Agenda of the Strategic Debate 2 (VERA Symposium)

The VERA Symposium

Strategies for European Research & Innovation Futures

Manchester, UK

Five building blocks of Day 1 Agenda: Back from the Future

B1	**Welcoming remarks** (Jakob Edler)		
	Introduction to the VERA Symposium: Day 1 Agenda (Rafael Popper)		
	VERA: Positioning the project and the scenario approach (Stephanie Daimer)		
B2	**The VERA Scenario Worlds** (Animated Video)		
	Key features of European STI futures: A VERA Team Backcast (Jordi Molas)		
	Key features of European STI futures: A Stakeholders Feedback (Rafael Popper)		
	Synthesis of Key features of ERA futures (Stephanie Daimer)		

Relaxing Cup of *'Café con Leche'*

B3	**Stakeholders' strategies and Strategic Debate on VERA Scenarios** • **Private Knowledge – Global Markets** (Jakob Edler) • **Societal Challenges – Joint Action** (Rafael Popper) • **Solutions apart – Local is beautiful** (Effie Amanatidou) • **Times of Crises – Experts at the Wheel** (Guillermo Velasco)

Networking Lunch

B4	**Evolving Dimensions of the European R&I Landscape** (Rafael Popper)		
	Stakeholders Feedback on ERA Dimensions + BackcasTEA Time dynamics *		
B5	BackcasTEA Time* Earl Grey • **Governance** • **Researchers** • **Smart evaluation**	BackcasTEA Time* Lemon & Ginger • **Global & EU** • **Research & innovation** • **Regional & local**	BackcasTEA Time* Mint • **Knowledge** • **Science-Society** • **Gender & equality**
	Open Debate on 'Back from the Future' Policy Issues + Overview of Day 2 dynamics *		

Three building blocks of Day 2 Agenda: Back to the Future

B1	**Introduction to the VERA Symposium: Day 2 Agenda** (Jakob Edler)		
	BackcasTEA Time results + PrioriTEA Time dynamics (Rafael Popper)		
B2	PrioriTEA Time* English B'fast • **Governance** • **Researchers** • **Smart evaluation**	PrioriTEA Time* Fruit Punch • **Global & EU** • **Research & innovation** • **Regional & local**	PrioriTEA Time* CO2 Decaf • **Knowledge** • **Science-Society** • **Gender & equality**
	Open Debate on Stakeholders' Policy Priorities		
B3	**'Back to the Future': Open debate on medium-to-long-term priorities & transformations**		
	Closing Remarks (Stephanie Daimer)		

Annexe 05: Selected memories from the 'ERA Open Advice' journey

VERA FG Society (Vienna, January 2014)

VERA FG Academia (Manchester, February 2014)

VERA FG Industry (Helsinki, April 2014)

VERA FG Research funders (Berlin, April 2014)

VERA FG ERA Instruments (Barcelona, May 2014)

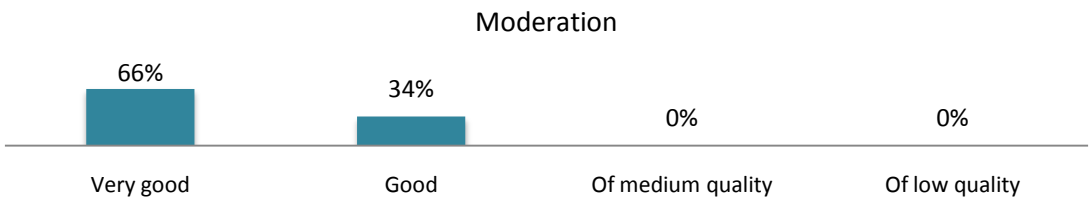
VERA FG Policymakers (Barcelona, May 2014)

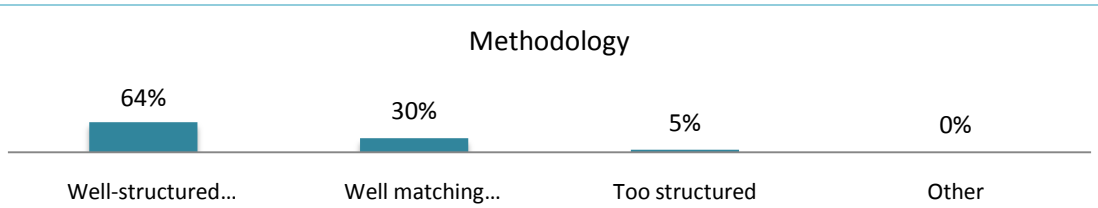
VERA FG International (Brussels, June 2014)

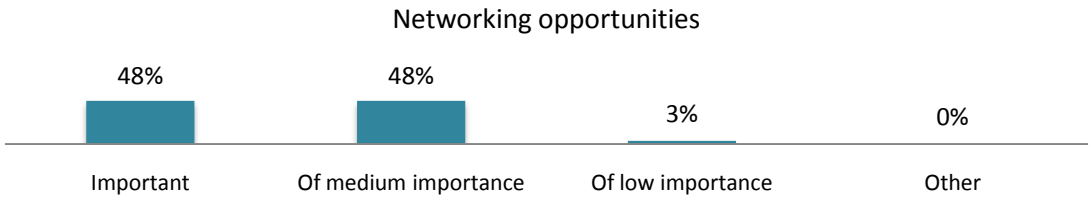
VERA Symposium (Manchester, October 2014)

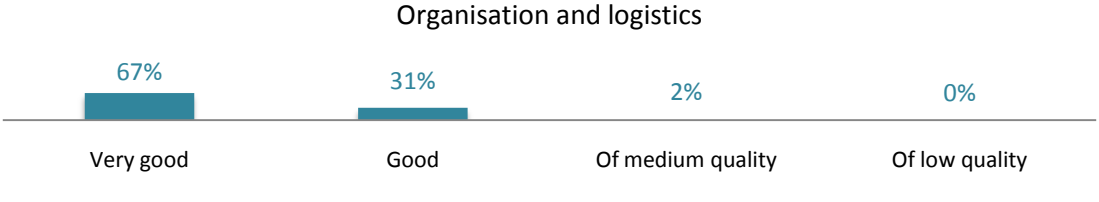
Annexe 06: Stakeholders' evaluation of the seven Focus Groups

Process evaluation

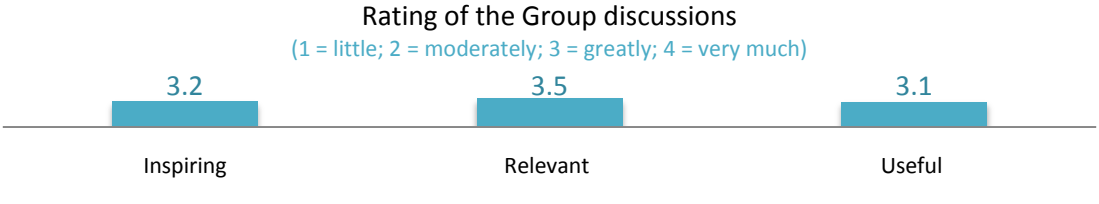


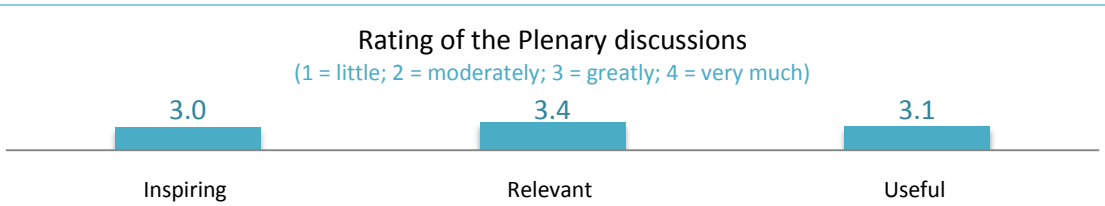


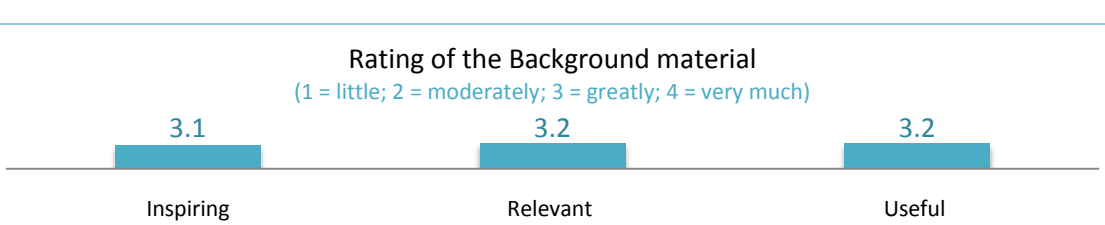




Content evaluation







Annexe 07: Stakeholders' feedback on SD1 and SD2 outcomes

"Thanks for the opportunity! Please find some comments below. Comments are personal, not necessarily a national position"

"Research and Innovation should be related indeed. So Innovation should be included in ERA as far as it is related to research. We need innovation elements to be included in research funding and in research agenda building, i.e. innovation driven research"

"We should not include general innovation funding, which would only dilute funding. It should be clear why and where Innovation funding has a European added value, because innovation is mainly developed locally"

"Boosting industry-academy cooperation is a very good recommendation. I would say the JTI's are in the lead here with substantial EU contribution"

"Although the ERA global perspective is important, the risk is that attention is diverted from the core mission of ERA, which is European cooperation (integration) of MS policies and funding"

"A cornerstone of the ERA agenda is to increase the effectiveness of national research systems in Europe, which includes improvement in policy making and implementation, growth in research investment and increased competition"

"The core is to consider the Research System at European level and to see how we can improve the functioning of the system as a whole by a better orchestration of the national systems, programmes, instruments and activities"

Peter Keet

Ministry of Economic Affairs - Department of Innovation and Knowledge

The Hague, Netherlands

"First of all, congratulations for the work, the VERA recommendations are very interesting"

I have chosen two recommendations to comment, that contribute to the ERA concept consolidation"

Comments on 'Broadening ERA into a European Research and Innovation Area'

"I firmly believe that this is a crucial element for ensuring long-term European competitiveness. It is true that today the emphasis on innovation constitutes a general policy trend in all European countries and, in fact, H2020 has addressed it (even if the term of ERA still refers to research). But H2020 is not enough. Nevertheless, both in terms of funding and instruments used, innovation is poorly covered in H2020 because many other factors influencing innovation success are not addressed: markets are still very far"

"The goal of 'broadening ERA' implies from my point of view the need to break the isolation between policy areas and citizen involvement"

"A broader ERA should affect the way that the exploitation of H2020 results are dealt with"

Comments on 'Developing a knowledge co-creation ecosystem'

"From my point of view, the consequences of this recommendation are in the core of the desirable transformation of the European innovation system structure"

"Unfortunately, the actors' fragmentation and weak stable and long-term links existing today in the EU are not well solved by current instruments"

"New approaches like EIT's 'knowledge and innovation communities' were created for this goal but their impact is still very low. We need to move from project-based actions to strategic partnerships where all actors could contribute (not only industry-led initiatives) by aligning their agendas"

"Clear stimuli at the institutional level are also needed to change priorities in public institutions to participate in these ecosystems."

"Furthermore, other actors outside the EU are also needed if we like to see an impact"

Prof. Gonzalo León

Vice President for Strategic Programmes

Director of the Centre for Technology Innovation- Technical University of Madrid

"First, let me say I really appreciated the efforts, approach and passion in this project I was involved in, thanks"

Comments on the EU R&I system governance

"Governance is the most structuring aspect of ERA but the most difficult to change. Top-down approach fails without any incentive (money). R&I system governance is inappropriate due to the average effect of the 'compromise' at national levels, so washing out regional needs/capacities and widening gaps between territories through concentration on national/EU commonalities"

"Coordination is usually approached between states, also in terms of funding instruments. Governance is therefore linked to funding instruments, regional dimension, Science in society. New modes of governance requires: fragmentation of the spatial scales (down to the individuals, total bottom-up approach) and coordination of these scales through enhanced connectivity"

Comments on Knowledge co-creation

"World is evolving towards user-manufacturers, high value of brain intensity jobs, decentralization of production, fast circulation of information. Knowledge co-creation is therefore linked to collaborative advantage in a world where open access to knowledge will be achieved maintaining neutrality of the infrastructures and truthfulness of information"

"Nevertheless, instead of 'alignment' I prefer indeed a 'strategic anarchy', where the system self-organizes towards the ultimate goal of tackling societal challenges with a 'shared value' approach and the public role is to create a friendly and free environment for knowledge creation and access"

Dr. Pier Francesco Moretti

Research policy officer

Permanent Representation to the European Union to support the Italian Presidency

"It was a pleasure to be involved in the very open and constructive discussions on the many issues of VERA" I scanned through the 38 recommendations (at level 2), which were pooled in 9 sections. It is not surprising that I feel that quite a number out of these 38 recommendations are relevant and important"

"I think that European research is challenged to provide an adequate balance between fundamental, blue-sky research and applied, market driven research. This is a formidable task – on one hand we need to stay competitive on global markets today and tomorrow, which justifies investment in the application oriented research. On the other hand we must also preserve fundamental research in all disciplines to protect and make progress in our human heritage and to create future innovations out of new grounds.

"Relevant and timely stimuli along the process from idea generation and selection to manufacturing, marketing, sales and after-sales are required to accelerate innovations. Basically, our global competitors in Asia and the United States don't have a better research or marketing, but they are faster in the implementation of their ideas. Shortening the time for commercialization of ideas is the most efficient source for future innovations and hence for future prosperity"

Prof. Dr. Dietmar Theis

Honorary Professor Technical University Munich

R&D Policy advisor of Siemens Board

"Combining recommendations about inclusion/diversity/gender (dimension 8) and the need to engage research in addressing societal issues in section (dimension 5) seems for stakeholders coming from feminist civil society and academia as an excellent way to address the shortcomings in the present framing of the European Research Area. Without the mobilization of the talent and ideas of the diverse intelligence in Europe in an atmosphere that encourages giving weight to issues of a sustainable and human future, the current resources present in the European Union will be squandered. It can only be hoped that the fine tuning proposed by the VERA will be followed with commitment".

Prof. Alison E. Woodward

Institute for European Studies

Department of Political Science, Vrije Universiteit Brussel

"Thanks for the invitation to comment on your comprehensive work. It was a pleasure to take part in the VERA workshop.

Comments on 'Strengthen the global influence of ERA'

"The competitiveness of ERA is measured on the global scale. The benefits of European integration are not self-contained they should be used for more strategic cooperation with third countries. Building on the work of the Strategic Forum for International Cooperation (SFIC) Member states and the Commission should work together closely to identify common interests and form an effective partnership vis-à-vis other nations".

Comments on 'Support knowledge co-creation and sharing'

"Knowledge co-creation is a dynamic driver for many aspects of ERA, especially regarding innovation. New electronic media and services fuel community-building, transparency, availability and synergies, and today's and tomorrow's digital natives in science and society will put them to the test. There will be more flexibility in funding, agenda-setting, data sourcing and peer review. Research systems should welcome this stimulus".

Andrea Grimm

EU-Bureau of the Federal Ministry for Education and Research

German Aerospace Center, Project Management Agency

European and International Cooperation

Selected comments from stakeholders after the VERA Focus Groups

"Simple and objective"

"Extremely enjoyable!"

"Next meeting in Tenerife!"

"Very fascinating discussions!"

"There were good networking opportunities"

"More attention to national priorities needed"

"Thank you. It was really enjoyable and useful!"

"You should try to use more visuals and cartoons"(*)

"The composition of groups stimulated discussions"

"It would be great to see the intermediate and final report"(*)

"Definitely entertaining! Please keep the momentum going!"

"The workshop was well-structured and interactive, dynamic"

"Overall, very engaging and interesting workshop. Thank you!"

"There are many challenges in bringing industry and research issues"

"Networking dinner was very relevant and useful in achieving its networking aims"

"I hope your efforts will continue and I, on behalf of my organisation, will be available to collaborate and support"

(*) The authors tried to address these comments in the preparation of this report by (a) including visualisations of the VERA Strategic Debates process and main results throughout the report, (b) using cartoons for the ERA key aspects and the policy bundles, and (c) sharing a draft of the chapter on *Participatory recommendations* (Section 3) with a selected group of VERA stakeholders to comment.

Annexe 08: Short description of the four VERA Scenarios

NOTE: The VERA team has produced four scenarios as part of the Work Package 3 activities led by the Fraunhofer Institute for Systems and Innovation Research in Germany. The VERA scenarios were used as 'food for thought' in the VERA Strategic Debates to stimulate stakeholder's thinking about policy options in several possible futures for ERA. For this reason, it is necessary to reproduce a short description of the VERA scenarios in this report, which is also available together with a short video at http://www.eravisions.eu/scenarios

On scenarios and ERA's future

Scenarios are simplified constructs that highlight different images of what the 'thing we care for' could look like in the future. The idea is not to produce 'pragmatic' scenarios, but to offer the users of such scenarios contrasted visions of the future that will enrich the way they think about how to act 'today'. The thing we consider is 'research and innovation activities'. Furthermore we have a dual focus: *geographically*, we focus on European level R&I activities; *politically* we are interested in the governance of these activities. The four VERA scenarios play with transition processes and future worlds of today's European Research Area (ERA), considering drivers and events which ultimately might lead to "less" or "more" coordination and integration of research and innovation activities at European level. As these future worlds are in their character quite different from today's ERA, the notion of "ERA" does not appear in the scenario texts.

Principal assumptions guiding all VERA scenarios

VERA scenarios are nested; that is, they are positioned within a global vision of Europe and of the world. In all exercises that deal with 'specific things', we have to take into account that the 'thing' that interests us is inserted in a wider context. The general trend in foresight analyses is to start from this global context, nesting the 'thing' within that context before presenting the different options we consider for it. A number of studies have, however, shown that specific 'things' can behave in similar ways, while being inserted in very different global scenarios of the future. We qualify our 'thing' – future Research and Innovation activities and governance in Europe – to be to a reasonable extent robust against global developments. Therefore we have made the choice to focus on the European R&I landscape per se, defining four very contrasted scenarios. Thus, we aimed at ensuring the internal coherence of each scenario. These scenarios take for granted three macro trends that are critical to explaining the landscape and the relative margins of manoeuvre of actors. We consider these trends to be present in all scenarios. In addition, we note that two drivers play a key role in the move towards one scenario or the other.

Three shared macro trends

1. Most foresight exercises insist about the existence of a multipolar world, where Europe is one pole and Asia or BRICS become a new rising pole. We fully assume this trend, and its assumption that we will witness the rise of new key countries in the global scene: the so-called 'dragons' (with Korea at the forefront), China and probably some of the other BRICS (Brazil, India) or even Indonesia. We still think that in this rebalancing Europe as an economic zone (or a market) will remain a major player. This means that we locate VERA scenarios in a persisting state of affairs where peace prevails at the global level.
2. We also endorse the view that the deepening of economic globalisation (goods, finance, IP and services) will continue into the future.
3. Whatever scenario prevails, climate change and global warming will become increasingly prevalent. The differences among scenarios lie in the way this challenge is addressed: how it handle in policy programming and used to justify resource allocations. Scenario 4 does indeed take it as the major driving force shaping the R&I landscape.

Two important drivers for differences in the scenario logics

1. **The role of the public finance crisis** in scenario shaping. Our scenarios take account of one major issue: whether Europe is over the public finance crisis in 2020. We have built two scenarios that assume Europe has the financial ability to address proactively the 'societal challenges' it has identified: scenario 2 makes a balanced effort between different societal challenges, while scenario 4 concentrates on the ecological transition. The two other scenarios take place in a constrained environment for public expenditure: scenario 1 recognises it and gives economic actors a wide responsibility in shaping directions, while scenario 3 corresponds to a fragmented search for solutions and the rise of local and regional answers.
2. **The rationale for societal progress**. Scenarios 1 and 2 reflect none or incremental changes in the way societies define themselves. The paradigm of growth and creating jobs prevails. In scenario 2 this has some qualifications as the addressing of societal challenges becomes prominent. VERA scenarios 3 and 4 correspond to two types of transitions: towards new definitions of progress ("human well-being" and "sustainability") and correspondent RTDI governance. They represent transformative structural changes.

Scenario 1: Private Knowledge – Global Markets

The Driving Force: In this scenario, the **after-effects of the global financial crisis** of 2008 are still deeply felt. As a consequence, the variety of approaches to recovery has led to locked-in growing inequalities between countries and regions within the European Union. So, the recovery from the crisis, a new period of growth and the creation of jobs are **the thrust** driving political and private action. The value of research is mainly to serve the economy.

Policy concerns: Public policy is therefore mainly concerned with boosting competitiveness. The consolidation of public budgets remains a major constraint. Public funding for research is limited and concentrated on basic research and future emerging technologies (FET).

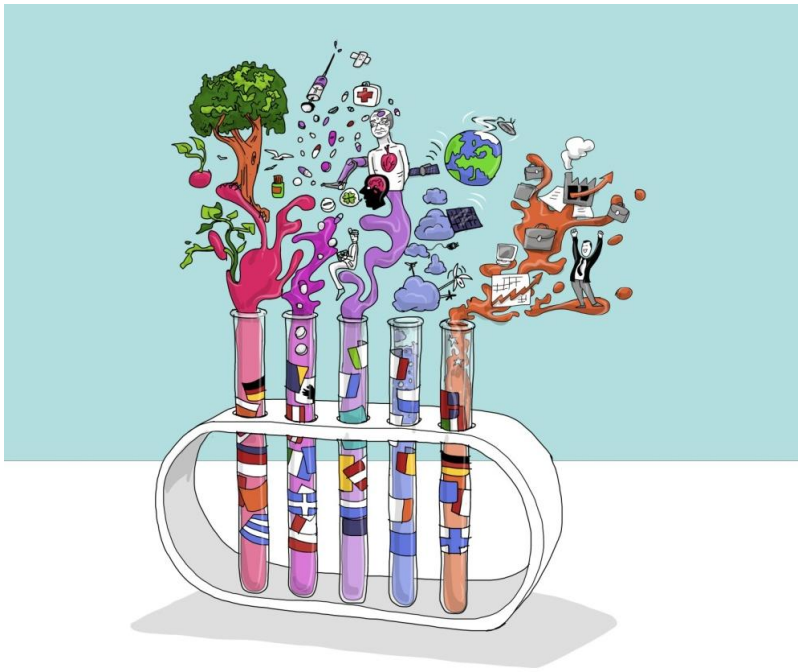
The Research and Innovation Landscape: The expenditure in research and innovation by companies and other private actors, in particular philanthropic organizations, amply outweighs public spending. Private actors are thus, de facto, able to define research priorities. The research landscape in Europe is mainly influenced by knowledge-intensive sectors that are concentrated in the stronger, globally interconnected regions. Here, research is being carried out as a specialized, globally distributed activity. Also, excellent science is located in science clusters with fewer and larger organizations, mainly universities, providing a cutting-edge science base. In fact, this scenario appears to be the only one where the excellence paradigm remains untouched.

European-level policies look quite different compared to 20 years ago. European Union bodies have established a regulatory framework supporting the innovation ecology with common structures for IP, standardization and public procurement. There are also coordinated approaches and collaborations among funding agencies, similar to the types of collaboration seen in the ERA-Nets, but more heterogeneous, involving national and regional public bodies and also NGOs. The number of states actually collaborating in such initiatives is rather small. Consequently, EU bodies have little to no power in setting research priorities or coordinate research funding.

Addressing Societal Challenges: The re-sectoralization of European policies hampers coordinated approaches to societal challenges. However, societal challenges can still be addressed in this scenario, thanks to the funding of philanthropic organizations, and public-private partnerships, or as the result of collective experiments bringing together concerned groups and local actors. Major concerns addressed are energy transition and health issues.

Europe in the world: International and global agreements about framework conditions, e.g. for IP or standardization, are pursued by the European institutions whenever perceived to be advantageous to the interests of European corporations.

Scenario 2: Societal Challenges – Joint Action



The sense of urgency has been **the driving force** of this scenario. Various causes are behind this sense of urgency, among them a shortage of energy provision, military conflict right on the borders of the European Union, and alarming developments as regards climate change or disease pandemics.

The thrust: To maintain the way of life in Europe, European States have become increasingly open to collective action. This is accompanied by **recovery from the 2008 financial crisis**. As Europe struggled over the years to emerge from that crisis, it has achieved a high degree of tax harmonization to battle against tax avoidance and tax optimization, particularly by large multinational firms.

The political will for **Joint Action at European level** grew over the years and has crystallized in thematic cooperation to tackle societal challenges. Decisions about these collaborations were first made at the intergovernmental level (the Council), where the debate around societal challenges focused on economic considerations, mainly on how to boost industrial leadership. This resulted in a variety of thematic joint actions bringing together, not only national governments, but also "hot-spot" regions and knowledge hubs. However, as claims from political parties and NGOs became more insistent, a new institutional framework was installed for the identification and selection of societal challenges, which were to be addressed by joint European action. This framework rests upon legitimation processes under the aegis of the European Parliament. So, overall the European institutions have become key players: The major part of decisions about policy priorities and programming takes place between the Commission, the Council, and the Parliament.

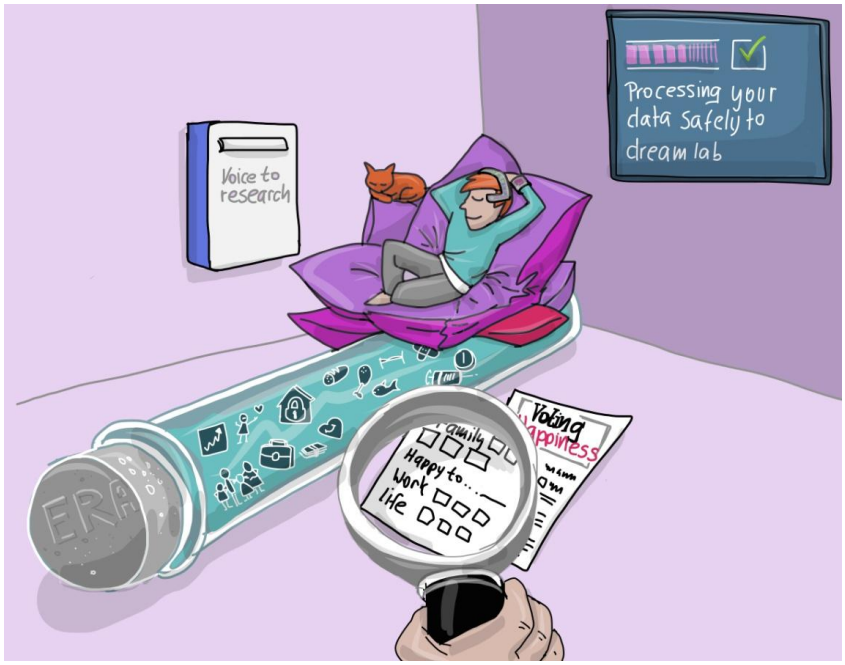
The Research and Innovation Landscape: The Joint Actions emerge as large programmes with large public investments in research and development addressing societal challenges. NGOs and other civil society organizations contribute to the funding and performance of these programmes. The RTDI system in Europe offers various promising career prospects for researchers, including better opportunities for women. With the main **policy concern** focusing on **addressing societal challenges**, the publicly funded pursuit of frontier research becomes embedded into this paradigm. Programmes addressing Societal Challenges embrace Health issues (e.g. pandemics, prevention), the security and sustainability of energy provision, and climate change.

Europe in the world: European-level networks and programmes are working towards linking up with or building new international alliances where the challenges need to be addressed at global level.

Scenario 3: Solutions apart – Local is beautiful

The driving force: Major political scandals, in particular data scandals, and the inability of policy to cope with the **lasting financial crises** have spawned a rapid growth of mistrust in higher level policy making. This has been speeded up by social movements supported by widespread internet use.

The thrust: The inability to collaborate leads to a local handling of societal challenges. The major **policy concern** is to address challenges (even when perceived to be global) in a manner which benefits the municipality and its citizens.



The societal paradigm which influences the attitudes towards science and technology is about progress in lifestyle and self-optimisation rather than problem-oriented solutions. The attributes of the European lifestyle are valued elsewhere in the world with non-European firms and organizations settling in Europe in order to both learn and benefit from the local quality-of-life attributes. Socio-economic value creation indicators are extended to include a quality of life index (e.g. including gender equality, personal-data privacy and a contentment-quotient). With the diverging societal rationales between Europe and the rest of the world, Europe also becomes a desired place to settle.

Research and innovation activities have a profoundly different function compared to 20 years earlier: Scientific knowledge is broadly seen as just one among many sources of knowledge, including practitioner, lay and indigenous, that can contribute to the development of local solutions. The open, heterogeneous research and innovation landscape provides opportunities for close links between scientists and society around micro/regional level activities. Citizens invest in such activities and take the initiative to become involved at the micro-level. Issues addressed by these activities (as they are in fact not being debated as **societal challenges**) are smart cities, local energy production, public health and prevention, or local food production and distribution systems.

The role of **European-level policies** is substantially re-defined to providing infrastructures as well as platforms for exchange of good practice and for learning.

Europe sees its **role in the world** in a Switzerland-type manner: having its own agenda and reluctant to intervene in any matter that is not of direct concern, and only developing ad-hoc relations when judged useful.

Scenario 4: Times of Crises – Experts at the Wheel

The driving force of this scenario is the onset of dramatic climate catastrophes with important effects on the environment and eventually our health and way of life. These disruptive forces are levers of deep societal transformation.

The thrust: As a consequence, the growth paradigm is completely replaced by a new sense of "deep sustainability" on which all economic, political and societal activities are based. The full **recovery from the economic and financial crises** of the early years of the Century supports these developments. Mitigation and adaptation to the effects of the crises are the main **policy concerns**. Experts working in understanding environmental phenomena and anticipating its dynamics gain substantial power and responsibility in policy processes, as policies rely strongly on scientifically produced evidence.

At the same time, the **research and innovation landscape** has become more diverse, opening up to cross-disciplinary collaborations and unconventional initiatives to collaborate with societal actors. Large research programmes are in place to boost mitigation and adaptation from different angles – ranging from breakthrough-driven research to speeding up the innovation process. As sustainability research evolves into a mainstream activity, comparable to the widespread acquisition of management skills decades before, the researcher base in sustainability-related fields expands significantly, integrating larger numbers of women, retired persons, and those living in remote areas.

Addressing Societal Challenges: Under the overarching goal of mitigation and adaptation to the effects of the climate crisis, several other challenges are addressed, including urban management, energy provision, new forms of housing and mobility, food production and circulation and many more.

European-level policies: Facing the climate crisis, a political choice was made to delegate the strategy and programming of mitigation and adaptation efforts to the European level, where the involvement of experts in the policy processes is managed by re-vitalizing the Commitology system within the European Commission.

Europe in the world: The sustainability rationale is adopted around the globe, but at different speeds and in a variety of ways. Numerous collaborations are in place for joint action, and Europe operates a large aid programme for those regions lagging behind.

Annexe 09: List of ERA priorities and aspects supporting VERA Focus Groups

ERA 2013 priorities	ERA aspects	Highlighted issues
1 Increasing the effectiveness of national research systems	ERA 01.1 Ensure coherent and stable public research funding	• Budget cuts are mostly affecting research performing organisations with short-term consequences, as the reductions in researchers' salary or temporary interruptions of R&D support measures. However, budget cuts and interruptions may have long-term implications in some countries.
	ERA 02.1 Promote project and performance based research funding	• At least 21 Member States have provisions to link part of, or all their institutional funding with competitive calls for projects and research performance in order to increase the efficiency and effectiveness in public spending.
	ERA 03.1 Define national research and innovation strategies	• In 21 Member States a strategy for R&D as well as innovation has been adopted. In some cases they are including measures which address the objectives of the ERA priorities.
	ERA 04.1 Use peer review criteria /ex-ante evaluation	• The majority of Member States increasingly apply the core principles of international peer review, i.e. work evaluated by professionals of analogous competence to the author. Some Member States also use foreign peer reviewers to seek greater independence in evaluations, or to raise domestic standards.
	ERA 05.1 Develop Smart Specialisation strategies	• Smart specialisation is aimed to boost regional innovation, in order to achieve economic growth and prosperity, by enabling regions to focus on their own strengths. • In dealing with Grand Challenges going beyond national borders, trans-national coordination and policies are needed. Smart Specialisation is a mean to ensure an entry point in this process while also safeguarding local interests.
2 Optimising transnational co-operation and competition	ERA 06.2 Foster transnational cooperation	• Transnational cooperation is increasingly supported by the EU R&D Framework Programmes. Dealing with Grand Challenges requires coordination at multiple levels, joining of efforts and effective use of resources.
	ERA 07.2 Implement compatible rules for transnational cooperation	• Compatible national funding rules to make transnational cooperation more effective are implemented by at least nine Member States. It would make more efficient the use of EC funding instruments.
	ERA 08.2 Harmonise access to Research infrastructures	• The conditions for cross-border access to research infrastructures are not always harmonised amongst Member States. This makes trans-national collaboration ineffective while also causing fragmentation and duplications of research efforts.
3 Promoting an open labour market for researchers	ERA 09.3 Improve recruitment processes	• European universities and Research Technology Organizations have reviewed their recruitment processes through programmes which aim to turn the rigid and bureaucratic procedures of the past into more transparent, open and flexible procedures based on meritocracy and excellence.
	ERA 10.3 Improve attractiveness of researchers' careers	• Member States continue to support the implementation of the Code and Charter, i.e. the researchers' roles, responsibilities, rights, recruitment and merit recognition processes, to improve researchers' working conditions. As of June 2013, more than 480 organisations from 35 countries in EU and beyond have endorsed the principles.
	ERA11.3 Increase researchers mobility	• Around 31% of EU post-PhD researchers have worked abroad (EU or worldwide) as researchers for more than three months at least once during the last ten years. • 80% of mobile researchers believe mobility had strongly increased the advancement of their research skills and 62% the quality of their publications.
4 Improving circulation, transfer and access to scientific knowledge	ERA12.4 Achieve open access to publications and data	• Almost all Member States have set up the legal and administrative context in support to provide on-line access to scientific information that is free of charge to the end-user. • The EC launched actions to support MS networking on Open Access and to train researchers.
	ERA13.4 Promote knowledge transfer	• Throughout the EU a strong emphasis is put on the development of capacities and skills in research performing organisations, whereas the development of knowledge transfer strategies has not yet received the same support. • National measures are still fragmented, which hampers overall open innovation and knowledge transfer efficiency. The EC is developing a comprehensive policy on Open Innovation and KT, and will consult stakeholders in 2014.
	ERA14.4 Reinforce digital ERA	• A digital ERA will facilitate seamless online access to digital research services for collaboration, computing and accessing scientific information (e-Science) and to e-infrastructures. • Seven countries support a wide range of actions and at least fourteen other Member States are partly promoting some necessary measures. At least eleven Member States have some provisions for the implementation of electronic ID for researchers.
5 Fostering gender equality and gender mainstreaming in research	ERA15.5 Encourage gender equality	• In Horizon2020, the EC is committed to promote effectively gender equality and the gender dimension in research content, including them in its programmes. • The EU provides support to universities and research organisations to set up and implement gender equality plans. Up to December 2013, eleven projects were funded involving around seventy research organisations and universities.

Annexe 10: List of multi-level recommendations of the ERA Open Advice report

The following list of recommendations has been inspired by either today's ERA context or the four VERA scenarios (see Annexe 08). Two important remarks should be made: firstly, while all recommendations have been edited and peer-reviewed, the essence and key ideas from stakeholders' insights have been kept; secondly, the "mapping" of recommendations against today's context (**T**) or VERA scenarios (**S1**, **S2**, **S3**, **S4**) simply indicates that the specific 'ERA key actions' were "inspired" by discussions about these settings. This does not mean that a given *ERA key action* mapped against S2 and S4 (e.g. *Go beyond mere analyses of EC instruments, and move towards systematic analyses of national research and innovation systems co-existence*) is not relevant for today's context. Instead, it means that "thanks" to these scenarios, R&I stakeholders thought about the need for such ERA action.

In other words, the table could be used as an "open access" tool for those who would like to know more about the type of context or vision that triggered the recommendations in sections 3 and 4 of this report, where T = today's context; S1 = Scenario 1; S2 = Scenario 2; S3 = Scenario 3; S4 = Scenario 4. In addition, the table includes the following coding for those ERA key actions that were used to build ERA Policy Bundles in section 4: **SD1** = included in the FG-based reflections bundle; **SD2** = included in the Symposium-based reflections bundle; **EXC** = included in the excellent science lens-based bundle; **IND**= included in the industrial leadership lens-based bundle; and **SOC** = included in the societal challenges lens-based bundle.

		T	S1	S2	S3	S4
R1. Boost research and innovation synergies						
1.1.	Broadening ERA into a European Research and Innovation Area					
	Go beyond mere analyses of EC instruments, and move towards systematic analyses of national research and innovation systems co-existence.			S2		S4
	Improve Innovation Union flagship with a wider vision of innovation, which includes organizational and social aspects, i.e. not focusing exclusively on technological approaches.	T				
	Promote more synergies between research and innovation in Horizon 2020, but not to the detriment to stable – and even increased – funds for basic research.	T				
	Explore and promote the use of public and joint procurement to accelerate innovation by developing more flexible regulations that focus on targets rather than specifying processes, thus supporting initiatives that genuinely incorporate innovation rather than staying within the status quo.	T				
1.2.	Implementing more effective innovation funding instruments					
	Promote financial instruments that provide venture funding and advisory services for projects and companies dealing with complex innovations in unproven markets, especially in areas linked to grand societal challenges.			S2		
EXC	Take on some of the R&I financial risks, e.g. sponsoring high risk research or challenge-oriented innovations, and provide back-up guarantees, e.g. facilitating so-called "subordinated loans" as a way of reducing investment uncertainties.		S1	S2		
	Encourage SMEs to invest in new R&I capacities by creating instruments such as tax incentives, e.g. making it more attractive to support part-time MSc and PhD studies and placements.		S1	S2		
	Create new 'insurance schemes' that may be capable of safeguarding SMEs R&I investments.		S1			
1.3.	Shortening the transition from invention to innovation					
IND	Support disruptive and transformative innovation by developing new regulatory frameworks that focus on solutions needed rather than on the processes to achieve them.			S2		S4
SOC	Make systematic use of horizon scanning to identify emerging innovation opportunities worldwide and support their piloting, implementation and scaling-up across MS.			S2		S4
	Promote the creation of common spaces for innovators, sponsors and beneficiaries to interact at their earlier stages R&I projects.		S1	S2		
1.4.	Using IP supporting strategies for innovation					
	Counterbalance the private sector ownership of IPR with new strategies that allow the public to share the IPR resulting from EU funded R&I.		S1			
1.5.	Boosting industry-academia R&I cooperation					

		Increase and improve labour exchange programmes and shared mission-oriented R&I platforms.		S1		S3	S4
		Develop new legislation, e.g. harmonising incentives policies, that supports and reinforces the linkages between research and industry.	T				
	1.6.	Embracing open innovation strategies					
		Create framework conditions in the EU and MS to better enable open innovation across Europe, e.g. brokering multi-disciplinary skills and perspectives.		S1	S2		
		Promote small-scale innovation projects that are driven by citizens, focused on local problems, facilitated by technology and integrated in daily life, e.g. "internet of things solutions".			S2		S4
	1.7.	Stimulating entrepreneurship					
		Promote dissemination and training programmes that feature successful close-to-market support for SMEs and businesses at local, regional, national and EU levels.	T				
	SD2	Encourage MS to share their best practices on promoting entrepreneurship and implementing universities third-mission strategies.			S2		
	SD1	Reinforce the entrepreneurial perspective among researchers so as to facilitate the creation of knowledge-intensive and technology-based start-ups and spin-offs.	T	S1	S2		
		Develop new instruments that strengthen and interconnect business incubator agencies across MS.	T				
		Promote synergies between the Entrepreneurship Action Plan (EAP) and Research and Innovation Action (RIA) activities, e.g. by providing entrepreneurship advice and training to initiatives aimed at exploring the feasibility of innovations.	T				
		Launch new RIA and Coordination and Support Actions to advance and disseminate knowledge on best practices for, and success stories of, for example, RIA-based spin-outs.	T				
R2.	**Strengthen the global influence of ERA**						
	2.1.	Enhancing ERA coordination for global cooperation					
	SOC	Promote international cooperation through more open mechanisms, e.g. by enlarging Joint Programming Initiatives to non-EU countries based on international variable geometry.	T	S1	S2	S3	S4
		Promote international cooperation as an end in itself, enabling researchers to cooperate with the most appropriate partners for their research programme, or facilitating cooperation to achieve a certain research outcome more effectively and to achieve efficiency gains.			S2		S4
	EXC	Encourage MS to open national R&I programmes to international partners, so as to enable co-funding on a reciprocal basis.	T		S2	S3	S4
	SD2	Rethink pan-European cooperation networks by including local and lay knowledge and by adopting flexible and open forms that facilitate a better understanding of social and crosscutting global problems.					S4
	IND	Create financial instruments and incentives to make global R&I collaboration easier for European SMEs, and to attract other SMEs to Europe.		S1	S2		
	2.2.	Intensifying dialogues with emerging and developing economies					
		Support research and innovation activities in less advanced countries so as to contribute to the creation of knowledge hubs and realisation of the potential of their best researchers.		S1	S2		
		Develop specific plans to integrate R&I with international aid programmes.					S4
		Support the modernisation of emerging economies industrial practices, especially those recognised as harmful or unsustainable.					S4
		Set up new university branches in third countries and promote more visiting professors and researchers.	T				
	2.3.	Optimising funding of, and access to, research infrastructures					
		Put world-class research facilities to the service and benefit of the whole international community in order to encourage global cooperation and project a stronger image of the EU.	T				
	SD1	Develop easy, transparent, and open procedures to facilitate a more effective and intersectoral use of EU research infrastructures.	T				
		Develop new e-RIs as a means of boosting the EU's global visibility.	T				
		Define strategies to encourage the public-private sharing of operational and maintenance costs of research infrastructures.		S1	S2		
R3.	**Promote smart R&I evaluation**						

	3.1.	Reinforcing the role of evidence and transparency in R&I policies					
		Push for more evidence-based decision-making, underpinned by EU-wide evaluation and monitoring standards, and supported by more reliable, standardised and comparable data.					S4
		Include evidence and transparency as key criteria in the evaluation of both policy formulation and R&I performance.				S3	S4
		Increase transparency in the use of research data by policymakers, e.g. through explicit references or even acknowledgements to specific R&I data, outcomes - or both - in policy documents.	T				
		Define new criteria and procedures to track how 'evidence' - produced by R&I performing actors - has been used by R&I policymakers for both policy formulation and implementation.	T				
		Evaluate data sharing initiatives when assessing research performance.	T				
	3.2.	Assessing R&I impacts more flexibly and comprehensively					
		Allocate funds more strategically towards projects with a clear impact - considered not only from the economic point of view but also from the perspective of social and environmental benefits.	T				
	SOC	Open research evaluation to other areas and DGs with R&I competences.			S2		S4
		Involve citizens and societal groups in ex-post evaluations of R&I activities with expected social and economic impacts.				S3	
		Anticipate and articulate the potential impact of research projects through ex-ante approaches – by requesting impact assessments, proofs of concept or strategies for pilot applications – instead of being predominantly based on the past performance of the grant applicants.					S4
	3.3.	Promoting peer review in evaluation of excellence and relevance					
	IND	Promote the evaluation of excellence, through peer review or self-evaluation, in order to enhance international R&I competitiveness, and as a driver for the modernisation of the R&I system.	T		S2		
	EXC	Promote the evaluation of R&I relevance in peer review, which should be supported by clearer assessment targets and by a broader ex-ante evaluation that takes into account scientific, technological and social implications.			S2		S4
		Foster interdisciplinary and international evaluation practices to assure a more coherent and fit-for-purpose evaluation system that is based on excellence and relevance.			S2		
	SD2	Shift from objective-based to performance-based evaluation of R&I institutions and programmes.			S2		
		Include citizens to play a supportive role in peer review 'committees' for the assessment of new societal relevance criteria in ex ante, accompanying and ex post evaluations.				S3	S4
		Start rolling out new methods and criteria that capture societal impact and the contribution that research organisations and research activities have made.					S4
	3.4.	Evaluating and monitoring citizen-science initiatives more sensitively					
		Consider citizen-science evaluation as a 'service' aimed at supporting R&I initiatives by sharing good practices and identifying areas for practical improvement.	T				
	SD1	Define proper metrics and indicators, based on representativeness, inclusivity and transparency, to measure R&I societal impact and evaluate the effectiveness and relevance of citizen participation in science.	T			S3	
		Promote the inclusion of citizens and other R&I stakeholders' perspectives, beliefs and actions in R&I proposals in order to improve ex-ante evaluations, and to allow a better monitoring of changes, e.g. levels of engagement, expectations and mutual learning achieved.				S3	
		Reinforce R&I ex-post evaluations by including citizens and stakeholders' perspectives and expectations.				S3	
R4.	**Improve the governance of the EU R&I system**						
	4.1.	Exploring synergies between R&I and other funding programmes at the EU level					
	SD2	Explore future reconfiguration pathways of the European R&I system, by looking at changes in the socio-economic landscape, envisioning its impact on R&I governance at national, regional, and local level, and analysing its implications on potential EU programmes complementarities.			S2		
		Integrate the European regional policy with R&I funding initiatives, e.g. connecting the ERDF programme with Horizon 2020.	T				
		Look for synergies between ERA and those ESF activities focused on EU education programmes.	T				

		Implement more standardised funding and evaluation rules at EU level.	T				
	4.2.	Improving the coordination of national R&I strategies					
		Encourage Member States' policy makers to take into account current EU priorities when defining their national R&I agendas, since they will have the local knowledge required to establish how national and EU concerns actually align.	T				
		Make a more systematic use of strategic intelligence instruments like foresight and other forward-looking activities to help put together national priorities, and to analyse and agree on coordinated actions in the long term.	T		S2	S3	S4
	4.3.	Raising European competitiveness through research and innovation					
		Promote the participation of companies in sectors of high transnational competition, while facilitating in other strategic areas the participation of R&I firms in global partnerships.	T				
		Create instruments and incentives to facilitate cross-border research in SMEs and attract foreign companies.		S1	S2		
	IND	Promote the use of roadmaps and other technological intelligence instruments to realise the potential of EU industries.		S1	S2		
	SD1	Formulate stronger mission-oriented R&I policies to support sustainable growth of European technological capacities, especially with regard to start-ups and SMEs.	T		S2		
		Foster a strategic participation of public funding in private research initiatives, e.g. by investing in excellent RTDI private institutes.		S1			
	4.4.	Supporting R&I stakeholder dialogues					
		Promote a more active dialogue between and with stakeholders during national and regional R&I agenda-setting processes.		S1	S2		S4
		Develop interfaces that facilitate a better science-policy mutual understanding as well as the involvement of more scientists in projects selection and capacity building.				S3	
		Develop policies that reinforce R&I actors' communication and interaction, thus connecting research institutions more effectively and linking up R&I programmes more strongly.					S4
		Improve existing ERA instruments to permit key stakeholders and society representatives to be heard, to interact, and eventually take over the driving seats, thus leaving to ministries the exclusive role of providing financial support.			S2	S3	
	4.5.	Reducing and simplifying EU R&I bureaucracy					
		Make EC regulations more flexible and better aligned with the EU business activities.	T				
		Simplify the bureaucratic burden of entrepreneurship processes.	T				
		Simplify R&I reporting systems and auditing processes.			S2		S4
	4.6.	Sustaining research and innovation funding					
		Develop mechanisms to facilitate and stimulate research crowd-funding and philanthropy initiatives.				S3	S4
	EXC	Promote a mix of goal oriented (application-driven) and knowledge oriented (curiosity-driven) funding to guarantee the sustainability of fundamental research.		S1	S2		
		Reinforce public funding of research with EU funds from other policy areas, especially when R&I results also feed into those areas.	T				
		Facilitate public-private actors' agreements on joint R&I funding, thus mutually contributing to the stability of funds and the sustainability of research activities.	T				
		Create mechanisms capable of 'returning' some of the benefits of science-driven innovations back into science funding, e.g. successful spin-outs co-sponsoring PhD or MPhil research in areas related to their innovations.	T				
	4.7.	Setting R&I agendas collaboratively					
		Increase the involvement of R&I actors in the R&I agenda definition, in order to avoid policies being disconnected from real societal and local priorities.	T	S1	S2	S3	S4
	SOC	Promote future-oriented and multi-stakeholder participatory processes that facilitate the bottom-up definition of common long-term challenges and research agendas.			S2		S4
		Support the decisions on participation on transparent and rational criteria that balance breadth of inclusion with maintaining and even upgrading the effectiveness of the decision making and agenda setting process.	T				
		Establish participation rules and procedures that ensure the avoidance of overly narrow or lopsided foci, or the capture of funding arenas by strong interest groups.	T				
		Organize advice-bodies for identifying new long-term research issues and high risk challenges, e.g. proposing investments in fields that industry will not target.		S1			
		Promote open calls in R&I funding so as to allow stakeholders to put forward less explored and sometimes more impactful areas of research.			S2		

R5. Foster relevant science-society engagement							
	5.1.	Encouraging 'sustainable' responsible research and innovation (RRI)					
	IND	Develop platforms (institutions and networks) as well as mechanisms and tools (communication channels and interfaces) capable of supporting truly participatory RRI processes.	T		S2		
		Increase the legitimacy of R&I processes and outcomes by including transparency, endorsement and multi-stakeholder participation as key features of sustainable RRI.					S4
	5.2.	Engaging society in science and R&I policy decisions					
		Create mechanisms that allow citizens to co-define R&I agendas, participate in capacity building activities linked to these agendas, and contribute to the generation and analysis of relevant societal insights.	T		S2		S4
		Foster an effective citizen-science that is based on well-defined research problems, promotes training and expertise of the crowd, and creates interfaces that facilitate citizens' access to data.			S2		
	SD2	Promote the professionalization of science communication so as to increase citizens' engagement in R&I processes.				S3	
	SD1	Promote the utilisation of crowd-funding in order to ensure a more direct participation of societal actors in R&I projects.	T				
		Require R&I proposals submitted under H2020 or national programmes to include citizen engagement initiatives.			S2		
	5.3.	Elaborating R&I-oriented education and social awareness strategies					
		Reinforce and interconnect education policies at all levels to regain the trust of society in science and research.		S1	S2	S3	
	EXC	Elaborate education and communication platforms that enable citizens to access relevant scientific knowledge and share qualified opinions on the value of excellent science.		S1	S2	S3	
		Restructure education programmes so as to increase awareness about the need for more consciousness about grand challenges oriented and associated careers.			S2		
	SOC	Enlighten citizens about the opportunities (and limitations) involved in developing collective responses to grand challenges, as well as highlighting the benefits and satisfactions of pursuing scientific and engineering careers.	T		S2		
		Develop collaborative R&I skills in individuals by promoting student mobility and exchange initiatives similar to the EC's Erasmus and Marie Skłodowska-Curie programmes in Secondary education programmes.	T				
		Re-orientate universities' third mission so as to value social impacts at least equally to economic and scientific impacts.	T				
R6. Develop attractive and impactful research careers							
	6.1.	Facilitating cross-border mobility of researchers					
		Create integrated 'packages' for researchers - designed from a long-term career projection perspective – that include not only research grants, but also job contracts and mobility supporting schemes.					S4
		Promote family friendly policies whereby any researcher expatriation plan incorporates solutions for covering an eventual partner's loss of salary or possible relocations, e.g. 'dual careers'.	T				
	SD1	Identify and promote better models for organizing research work in a family-friendly manner, e.g. by encouraging universities and research centres to provide free or economical services for child-care on their premises.	T				
		Establish a funding compensation system between countries that ensures an extended (and justified) researcher's stay in a host institution when the project funding in that institution is over, thus facilitating further research.	T				
	6.2.	Enabling impactful exchange of researchers between academia and industry					
		Review university policies as regards the strengthening of industry engagement, in order to create a better understanding and awareness (especially in PhD education) of industrial research opportunities and needs.	T				
	IND	Improve the financial support for the researchers' cross-sectoral mobility transition costs.			S2		S4
		Recognise and reward researchers' commitment to mobility and knowledge exchange with industry, e.g. through improvements in salaries or promotion prospects.	T				

	SD2	Foster academia-industry R&I joint initiatives in order to introduce a more practical problem-solving and close-to-market perspective into researchers' careers, increasing their orientation to innovation.		S1	S2		
		Establish public-private partnerships between academia and industry, in order to achieve the required critical mass to confront societal challenges.			S2		
	6.3.	Achieving an open and cohesive labour market					
	EXC	Facilitate more attractive research careers in EU public organisations, in terms of stability and security, longer term contracts, portability of grants, and the roll out of tenure track.			S2		S4
		Encourage a more active use of EURAXESS to ensure that most EU academic jobs are advertised internationally.	T				
		Create and promote more transparent mechanisms in research recruitment, e.g. using comparative benchmarking and monitoring indicators.			S2		
		Identify and disseminate 'good academic practices' regarding recruiting and mobility in research careers.	T				
		Create auditing bodies to supervise and guarantee the quality of R&I recruitment procedures.	T				
		Increase the participation of international R&I members in recruiting panels.	T				
	6.4.	Harmonising careers and training programmes					
		Transform rigid and exclusive models of higher education into more flexible schemes - ones that include, for example, more possibilities for shifting between career paths, and a wider offer of disciplines, including less conventional and transdisciplinary studies.	T				
	SOC	Promote a gradual shifting in the promotion of researchers towards taking more account of impact and relevance of research alongside quality as traditionally understood.			S2		S4
		Develop a European Researcher Career programme that includes more efficient training programmes for researchers at the EU level.	T				
R7.	**Support knowledge co-creation and sharing**						
	7.1.	Developing a knowledge co-creation ecosystem					
	EXC	Set up multidisciplinary communities and structures where researchers can develop bottom-up initiatives, thus complementing those directions marked by grand challenges.	T		S2	S3	S4
	SOC	Broaden the spectrum of disciplines that directly participate in grand challenges research, especially social sciences and humanities.	T		S2		
		Embed into schools and universities those traditional disciplines that promote and enable generation of knowledge from multiple perspectives and critical reflection on contemporary issues, e.g. Ethics and Philosophy.					S4
	7.2.	Fostering knowledge sharing and transfer					
	SD1	Engage industries in the development of innovation-oriented university curricula, professorships, and exchange programmes.	T	S1			
	SD2	Promote a more effective dissemination of research findings across Europe by encouraging research funders to take into consideration how the results of their funded projects could benefit broader stakeholder groups.			S2		
		Train knowledge transfer agencies to improve cross-country cooperation, e.g. by enabling them to take into account country-specific and cultural differences.	T				
		Increase the effectiveness of conventional knowledge sharing channels such as scientific and professional publications, workshops and conferences, e.g. through improved digital research services.	T				
	7.3.	Adopting broader open access practices and policies					
		Encourage and facilitate open, timely and long-term access to qualitative and quantitative research findings, as well as to the research processes that facilitate the results.	T	S1	S2	S3	S4
		Ensure the access to data supporting research, so as to guarantee the quality of publications, facilitate more informed opinions on that research, and preserve its integrity and reliability.	T				
		Enforce existing data protection rules, to ensure that broader open access policies will not give rise to a violation of personal and institutional data privacy.	T				
		Promote a more collaborative approach to open access within universities to make access to data from within and outside the University easier, e.g. by fostering dialogue and debate among librarians, researchers and university leaders.	T				
	7.4.	Standardising and utilising digital research platforms					

	IND	Build greater awareness and provide more intensive training of industry, policy and society actors about the use of digital technologies, in order to realize the potential of e-infrastructures as channels for transferring knowledge across sectors and countries.	T			S3	
		Foster the digital reinforcement and expansion of EC collaborative initiatives like Knowledge and Innovation Communities.	T				
		Enable digital platforms to better support the identification of, and dialogue with, potential R&I partners across Europe.	T				
		Promote a 'digital shift' in all the EU universities, in order to foster digital catching-up processes that reduce IT gaps between institutions.	T				
		Develop programmes for improving the digital skills of researchers, students and teachers, and the utilisation of new social media instruments in academia.	T				
R8. Achieve gender equality and social inclusion in R&I							
	8.1.	Putting in place and implementing appropriate gender equality measures					
	SD2	Reinforce gender regulation for taking into account not only career and employment aspects, but also the implication that gender equality has on research and science excellence and relevance.			S2	S3	S4
	IND	Create gender equality measures that recognise the relevance of equality for R&I industry strategies, especially in SMEs.	T			S3	S4
		Strengthen EU monitoring processes to better assess the progress and effectiveness of EU-funded long-term gender equality measures.	T				
		Develop Education policies to raise awareness about gender problems and to avoid the predominance of male-oriented models of work-life balance.	T				
	SD1	Shift from schemes driven by exclusively gender objectives, to more effective and formally based assessment of institutions, including rewards for organizations that show a high commitment and performance on gender equality.	T				
		Foster gender equality and diversity initiatives at the international level so as leverage change in other non-EU countries.	T				
	8.2.	Involving disable and vulnerable groups in R&I					
		Review MS regulations and actions that affect disabled and vulnerable groups, especially those concerning equality actions for R&I employment.	T				
		Consider the participation of disabled and vulnerable groups from the initial stages of the research design and accommodate these groups in those roles and phases of the research process where their contribution is more valuable.	T				
	EXC	Introduce a specific Horizon 2020 cross-cutting issue that build on the advantages of social inclusion to tackle societal challenges and to take advantage of the entire 'talent pool' in Europe, e.g. disabled, aged.	T		S2		
		Foster synergies between H2020 and the 'Employment and Social Innovation' programme in order to increase the use of existing microfinance opportunities by vulnerable groups.	T				
	8.3.	Including multicultural perspectives in R&I programmes					
	SOC	Create favourable conditions in Europe for R&I to draw on the insights stemming from different cultures and societies.	T			S3	
		Enhance Education programmes by including more initiatives to raise awareness, and inculcate values, of inclusiveness.	T				
R9. Reinforce ERA regional and local outreach							
	9.1.	Accelerating regional cohesion through R&I					
	SD2	Maximize upstream synergies between R&I funding and structural funds in order to develop regional R&I capacities.			S2		
		Identify and exploit downstream synergies between R&I funding, structural investment, and competitiveness-oriented financial programmes.	T				
	IND	Intensify R&I regional efforts on those emerging areas where regions have strong capabilities.	T		S2	S3	
		Establish the relevance of the 'grand challenges' agenda for the regions - so as to orient R&I efforts to relevant areas and existing strengths.			S2		
		Build foresight capabilities in regions, in order to design and implement truly forward-looking roadmaps capable of unleashing their real and often hidden R&I potential.		S1	S2		
		Maintain Smart Specialisation Strategy as a precondition to access European Structural and Investment Funds.	T				
	EXC	Orientate regional specialisation efforts towards a better utilisation of existing regional R&I infrastructure and knowledge base.		S1	S2	S3	

	SD1	Promote a better involvement of business actors in the definition and implementation of smart specialisation agendas.	T				
9.2.	Strengthening the role of regions in ERA						
	SOC	Create mechanisms to better identify the regional diversity of local problems and needs, so as to grasp how national, European and global challenges are interpreted and experienced differently across regions and transregional spaces.			S2	S3	
		Give regions more prominent positions in the definition of R&I priorities at national and EU levels, e.g. EU societal challenges.			S2		
		Complement Smart Specialisation with internationalisation strategies that, based on variable geometry principles, avoid the eventual isolation and exclusion of regions with a lack of technology-intensive sectors.			S2		
		Develop new instruments and indicators to monitor ERA regional progress.	T				
		Promote new modes of multi-level joint funding, whereby the relative importance of the national level would give way to an improved role of regions (and cities) with policy and funding capabilities.			S2		
		Strengthen the role of regions in multi-level governance structures, e.g. Joint Programming initiatives.				S3	
9.3.	Increasing interregional R&I cooperation						
		Develop strategies that combine 'complementarity' actions, based on synergies between existing regional and R&I programs, with 'solidarity' actions, which require solidarity initiatives as a prerequisite for high-performing regions to apply for Structural funds.		S1	S2		
		Elaborate indicators to measure and monitor the intensity and impact of EU regional R&I cooperation.	T				

Annexe 11: List of acronyms

BRICS	Brazil, Russia, India, China and South Africa
CIP	Competitiveness and Innovation Programme
COSME	Competitiveness of Enterprises and Small and Medium-sized Enterprises
EAP	Entrepreneurship Action Plan
EaSI	Employment and Social Innovation
EC	European Commission
EU	European Union
EIB	European Investment Bank
EIP	European Innovation Partnership
EMM	ERA Monitoring Mechanism
ERA	European Research Area
ERIA	European Research and Innovation Area
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds
ETP	European Technology Platforms
ERC	European
FET	Future & Emerging Technologies
FP	Framework Programme
FTI	Fast Track to Innovation
H2020	Horizon 2020
IP	Intellectual Property
IPR	Intellectual Property Rights
JPI	Joint Programming Initiative
JTI	Joint Technology Initiatives
KIC	Knowledge Innovation Community
LEIT	Leadership in enabling and industrial technologies
MS	Member State
MSCA	Marie Skłodowska-Curie actions
NGO	Non-governmental organization
PPP	Public–private partnership
PPPP	Public Private People Partnership
RICA	Research and Innovation Complementary Action
RISA	Research and Innovation Solidarity Action
R&I	Research and Innovation
RIA	Research and Innovation Action
RRI	Responsible Research and Innovation
RTDI	Research, Technological Development and Innovation
S3	Smart Specialisation Strategy
SD1	Strategic Debate 1
SD2	Strategic Debate 2
SME	Small and medium-sized enterprises
SSH	Social Sciences and Humanities
SWAFS	Science with and for Society
VERA	Forward Visions on the European Research Area

Annexe 12: About the authors

Rafael Popper (PhD) is Research Fellow at MIoIR of The University of Manchester since 2002, where he completed his PhD on 21st Century Foresight. He is also Innovation Director and CEO of Futures Diamond Ltd in the UK and Czech Republic; Coordinator of the iKnow project on wild cards and weak signals informing science, technology and innovation policy; Leader of the Mapping of the European Foresight Platform (EFP); and Co-Principal Investigator of the EU-funded CASI project on Public Participation in Developing a Common Framework for Assessment and Management of Sustainable Innovation. He is also Director of Executive Education on Foresight at MBS and he was a member of the EC Expert Group on Rationales for the European Research Area. His main areas of work include: 'foresight' as an instrument of innovation policy, the development of foresight and horizon scanning methodology, the design of forward-looking activities and their evaluation, as well as the translation of anticipatory intelligence into policy advice. E: rafael.popper@mbs.ac.uk

Guillermo Velasco holds a MPhil in Economics and Innovation Management (EU-SPRI) and BEng in Industrial Organization from the Technical University of Madrid (UPM). He is also researcher at MIoIR since 2012 where he completes his PhD in the area of Strategic Intelligence for R&I policies, by analysing how future-based participatory projects can provide consistent R&I policy advice, and exploring new schemes for its systematic generation and evaluation. He has developed an intensive action-research on VERA, and currently contributes to design sustainable innovation advice on the CASI EC project. He has also been involved in Horizon scanning for the UK NHS on new technologies and models of care. He has experience in the creative industries, as Director of Innovation, and has been actively involved in product innovation, IPR management, and 'design thinking' assessment. He was Industrial Organization Director in technological corporations in US, Spain and Sweden. He combines this activity with Master Executive lecturing. E: guillermo.velasco@mbs.ac.uk

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

Effie Amanatidou (PhD) is Research Fellow at MIoIR since 2011. Her first degree is in Applied Mathematics from the Aristotle University of Thessaloniki (Greece). She also has an MSc in Technical Change and Industrial Strategy (1996) and a PhD in foresight evaluation (2011) from the University of Manchester / MIoIR. Her PhD thesis focused on creating a new impact assessment framework and methodology for evaluating foresight programmes based on their contribution to developing more participatory 'knowledge societies'. Before she joined MIoIR she was a free-lance research and innovation policy analyst for five years (2006-2011). During that period she participated in research and innovation policy studies funded by the European Commission. Since November 2011 she has been working at MIoIR on a variety of projects with a special focus on innovation policy and foresight as well as evaluation. E: effie.amanatidou@mbs.ac.uk

Ian Miles graduated in psychology from the University of Manchester in 1969, and received a higher Doctorate in Social Science from the same University in 2011. He is Professor of Technological Innovation and Social Change at MIoIR, MBS, and also Head of the Laboratory of Economics of Innovation at ISSEK, Higher School of Economics in Moscow (where he spends two months each year). He previously worked at the Science Policy Research Unit, University of Sussex, which he left (as Senior Research Fellow) in 1990 to move to Manchester. In addition to research on service innovation and Knowledge-Intensive Business Services, his work has encompassed foresight and futures studies, information technology innovation, and social indicators. Numerous publications and presentations are available online (including scribd and slideshare), as well as via traditional publication outlets. Publications include 25 authored or edited books, 100 journal articles and 150 book chapters, etc. E: ian.miles@mbs.ac.uk

Annexe 13: About the Manchester Institute of Innovation Research (MIoIR)

The Manchester Institute of Innovation Research is a centre of excellence in the field of innovation studies, building on a 50-year tradition of innovation and science studies in Manchester.

The Institute comprises of a group of internationally renowned scholars and experts, and supports a broad expertise across a range of academic disciplines. With more than 50 full members, approximately 50 PhD researchers, and a range of associated academics, we are Europe's largest - and one of the world's leading - research centres in our field.

We are at the heart of innovation-related research and also form one of the largest components of the University of Manchester Research Institute (UMRI).

We are also a recognised international centre of excellence for the study of Science, Technology and Innovation policy and management, and the Institute informs science and innovation policy by engaging with key policymakers, in the UK, Europe and further afield. Reflecting the ethos of rigour and relevance, engagement with key stakeholders is at the core of our work.

The Institute also has a very strong visitor programme for academics and management and policy practitioners, and provides a range of popular and high level short courses on evaluation, foresight and S&T Policy.

Our research topics group around a set of dedicated themes, while the Institute hosts the key journal Foresight. The Institute is fully integrated into several global academic networks. It is a founding member of the European Network of institutes active in innovation and science policy studies - EU-SPRI - and is a member of European policy analysis networks such as ETEPS (the European Techno-Economic Policy Support Network).

Visit us at: http://www.research.mbs.ac.uk/innovation/

The VERA project aims to provide relevant strategic intelligence for the future governance and priority-setting of the research, technology, development and innovation (RTDI) system in Europe and for better adapting science, technology and innovation policy to the shifting global environment and upcoming socio-economic challenges. For this purpose VERA carries out an in-depth stocktaking of RTDI related forward looking activities in Europe and internationally and a thorough review of trends and drivers of long-term change of European RTDI governance. On the base of these insights VERA develops scenarios on the evolution of the European Research Area, assesses the critical issues for the ERA's future capabilities emerging from these scenarios, explores subsequent strategic options and ultimately generates a set of policy recommendations for responsive and future oriented multi-level, multi-domain RTDI policy strategies.

VERA is conceptualised as a continuously progressing two-way communication process among ERA actor groups from society, industry, academia and policy across domains, levels and regions. It is setting up a strategic conversation between these stakeholders that evolves through several carefully tailored stages in order to jointly discover shared visions and strategic options around the ERA's future perspectives towards 2020 and far beyond. VERA is exploring gradual evolution following from current patterns of change but is also explicitly embracing transformative and disruptive developments with a long term perspective.

The VERA project has been proposed by a consortium of ten internationally renowned institutes from nine EU countries involving a team of more than 20 researchers with outstanding expertise both in terms of relevant knowledge and forward looking methodology and excellent contacts with RTDI stakeholders in Europe and the world.

VERA is based on a well-defined work programme with clearly defined steps and measurable outcomes that are targeted to specific user groups and purposes. The backbone of the process is a communication strategy that is coordinating the stakeholder engagement in a systematic manner. Substantial efforts are dedicated to go beyond unspecific propositions and to co-create relevant strategic intelligence together with the key target groups.

For further information, please visit the VERA project website at http://www.eravisions.eu